

# chronos

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## Abstract

`chronos` is a  $\LaTeX$  2 $\epsilon$  package, based on `PGF/TikZ`, for typesetting timelines or chronologies. Externalisation is supported out-of-the-box with `memoize`. The package developed from two sources: first, the creation of a timeline for use in teaching<sup>1</sup> and, second, questions on [tex.stackexchange.com](https://tex.stackexchange.com) concerning obstacles encountered in using existing packages. This package might be considered an attempt to use the former to partially remedy the latter. It also means both the code and the user-interface contain strange and tangled regions where the wild errors may grow.

\*Bug tracker: [codeberg.org/cfr/chronos/issues](https://codeberg.org/cfr/chronos/issues) | Code: [codeberg.org/cfr/chronos](https://codeberg.org/cfr/chronos) | Mirror: [github.com/cfr42/chronos](https://github.com/cfr42/chronos)  
<sup>1</sup>See [this answer on TeX StackExchange](#) or view the PDF.

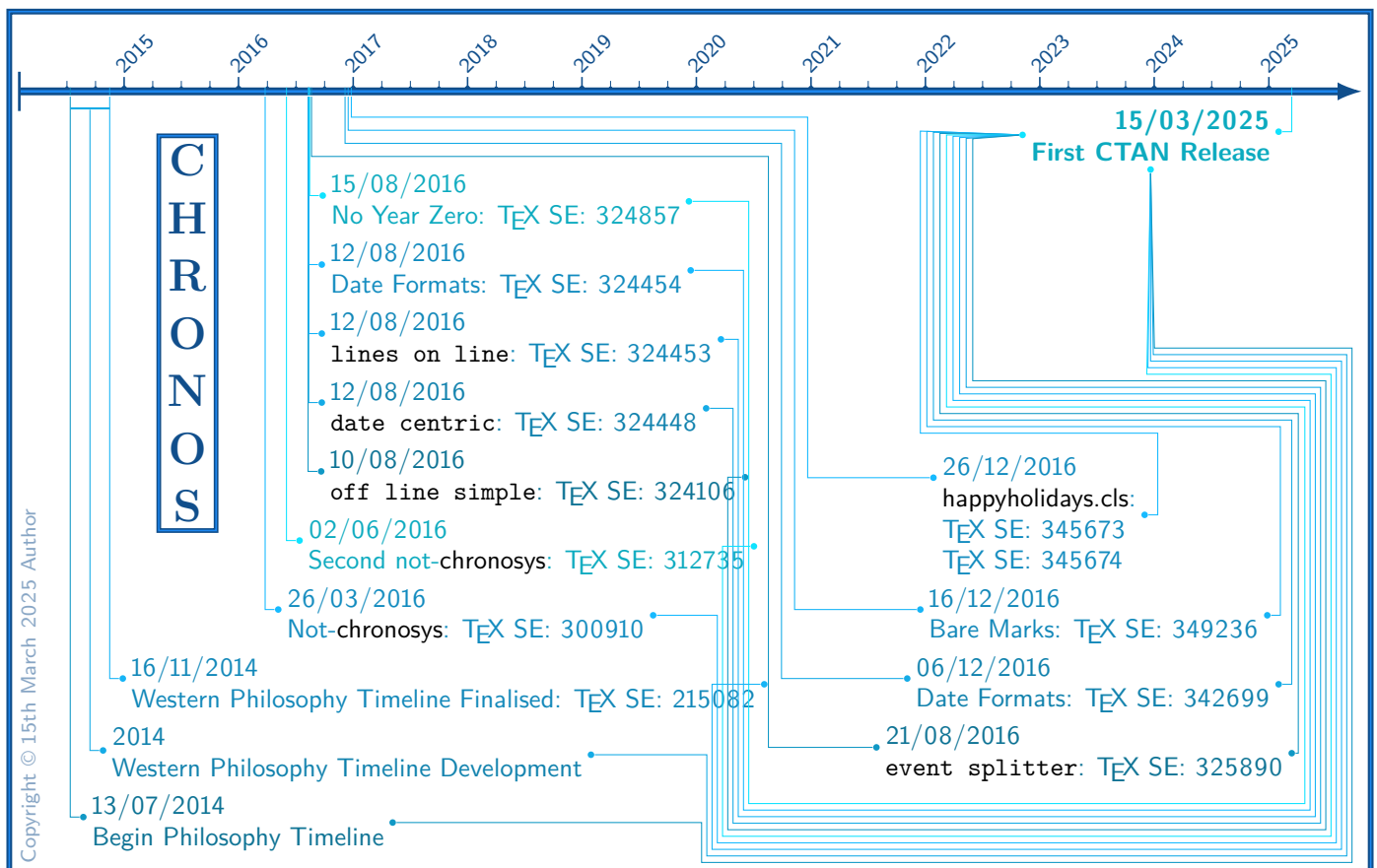


Figure 1: Chronos development: a chronos timeline (sections 6 and 8.4) with chronos style blues below (section 7.1.2) and custom styles tag left, tag post and tag right (section 13.3).

# Contents

<b>1</b>	<b>Raison d'être</b>	<b>3</b>
<b>2</b>	<b>Caveats, Assumptions &amp; Limitations</b>	<b>4</b>
<b>3</b>	<b>Typesetting a Timeline</b>	<b>5</b>
<b>4</b>	<b>Loading the Package</b>	<b>10</b>
<b>5</b>	<b>Invocation</b>	<b>11</b>
<b>6</b>	<b>Chronos Anatomy</b>	<b>12</b>
6.1	Chronos Timeline . . . . .	12
6.2	Chronos Additional Element Types . . . . .	12
6.2.1	Primary Types . . . . .	14
6.2.2	Secondary (Sub-)Elements . . . . .	15
6.3	Chronos Coordinate and Node Names . . . . .	15
6.4	Chronos Layers . . . . .	15
<b>7</b>	<b>Chronos Schemes and Styles</b>	<b>17</b>
7.1	Chronos Styles . . . . .	17
7.1.1	'On Line' Styles . . . . .	17
7.1.2	'Off Line' Styles . . . . .	19
7.1.3	'No Year' Styles . . . . .	21
7.2	Chronos Colour Schemes . . . . .	24
<b>8</b>	<b>Configuration</b>	<b>29</b>
8.1	Documentation Notes . . . . .	30
8.1.1	Font Conventions . . . . .	30
8.1.2	Keys and Values . . . . .	31
8.1.3	Key Specifications . . . . .	31
8.1.4	Syntax Notes . . . . .	32
8.1.5	Dimension Notes . . . . .	33
8.1.6	Date Specification Notes . . . . .	34
8.1.7	Colour Notes . . . . .	34
8.2	Dates . . . . .	34
8.2.1	Input . . . . .	34
8.2.2	Output . . . . .	35
8.2.3	The Problem of the Non-Existent Year . . . . .	38
8.3	Basic Colours . . . . .	40
8.4	Timeline . . . . .	41
8.4.1	Timeline Dates . . . . .	41
8.4.2	Timeline Dimensions . . . . .	42
8.4.3	Timeline Marks and Years . . . . .	45
8.4.4	Timeline Fonts . . . . .	50
8.4.5	Timeline Colours . . . . .	51
8.4.6	Timeline Style . . . . .	52
8.5	Frame . . . . .	53
8.6	Placing Things: Levels & Coordinates . . . . .	54
8.6.1	Levels . . . . .	54
8.6.2	Chronos Coordinates . . . . .	55
8.6.3	Miscellaneous . . . . .	55
8.7	Headings . . . . .	55
8.7.1	Example . . . . .	56
8.7.2	Headings Configuration . . . . .	57
8.8	Colours . . . . .	57

8.8.1	Colour Rotation . . . . .	58
8.8.2	Using Colours . . . . .	58
8.8.3	Colour Lists . . . . .	59
8.8.4	Simple Colour Names . . . . .	60
<b>9</b>	<b>Adding Elements to the Timeline</b>	<b>61</b>
9.1	Adding Connectable Elements . . . . .	61
9.1.1	Timeline-Connectable Elements . . . . .	61
9.1.2	Adding Other Connectable Elements . . . . .	64
9.2	Adding Non-Connectable Elements . . . . .	65
9.3	Additional Elements: Local Configuration . . . . .	67
9.4	Additional Elements: Local/Global Configuration . . . . .	72
9.4.1	Specialist Fonts for Text Tags . . . . .	76
9.5	Additional Elements: Global Configuration . . . . .	76
9.6	Adding Connections, Using Colours and Accessing Styles . . . . .	82
<b>10</b>	<b>Drawing on Chronos Layers</b>	<b>83</b>
<b>11</b>	<b>Externalising Chronos Timelines with Memoize</b>	<b>84</b>
<b>12</b>	<b>Deferring Code</b>	<b>84</b>
12.1	Additional <code>TikZ</code> . . . . .	84
<b>13</b>	<b>Custom Schemes and Styles</b>	<b>85</b>
13.1	Defining Chronos Colour Schemes . . . . .	85
13.1.1	How Colour Schemes are Processed . . . . .	86
13.2	Defining Chronos Styles . . . . .	88
13.2.1	How (Not) to Customise Colours . . . . .	90
13.2.2	How to Rotate Years . . . . .	91
13.2.3	Hashes . . . . .	92
13.2.4	Timeline Arrow . . . . .	93
13.2.5	Styles and Automemoization . . . . .	95
13.3	Defining Styles for Additional Elements . . . . .	95
<b>14</b>	<b>Debugging</b>	<b>97</b>
<b>15</b>	<b>Compatibility</b>	<b>101</b>
15.1	Compatibility with Code from <code>T<sub>E</sub>X SE Answers</code> . . . . .	102
<b>16</b>	<b>chronos</b>	<b>106</b>
<b>17</b>	<b>chronos-lib-styles</b>	<b>206</b>
17.0.1	On-line . . . . .	206
17.0.2	Off-line . . . . .	209
17.0.3	No-year . . . . .	215
<b>18</b>	<b>chronos-lib-colschemes</b>	<b>216</b>
	<b>Index</b>	<b>220</b>

## 1 *Raison d'être*

Chronos aims to make it easy

- to specify timelines covering from days to centuries;
- to customise a timeline's appearance using the standard key-value syntax familiar to users of `TikZ`;
- to define new timeline styles in a straightforward manner;

- to utilise a range of timeline styles provided out-of-the-box, including some based on those offered by other packages and/or featured on [tex.stackexchange.com](https://tex.stackexchange.com).

## 2 Caveats, Assumptions & Limitations

**First,** the caveats ...

Chronos is *experimental*. Future releases will not make significant backwards-incompatible changes to documented features of the user interface without good reason. If such changes are made, a compatibility option will be offered, unless there is extremely good reason not to do so. *This applies only to documented features. It applies to neither undocumented features nor the implementation details of those documented.*

Chronos makes some use of undocumented internal PGF/TikZ commands.

Chronos uses `etoolbox` to patch certain internal PGF/TikZ commands. While some of these changes, such as modifications to `rectangle`<sup>2</sup> are applied only locally, others, including changes to the `tikzpicture` initialisation code<sup>3</sup>, are made globally.

Chronos has known incompatibilities with certain standard PGF/TikZ libraries (section 15).

Chronos has unknown incompatibilities with other standard and non-standard PGF/TikZ libraries and packages. These will be documented when discovered.

Chronos differs substantially from code previously published as `chronos` on [TeX StackExchange](https://tex.stackexchange.com). In particular, the user interface has changed: `chronos` now uses a key-value interface rather than multiple arguments when adding things to the timeline and the timeline itself is now created by the environment `chronos`<sup>4</sup>. See section 15.1 for guidance on converting existing timelines.

*Caveat emptor ...*

**Second,** (some of) the assumptions ...

Within the `chronos` environment, `chronos` assumes control over PGF/TikZ layers, disregarding any configuration setup by the user or other packages (section 6.4). This means you cannot use additional, custom layers in `chronos` environments unless you integrate them appropriately with `chronos`'s changes. These changes are made locally and do not affect the use of whatever layers you please in a non-`chronos` environment, such as a regular `tikzpicture`.

*Caveat emptor ...*

**Third,** (some of) the limitations ...

The most serious limitation, given `chronos`'s aims (section 1), is that you cannot define styles involving `chronos` keys using the standard PGF/TikZ interface, if you want to use them to configure individual additional elements (sections 6 and 9). Moreover, the alternative mechanism provided has serious shortcomings (section 13.3).

Chronos cannot produce timelines covering hundreds of thousands of years or which need to distinguish temporal units less than a day. It does days, months, years and centuries; it does not do (many) millennia, hours, minutes or seconds.

In particular, `chronos` is not designed to deal with dates outside the current Julian period. In theory, this means any date from 24<sup>th</sup> November, 4714 BCE should be permissible, but in fact, 24<sup>th</sup> November, 4713 BCE is the first date for which the package's behaviour should be relatively well-defined<sup>5</sup>. Matters are a little different when it comes to dates in the *next* Julian period. The cut off date for these is sometime in 3268 CE, according

---

<sup>2</sup>I am grateful to Symbol 1 for providing the code implementing this at [TeX StackExchange: 385953](https://tex.stackexchange.com/answers/385953).

<sup>3</sup>I am grateful to Martin Scharrer for for this at [TeX StackExchange: 56405](https://tex.stackexchange.com/answers/56405).

<sup>4</sup>Early versions on TeX SE actually used an environment, so this difference applies only to some `chronos`-based answers there.

<sup>5</sup>`pgfcalendar` says it uses the Wikipedia method, but appears to return dates 1 year later than some Wikipedia specifies e.g. day 0 gives a date in 4713 exactly a year after Wikipedia's one in 4714. But Wikipedia itself seems inconsistent, sometimes suggesting a date in 4713 and sometimes the previous year. For current purposes, the right answer doesn't matter: what matters is that `pgfcalendar`'s answer is consistent. This means quibbles about the start date are unimportant (unless you're drawing a timeline starting with Winter Solstice 4714 BCE, of course. If you are, you might want to look into the matter.)

to Wikipedia, but `pgfcalendar` appears to be unaware of this. This means you may be able to get away with later dates, even though they are officially beyond the scope of this package<sup>6</sup>.

`Chronos` draws horizontal timelines. It does not support alternative orientations. In particular, vertical timelines are not currently supported.

*Caveat emptor ...*

**Finally**, the code lacks both the virtues of sophistication and simplicity, while the user interface is characterised by confusion and complexity, the documentation is spotted with lacunae and unclarities, and the index is a conglomeration of misdirection and bull shit<sup>7</sup>.

*Caveat emptor ...*

### 3 Typesetting a Timeline

Further details concerning loading and invocation are explained in sections 4 and 5. The overall structure `chronos` provides is outlined in sections 6 and 6.4. Section 7 covers simple customisation using colour schemes and `chronos` styles. Detailed configuration of the timeline is explained in section 8. Section 9 covers the addition of elements such as lives, events, periods, theories, info boxes and titles to timelines. In this section, we begin by looking at a simple example.

After loading `chronos` in the document preamble:

```
% in document's preamble
\usepackage{chronos}
```

the `chronos` environment is available for typesetting timelines.

```
\begin{chronos}
  []
\end{chronos}
```

This takes an optional argument used to configure the timeline. This determines the size, appearance and duration of the timeline, as well as the use of headings, subheadings and frame. The body of the environment should consist of material to be added to the timeline itself, typically using `chronos`'s commands for adding lives, events, periods, theories, theory circles, info boxes and/or main titles. It is also possible to include arbitrary `TikZ` code in the body of the environment, but commands need to be added to the appropriate `chronos` layer if they are to have their intended effects.

Suppose that we wish to typeset a timeline illustrating developments in the history of writing and printing. Having done exhaustive research utilising a single Wikipedia page, we decide our timeline should begin around 3,100BCE and end in the present. We're going to use the `chronos` style `cronoleg`, which puts year markers on the timeline itself. We decide we'd like large markers every 500 years and a smaller marker halfway between each pair of larger ones. We might, therefore, try

```
\begin{chronos}
[
  cronoleg,% load chronos style
  timeline={% configure the timeline 'line' itself
    start date={-3100},
    end date=2100,
    minor step=250,
    major step=500,
  },
  levels=10:10,
]
```

---

<sup>6</sup>That is, it may work, but it isn't a bug if it doesn't.

<sup>7</sup>In what sense 'bull shit'? Take your pick from any of several technical philosophical senses.

This will result in ‘major’ markers (marks and years) at 3,000BCE, 2,500 BCE etc. and ‘minor’ at 2,750BCE, 2,250BCE and so on. Note that `chronos` starts the timeline at 3,100BCE, but assumes we’d like the first marker at 3,000BCE. `levels=10:10` will create a series of invisible nodes above and below the timeline named `level 1, . . . ,level 10` and `level -1, . . . ,level -10` respectively. The nodes are constructed so they take the same space as a ‘standard’ text tag of ‘tag’ type life created with `\chronoslife`. We can refer to these nodes when placing items to facilitate stacking, spacing and packing.

Based on our exhaustive seconds-long research, we now want to add some items of interest onto our timeline. We decide we’d like to note the lives of significant figures in the development of contemporary typography, most notably Donald Knuth, as well as a few luminaries from the modern era<sup>8</sup>. We’d also like to note certain specific events, such as key publication dates, and processes of longer duration.

```
\chronosevent{%  
  name=\emph{jikji},  
  date=1377  
}
```

This will create an event in the default style in the default location, just off the timeline. Note that the text displayed in the event’s node is ‘*Jikji*’. The coordinate `jikji` is placed at the point the element is added on the border of the timeline. The circular connector created at this point is the node `chronos connector jikji`. The circular connector on the event’s text tag is the node `main connector jikji`. The text tag itself is the node `tag jikji`. As it stands, we may not be able to actually see all these elements if the event’s text tag is placed right on the border of the timeline. If `text tag yshift` is non-zero, `chronos` will shift the node but, in general, it is necessary to tell `chronos` where to place the text tag. This doesn’t affect the placement of the event on the timeline itself.

```
\chronosevent{%  
  name=\emph{jikji},  
  date=1377,  
  yshift=20pt,  
}
```

This will place the text tag node due north of the circular connector on the timeline with a straight line connecting the circular connector nodes `main connector jikji` and `chronos connector jikji`. However, we might also want to shift the text tag node horizontally and have the connection drawn to the west or east of the text tag.

```
\chronosevent{%  
  name=\emph{jikji},  
  date=1377,  
  yshift=20pt,  
  xshift=-5pt,  
  anchor=east,  
}
```

will shift the text tag 5pt to the left and draw the connection up and left from the timeline to `main connector jikji` which is now drawn `east` rather than the default `south`.

We decide to place a second event, for which we have a precise date. This time, we use `as is` to tell `chronos` not to attempt to capitalise the text. This is necessary because we have an `\emph{<word> <word>}` and `chronos`’s capitalisation command can’t cope with this. This also means we need to add appropriate capitalisation ourselves.

```
\chronosevent{%  
  date={868-05-11},  
  name={Publication of \emph{Diamond Sutra}},  
  yshift=-40pt,  
  xshift=20pt,  
  anchor=west,  
  as is,  
}
```

---

<sup>8</sup>In my discipline, ‘modern’ means roughly the sixteenth to nineteenth centuries.

```
connectors={east,south},
}
```

Note that this event is placed below the timeline.

We decide to add some notable figures next. For this, we create elements of tag type `life`, beginning with the inventor of movable type, Bi Sheng.

```
\chronoslife{%
  name=bi sheng,
  birth=972,
  death=1051,
  at=tag jikji.north -| bi sheng,
  connectors={east,north},
}
```

Note the use of `at` to place the text tag detailing the name and dates. Since this node is placed above the timeline, its anchor is `south` by default. `at=tag jikji.north -| bi sheng` aligns this anchor directly above the relevant point on the timeline (`bi sheng`) and just on top of `tag jikji`. If you want to fit many items onto your timeline, fitting them closely together is useful but you could, of course, lift the box higher if you want a bit more space.

Leaping ahead, we now want to add Donald Knuth.

```
\chronoslife{%
  name=donald knuth,
  birth={1938-01-10},
  text tag yshift=40pt,
  connectors={west,north},
}
```

Note the omission of `death` for a living person. `Chronos` assigns today's date internally for placement purposes, but will not typeset it when constructing the text tag<sup>9</sup> This works reasonably, but the connection from the timeline crosses the text node for the publication of the *Diamond Sutra* because `chronos` has placed this item below the timeline, even though there is plenty of space above. This is because, by default, `chronos` alternates between placement above and below the line. In this case, we decide to override the default choice.

```
\chronoslife{%
  name=donald knuth,
  birth={1938-01-10},
  text tag yshift=40pt,
  connectors={west,north},
  place above,
}
```

Note that the `cronoleg` rotates the colours used for elements belonging to tag types `life`, `event` and `period`, but not `theory`, but colour lists are rather subdued for events and periods. For each type of elements, one set of colours is used below and another above the timeline. These colours can be accessed later as `colour <name>`<sup>10</sup>.

Colour rotation can be switched on or off for particular kinds of elements, overridden for individual elements and configured by altering the colour lists `chronos` cycles through. These colours are tracked by copying them to new names for each element created and may be accessed using these names later. This means you can draw something in the colour assigned to Donald Knuth, say, without knowing which colour that is. If you add an element to the timeline or change the colour lists later, the drawing will use the appropriate colour. For example,

```
\node (pi) [colour donald knuth, font=\Huge, right=5pt of tag donald knuth.base east, anchor=base west] {$\pi$};
```

<sup>9</sup>`chronos` is not the most optimistic of packages.

<sup>10</sup>In most cases, you can also access items using American spelling. So `color` would work here. So would `lliw`.

will add a large  $\pi$  in the colour (automatically or otherwise) assigned to Knuth.

```
\draw [colour donald knuth] (tag donald knuth.north) ++(0pt,20pt) circle (10pt);
```

would draw a circle above Donald Knuth's text tag in the colour automatically assigned to Donald Knuth.

We next decide to indicate the period when woodblock printing was used to produce books. This is a *circa* date, so we can't use `chronos`'s automatic production of the date information, though we still need to specify dates for placement on the timeline. We'd still like `chronos` to format the name of the text tag, though, so we use `dates content` to override the automatic production of date labels.

```
\chronosperiod{%
  name=woodblock printing,
  start=600,
  end=1450,
  yshift=-20pt,
  xshift=10pt,
  anchor=west,
  dates content={c600--1450\ceyearlabel},
  place below,
}
```

If we wanted to override the formatting of the name rather than the dates, we could use

```
name=woodblock printing,
name content={Wo0dB10cK pRiNtInG},
```

If we wanted something completely different in place of the name and date information, we could instead use

```
text content={something entirely different\--- not even about woodblocks!},
```

BCE dates require special consideration. In general, a minus indicates BCE, but `chronos` needs to be able to distinguish this from the hyphen between years and months or months and days in standard date specifications (section 8.2). This means either providing a full date of the form `-YYYY-MM-DD`, for example, or ensuring `chronos` expects only a partial date such as a year.

```
\chronosperiod{%
  name=proto-Elamite use of cylinder seals,
  start={{-3100}-01-01},
  end={{-2700}-12-31},
  dates content={c3000\,\bceyearlabel},
  yshift=20pt,
  connectors=north,
  connectors=east,
}
```

Here, we protect the BCE year with curly brackets, specify a default month and day. If we specified only a year, `chronos` would assign a month and day; if we assigned only a year and month, `chronos` would assign a day. (The outer set of curly brackets is standard and cannot be omitted for full date specifications, regardless of era.)

We've now added examples of each of the three basic types `chronos` supports connecting to our timeline. However, the package also offers some complementary elements. These are not connected to the timeline, though theories are designed to be connected to the types which are.

```
\chronostheory {%
  name=TeX,
  text content=\TeX,
  at=donald knuth-text.north west,
  xshift=-10pt,
  anchor=south east,
  connectors={east},
}
```



We also want to indicate Knuth's connection with T<sub>E</sub>X, so we join the connector we made when creating the text tag for Knuth to the connector we've just created for T<sub>E</sub>X. Chronos supports the addition of such connectors on most text tags created with its commands and the drawing of connections between connectors.

```
\draw [chronos connect=life:donald knuth] (connector donald knuth) -- ++(-5pt,0pt) |- (connector TeX);
```

This makes it possible to connect multiple people to the same theory, for example, as well as connecting a single person to multiple theories. In a more complete chronology, several different font designers or book publishers, for example, might be connected with a particular approach to typography. Elements which support connectors out-of-the-box are those belonging to tags of types life, event, period and theory.

When `cronoleg` is used, connectors are small circular nodes on the timeline's border and the borders of text tags i.e. the nodes containing information about the chronos elements presented in the chronology illustrated.

In contrast, theory circles, info (information boxes), copyleft or copyright notices and main titles are freestanding objects without ready-made connectors.

Headings and subheadings are designed to label stretches of time and are placed in relation to the timeline, though no connecting lines are drawn.

When we've finished adding material to the timeline, of course, we need to complete it.

```
\end{chronos}
```

## 4 Loading the Package

Chronos requires a L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> format no older than 2021–11–15. To load the package simply add the following to your document’s preamble.

```
\usepackage{chronos}
```

Chronos will load the following packages and libraries automatically:

Packages:

- calc
- chronos-lib-colschemes (part of chronos)
- chronos-lib-styles (part of chronos)
- etoolbox
- expl3 (if required)
- fp
- pgfcalendar
- svn-prov
- tikz
- xcolor
- xparse (for L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> formats prior to 2020–10–01)

PGF/TikZ libraries:

- arrows.meta
- backgrounds
- calc
- decorations.text
- fit
- fixedpointarithmetic
- positioning
- shadows

```
simple colour names = true|false
no simple colour names
simple color names
no simple color names
boolean key
```

The only two options currently supported are `simple colour names` or `simple color names` and its complement `no simple colour names` or `no simple color names`. The following are equivalent:

```
\usepackage{chronos}
\usepackage[simple colour names]{chronos}
\usepackage[simple colour names=true]{chronos}
\usepackage[no simple colour names=false]{chronos}
```

In these cases, `chronos` will create an additional colour for each additional element of `tag`-type life, event, period, theory or info named  $\langle name \rangle$ , where  $\langle name \rangle$  is the value given to `name` when creating the element.

Since `chronos` creates these colours globally, this is potentially problematic. To disable it use any of the following

```
\usepackage[no simple colour names]{chronos}  
\usepackage[no simple colour names=true]{chronos}  
\usepackage[simple colour names=false]{chronos}
```

If you want to disable such names later, perhaps for specific timelines, see section 8.8.

## 5 Invocation

**chronos** [*⟨chronos preamble⟩*]  
*environment*

The *⟨chronos preamble⟩* is a *⟨key-value list⟩* setting any non-default options which should be applied to the timeline and any other macro-level elements of the picture to be constructed. At a minimum, most users will want to specify start and end dates, but the majority will likely want to customise the timeline further. (If you do not much care about customisation, there are simpler packages to typeset timelines!)

Some options can be given only *in or before* the *⟨timeline specification⟩* in the optional *⟨chronos preamble⟩*. Others will have no effect or unwanted effects at this point and must be specified later.

***The environment chronos is a wrapper for a tikzpicture. It can neither include, nor be included in, another tikzpicture. Additional drawing commands must, therefore, be included in chronos itself.***

## 6 Chronos Anatomy

Figure 2 provides an overview of the configuration and anatomy of a `chronos` timeline.

As explained in section 5, the `timeline` itself is constructed by the `chronos` environment, as determined by the `<chronos preamble>`, any prior use of `\chronosset` and fallback defaults.

In addition to configuring the `timeline` itself, the `<chronos preamble>` and any prior use of `\chronosset` determine the use and configuration of any `frame`, `headings` and `subheadings`, as well as the default configuration of any additional elements.

The body of the `chronos` environment is the `<timeline additions specification>`. The `<timeline additions specification>` specifies what should be added to the `tikzpicture` besides the `timeline` itself and any `frame`, `headings` or `subheadings`. It will typically consist of a series of `chronos` commands specifying the items to be connected to the `timeline` and any non-connected elements (section 9). However, it may include any code valid in a `tikzpicture` environment or be entirely empty.

Section 6.1 provides a breakdown of the various elements of which the `timeline` is composed. Section 6.2 provides an overview of the additional elements which may be added in the `<timeline additions specification>`.

If your `timeline` uses non-`chronos` commands, you will need to read sections 6.4 and 10, which explains the layers `chronos` uses. If your commands are not having their usual effects, you should first check whether they are simply hidden by another layer.

### 6.1 Chronos Timeline

The `timeline` itself is a horizontal line consisting of some or all of the following elements

- `Timeline line` refers to the main line, which is drawn or filled by default depending on height and configuration. The `height`, `width` and `timeline border height` are responsible for the total size of the `timeline`.
- `Borders` are (potentially) filled with a gradient above and below the main line. By default, borders are added when marks are placed on the `timeline` itself, which necessitates a taller `timeline`.
- `Era labels` are (potentially) placed at each end of the line, depending on the time period covered.
- `Timeline years`, `minor years`, `marks`, `minor marks` and `bare marks` may be placed above, below or on the main `timeline` line.

Some elements must be specified in the `<chronos preamble>`, but are constructed only at the end of the `chronos` environment. These include optional `headings` and `subheadings` to be placed at the top of the `chronos` environment and an optional `frame`.

`Headings` and `subheadings` are constructed after and above most other elements on `chronos foreground layer`. As explained in section 8.7, `headings` and `subheadings` may be used to roughly indicate named stretches of time such as ‘Tudors’ or ‘Bronze Age’.

- `Headings` are placed in a single row at the top.
- `Subheadings` are placed just below the `headings` in two rows:
  - The upper `subheadings` are placed in a single row just beneath the `headings`.
  - The lower `subheadings` are placed in a single row just beneath the upper `subheadings`.

The `frame` is constructed even later, but drawn behind most other elements on `chronos background layer`.

### 6.2 Chronos Additional Element Types

Aside from the `timeline` itself, its `headings` and `subheadings` and `frame`, `chronos` provides six primary types of element which may be added to the `timeline`: `life`, `event`, `period`, `theory`, `info` and `theory circle`. In this documentation, these are referred to as ‘`tags`’ or ‘`tag types`’. Three further `tags` encompass one-off elements:

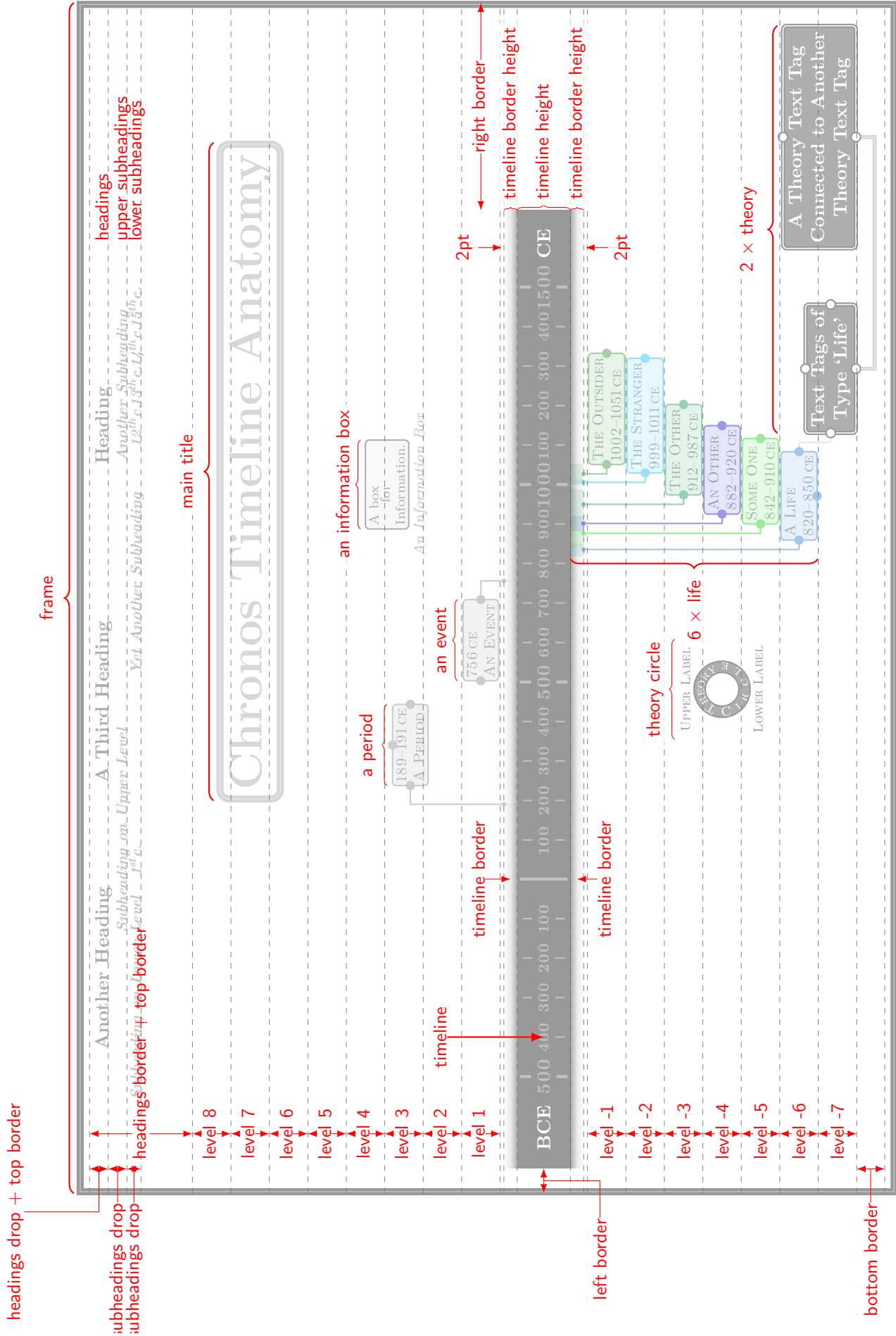


Figure 2: chronos anatomy

main covers the main title and frame, while `copyleft` and `copyright` account for any declaration of `copyleft` or `copyright`.

For example, all elements created using `\chronoslife` are said to belong to tag type `life`.

### 6.2.1 Primary Types

**6.2.1.1 Timeline-Connectable Elements** Elements belonging to the first three tags (`life`, `event`, `period`) are (potentially) connected to the `timeline` and are placed according to date of occurrence.

- These elements are assigned colours and colour names are created so they may easily be reused. These colours may (and, by default, are) used to create `connections`, `connectors`, `lines` and `text tags`.
- These elements are connected to the `timeline` by default using `connections` which join `chronos connectors` to `text tag connectors` on the elements' `text tags`.
- Dates/periods are (potentially) drawn or filled on, above or below the `timeline` using `lines`.
- `Text tags` are created for the elements<sup>11</sup>. By default, these typically include a name and date or date-range, though arbitrary content is permissible. The location of `text tags` is configurable, though it usually makes sense to place them in relation to their `chronos connectors`.
- `Life` and `period` use two dates for placement. A line is (potentially) drawn and/or filled on, above or below the `timeline`, by default in the element's associated colour.
- `Event` uses a single date for placement. A line is (potentially) drawn on the `timeline`, by default in the element's associated colour.

Timeline-connectable elements are also connectable (note 6.2.1.2).

**6.2.1.2 Connectable Elements** Elements belonging to the first four tags (`life`, `event`, `period`, `theory`) are (potentially) connectable to each other.

- These elements (potentially) feature `connectors` which may be used to connect elements together. When the first three are connected to the `timeline`, one such connector is created by default<sup>12</sup>.
- Elements belonging to the `theory` tag are connectable, but not timeline-connectable. Unlike timeline-connectable elements (note 6.2.1.1), they cannot be connected to the `timeline` and may be freely placed; unlike non-connectable elements (note 6.2.1.3), they may be connected to each other and/or timeline-connectable elements.

### 6.2.1.3 Non-Connectable Elements

Elements belonging to the remaining tags (`info`, `theory circle`, `main`, `copyleft` and `copyright`) are non-connectable and, with the exception of `frame` may be located according to user preference.

- Like connectable-but-not-timeline-connectable elements, non-connectable elements are not connected to the `timeline` and may involve no date information at all, but unlike theories they do not feature `connectors` so may not easily be connected to other elements.
- `Info` and `theory circle` elements are standalone items for providing content. The former (potentially) have `captions` below; the latter (potentially) have `labels` above and/or below. The first are basically just text nodes with arbitrary content; the second can display two small chunks of text arranged in semicircles with a hole in the middle for a letter or symbol.
- `Theory circles` are *slow* and their use should be limited to avoid excessive compilation times. They are also arguably the most difficult to read and should be used only for items of minor or secondary importance.

<sup>11</sup>I am grateful to Symbol 1 for enabling `connectors` to be centred correctly on the borders of `text tags` at [TeX StackExchange: 385953](https://tex.stackexchange.com/questions/385953).

<sup>12</sup>Connectors may be customised to 'disappear', but even invisible connectors can be used in connections.

- The standalone elements are best created last and are most useful for filling in ‘holes’ in a timeline which would otherwise look unbalanced. If chiropody didn’t develop much in the twelfth century or not much is known about the finer points of tortoise-raising in the second, these elements may be used to plug the unsightly gaps left by inconvenient histories.

### 6.2.2 Secondary (Sub-)Elements

Orthogonal to the primary elements explained above, `chronos` uses the following (sub-)elements:

- **Connectors** are small elements drawn on the boundaries of `text tags` and the `timeline` which can be used as connection points. By default, they are small and circular, but they may be rendered invisibly or otherwise according to preference.
- **Connections** are drawn between **connectors**. The package draws a connection between the `timeline` and date-placed elements by default, but occasionally you may prefer to specify this connection manually. Other connections can be added to link elements.
- `Text tags` hold information associated with all elements except **theory circles**.
- Lines are marked on the `timeline` to indicate the date and/or duration of dated elements.

## 6.3 Chronos Coordinate and Node Names

Figure 3 shows key coordinate and node names. Those available by default can be shown on any `timeline` using the option `debug`. Examples of different `tags` have been added with labels to illustrate how `chronos` names their coordinates and nodes. Detailed documentation is provided in sections 8 and 9.

## 6.4 Chronos Layers

In addition to loading the `backgrounds` library, which defines the layer `background`, and the default layer `main`, `chronos` defines another four layers, for a total of six: `chronos background` and `chronos middle ground`, which are layered between `background` and `main`, and `chronos foreground` and `chronos overlay`, which are layered above `main`. From top to bottom:

```
chronos overlay
chronos foreground
main
chronos middle ground
chronos background
background
```

Section 10 explains how to draw directly on different layers. You may wish to do this if you are using non-`chronos` code in the (*timeline additions specification*) or the facilities explained in section 12 for deferring code.





## 7 Chronos Schemes and Styles

Two simple methods for applying, defining and reusing chronos styles are provided: chronos styles and colour schemes. If using both, load the chronos style first, since it may already load a colour schemes.

### 7.1 Chronos Styles

By far the easiest way to customise a timeline is simply to load a chronos style in the `<chronos preamble>`. This section illustrates a basic timeline typeset with each of chronos’s standard styles.

*Note that you will typically need to set `start date` and `end date` and perhaps adjust how often years and marks appear on your timeline. Chronos styles such as `key[chronosstyle]event splitter` set highly idiosyncratic dates by default, simply by way of example. chronos will not warn you if you don’t override options set by a chronos style.*

In selecting a chronos style, bear in mind that some things are easy to change, while others are harder. At a minimum, you should pick an ‘on line’ chronos style if you want `timeline years on line` and an ‘off line’ one if you want them above or below. `event years on line` requires an ‘on line’ chronos style; `event dates split` is designed for an ‘off line’ one.

You should also think about how much information you need to display. `date centric` won’t work for a densely packed timeline, so if you have a lot of things to pack in, don’t choose this unless you’re drawing an extremely long timeline. Likewise, `cronoleg` will look rather silly if you only want to represent the lives of Socrates and Plato.

#### 7.1.1 ‘On Line’ Styles

All ‘on line’ styles are designed to support adding elements both above and below the timeline. This includes the default settings. See table 1 and fig. 4.

`cronoleg`  
*chronos style* The most developed and best tested, if somewhat idiosyncratic, chronos style, based on the code used to construct my Western Philosophy Timeline. It constructs a 235mm timeline and uses a colour scheme highlighting elements of type life, but the colours may be adjusted or the same colour scheme applied to event and period as well. By default, it is designed to produce a picture occupying an entire A4 page and has a wide right-hand margin for additional elements, in addition to ten levels above and below the timeline. See table 1 and fig. 5. By default, this chronos style does *not* use the bounding box for the frame.

`date centric`  
*chronos style* A chronos style with a monochrome appearance and sans-serif fonts of 150mm<sup>13</sup>. Intended for timelines highlighting relatively few dates. See table 1 and fig. 6. This style demonstrates the use of `event years on line` and `special date`.

`lavender menace`  
*chronos style* A variant of `modern` with a muted colour scheme and sans-serif fonts. By default, it produces a timeline covering the modern era (1500–1900 CE). See table 1 and fig. 7a.  
`modern`  
*chronos style* A chronos style with a monochrome appearance and sans-serif fonts. By default, it produces a timeline covering the modern era (1500–1900 CE). See table 1 and fig. 7b.

`rainbow serif`  
*chronos style* A colourful variant of `serif on line` utilising xcolor colour series and serif fonts. See table 1 and fig. 8a.

`serif on line`  
*chronos style* A chronos style with a monochrome appearance and serif fonts. See table 1 and fig. 8b.

`sober judge`  
*chronos style* A somewhat subdued chronos style with a monochrome appearance, sans-serif fonts and boxed text tags. See table 1 and fig. 9.

<sup>13</sup>Based on my answer at [TeX StackExchange: 324448](https://tex.stackexchange.com/questions/324448).

Table 1: Summary of chronos styles.

Name	Timeline Year Style	Defaults				
		Levels	Dates	Colour Scheme	Rotation	Arrow
-	on line	0:0	1800–2050 CE	default	✓	–
cronoleg	on line	10:10	500 BCE– 2050 CE	cronoleg	✓	–
date centric	[on line]	–	1935–2010 CE	default	–	–
lavender menace	on line	3:3	1500–1900 CE	lavender+chronosSilver	✓	–
modern	on line	3:3	1500–1900 CE	modern	–	–
rainbow serif	on line	3:3	1500–2100 CE	xcolseries	✓	–
serif on line	on line	3:3	1800–1900 CE	default	–	–
sober judge	on line	3:3	1/10/1001– 14/6/1003 CE	default	–	–
blues below	off line, below	0:3	1550–2050 CE	blues	✓	✓
flipping blues	off line, above	3:0	1550–2050 CE	blues	✓	✓
contemporary 90	off line, above	0:3	2002-2016 CE	contninety	–	✓
off line colour	off line, below	–	3000– 2000 BCE	offlinebasic	✓	✓
off line colour alt	off line, below	–	3000– 2000 BCE	offlinealt	✓	✓
off line simple	off line, below	–	3000– 2000 BCE	offlinebasic	–	✓
rotated 45	off line, above	–	25 BCE–20 CE	default	–	–
simple arrow	off line, above	–	1–2000 CE	default	–	✓
somewhat plain	off line, above	0:3	500 BCE– 2050 CE	default	–	–
event splitter	[above]	–	01/13– 02/22/2014 CE	default	–	–
lines on line	none	–	1–2016 CE	default	✓	✓
plain arrow	none	–	1–2016 CE	default	✓	✓

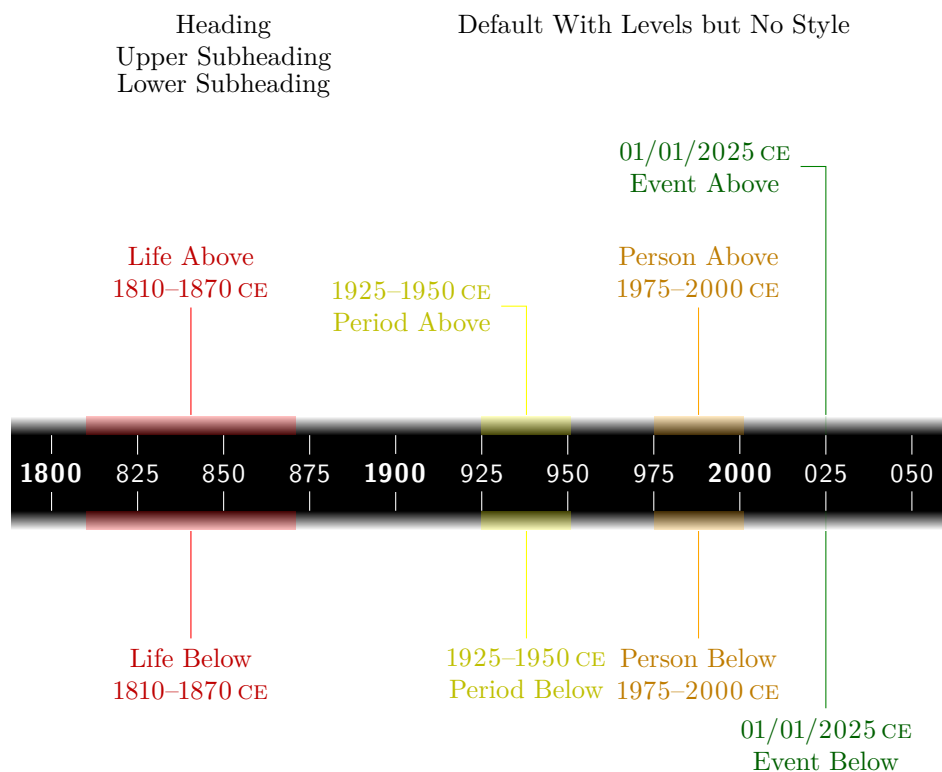


Figure 4: Chronos style: none.

### 7.1.2 ‘Off Line’ Styles

**blues below** A chronos style featuring the **blues** colour scheme, off-set lines and year labels rotated through  $45^\circ$ .  
*chronos style* Intended for timelines which add elements below. See table 1 and fig. 10a. This style demonstrates how to rotate year labels.

**contemporary 90** A chronos style with a monochrome appearance, sans-serif fonts and rotated year labels, which produces a relatively short timeline of 90mm by default. Intended for timelines which add elements below. See table 1 and fig. 11.

**flipping blues** A variation of **blues below** featuring year labels rotated through  $-45^\circ$ . Intended for timelines which add elements above. See table 1 and fig. 10b. This style demonstrates how to utilise an existing chronos style to produce a variant.

**off line colour** =  $\langle length \rangle$   
*chronos style*

A straightforward style utilising scientific dates in which the line tapers to form an arrow. Intended for timelines which add elements above and/or below. The optional  $\langle length \rangle$  specifies the length of the tapering.

Default: 20mm

See table 1 and fig. 12a. This style demonstrates the use of **chronos middle ground layer** to reduce visual clutter where **connections** cross **timeline marks**. Although the **connections** are drawn after the **timeline**, they are placed on a lower layer, with a partially transparent rectangle in between.

**off line colour alt** =  $\langle length \rangle$   
*chronos style*

A variant of **off line colour** which uses a different colour scheme.

Default: 20mm

Heading  
Upper Subheading  
Lower Subheading

# Cronoleg

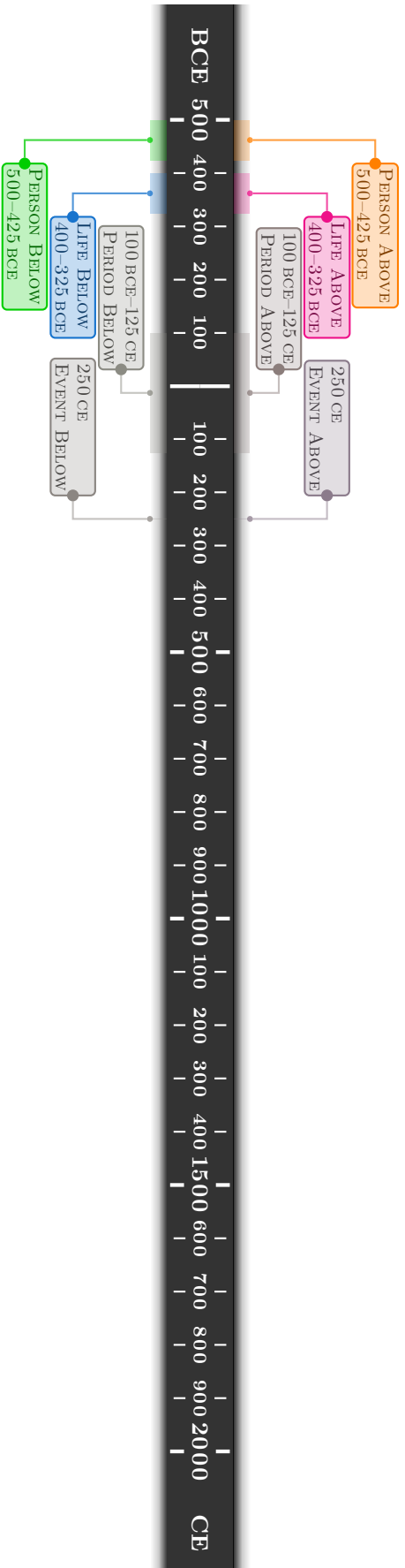


Figure 5: Chronos style: cronoleg.

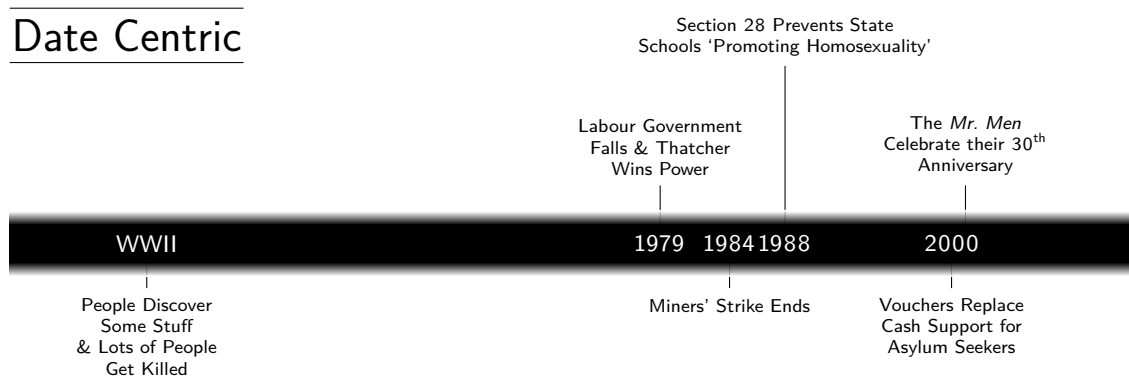


Figure 6: Chronos style: date centric.

See table 1 and fig. 12b.

**off line simple** =  $\langle length \rangle$   
*chronos style*

A less colourful variant of `off line colour` utilising only two colours<sup>14</sup>.

Default: 20mm

See table 1 and fig. 12c.

**rotated 45** A chronos style featuring the off-set lines and text tags rotated through 45°. Intended for timelines which add elements below. See table 1 and fig. 13. This style demonstrates how to rotate text tags.  
*chronos style*

**simple arrow** =  $\langle length \rangle$   
*chronos style*

A monochrome appearance with a plain 200mm arrow timeline and years and marks above<sup>15</sup>.  $\langle length \rangle$  determines the length of the taper comprising the arrow.

Default: 10mm

Intended for timelines which add elements below. See table 1 and fig. 14.

**somewhat plain** A chronos style with a monochrome appearance and sans-serif fonts which produces a relatively short timeline of 100mm by default. Intended for timelines which add elements below. See table 1 and fig. 15. This style demonstrates how to create a style to draw lines above and below the main title node, without drawing the left and right sides of the node.  
*chronos style*

### 7.1.3 ‘No Year’ Styles

**event splitter** A 150mm timeline with no year labels which demonstrates the use of `event dates split`<sup>16</sup>. Intended for timelines with connected elements solely of tag type event. See table 1 and fig. 16.  
*chronos style*

**lines on line** =  $\langle dimension \rangle$   
*chronos style*

A 120mm timeline arrow,  $\langle dimension \rangle$  high, with no year labels and life, event and period lines drawn on the timeline itself<sup>17</sup>. Date information is confined to text tags. Out-of-the-box, this chronos style adds elements of tag type event above and those of type life and period below.

Default: 5mm

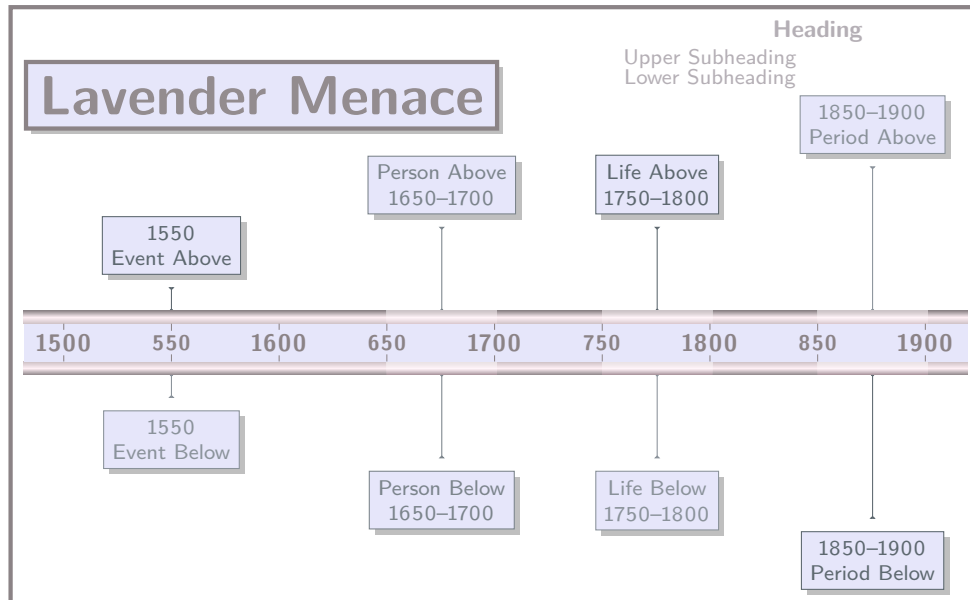
See table 1 and fig. 17.

<sup>14</sup>In fact, this version is closest to the original. See my answer at [TeX StackExchange: 324106](#).

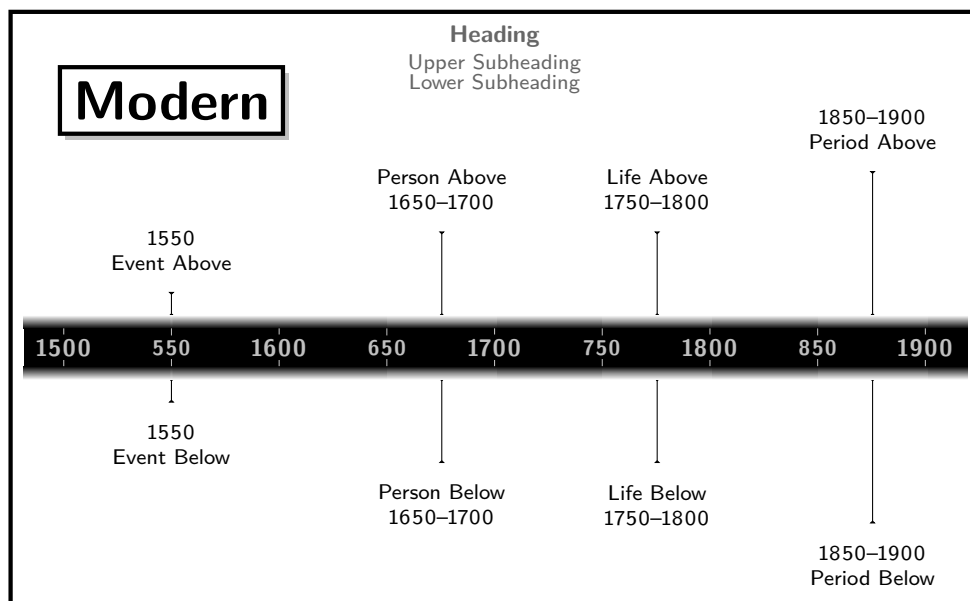
<sup>15</sup>Based on my answer at [TeX StackExchange: 342699](#).

<sup>16</sup>Based on my answer at [TeX StackExchange: 325890](#).

<sup>17</sup>Based on my answer at [TeX StackExchange: 324453](#).

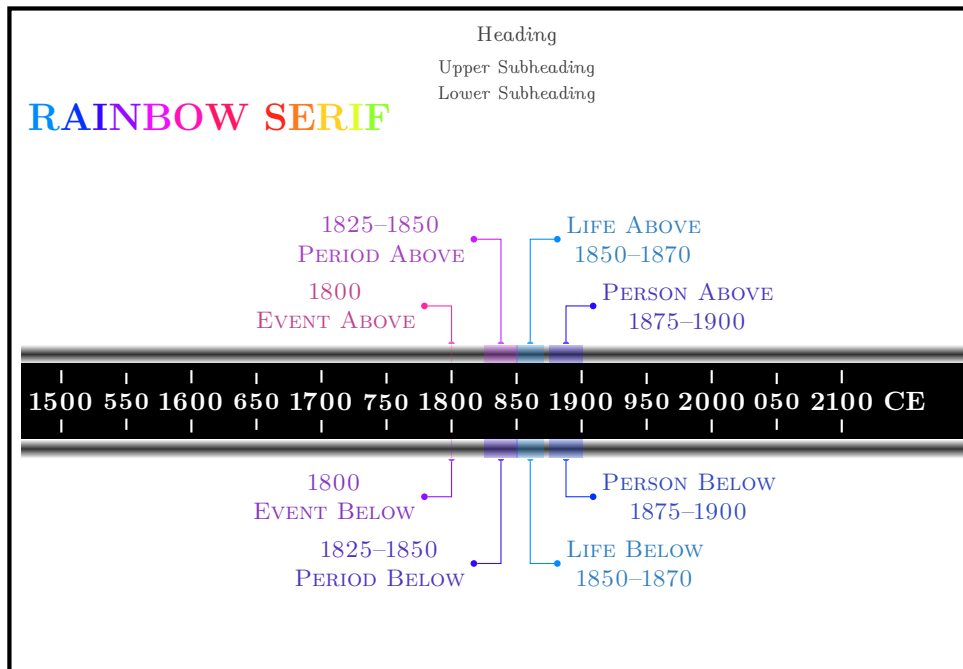


(a) Chronos style: lavender menace

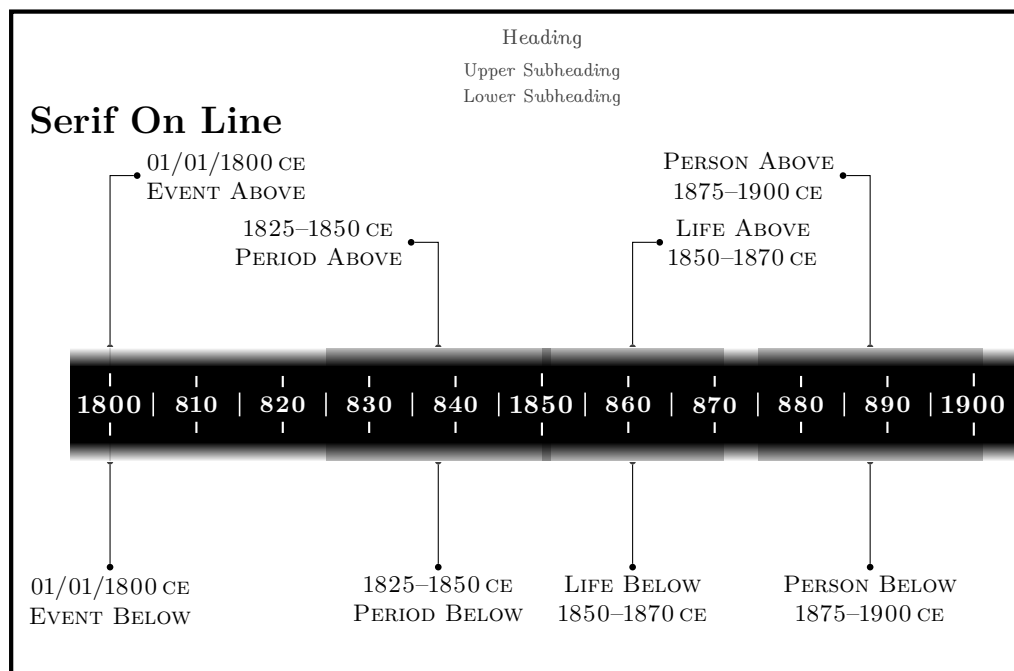


(b) Chronos style: modern

Figure 7: Figure 7a is a variant of fig. 7b.



(a) Chronos style: rainbow serif.



(b) Chronos style: serif on line.

Figure 8: Figure 8a is a variant of fig. 8b.

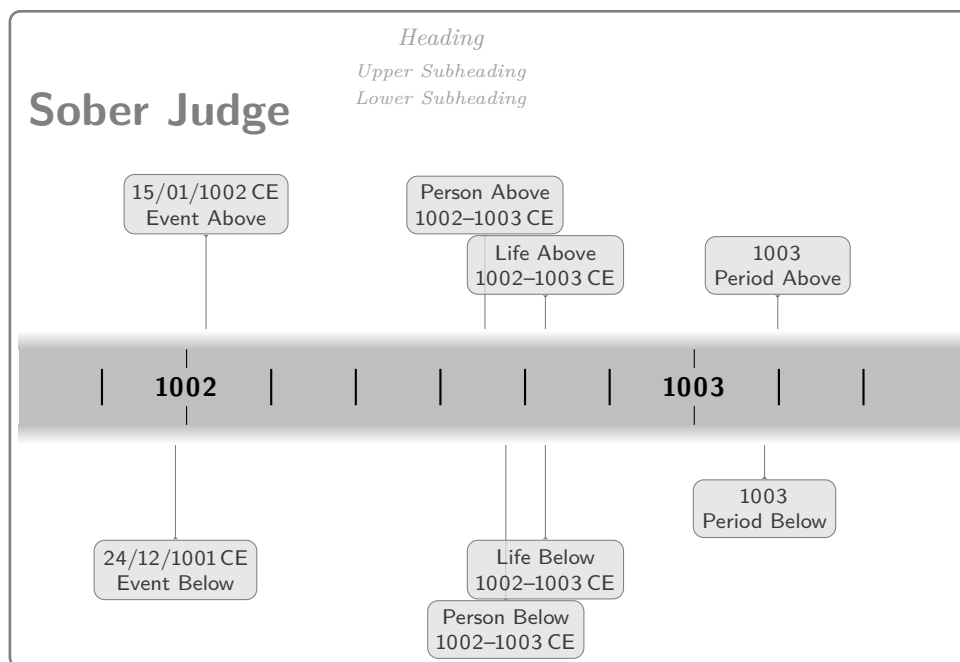


Figure 9: Chronos style: sober judge.

`plain arrow` =  $\langle$ *dimension* $\rangle$   
*chronos style*

A variant of `lines on line` (fig. 17) which draws a 120mm timeline arrow with no year labels and life, event and period lines drawn on the timeline itself<sup>18</sup>. Date information is confined to text tags.

Default: 5mm

Intended for timelines which add elements of `tag type event` above and those of `tag type life` and `tag type period` below. See table 1 and fig. 17b.

## 7.2 Chronos Colour Schemes

As explained in section 8.8, `chronos` utilises a somewhat complex system for colour customisation. In many cases, however, you will not need to delve into the mechanisms used. Instead, you can simply load an existing colour scheme. If none of the provided schemes meet your needs, see section 13.1.

To load a colour schemes, you just write

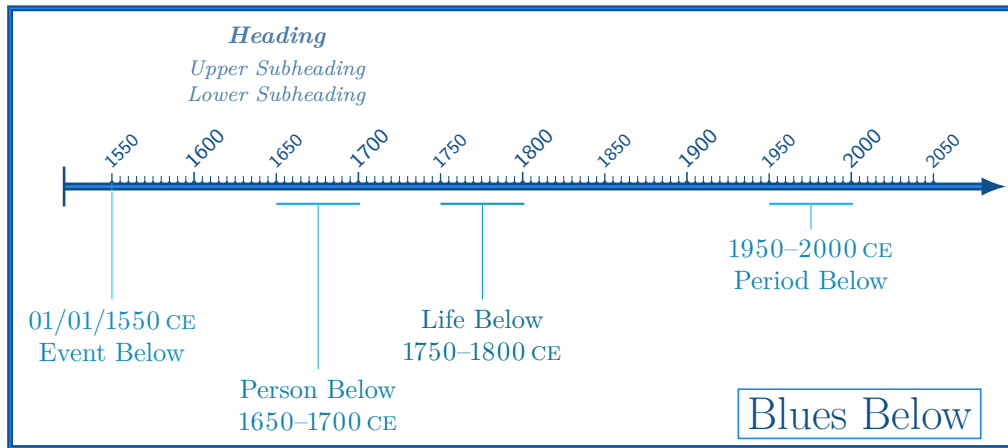
```
\begin{chronos}
[
  modern,
  colour scheme=blues,
]
\end{chronos}
```

which would load the `chronos` style `modern` followed by the colour schemes `blues`. Since `chronos` styles may legitimately load colour schemes, but colour schemes may not load `chronos` styles, always load any `chronos` style *before* any colour scheme. Then make any further modifications you wish.

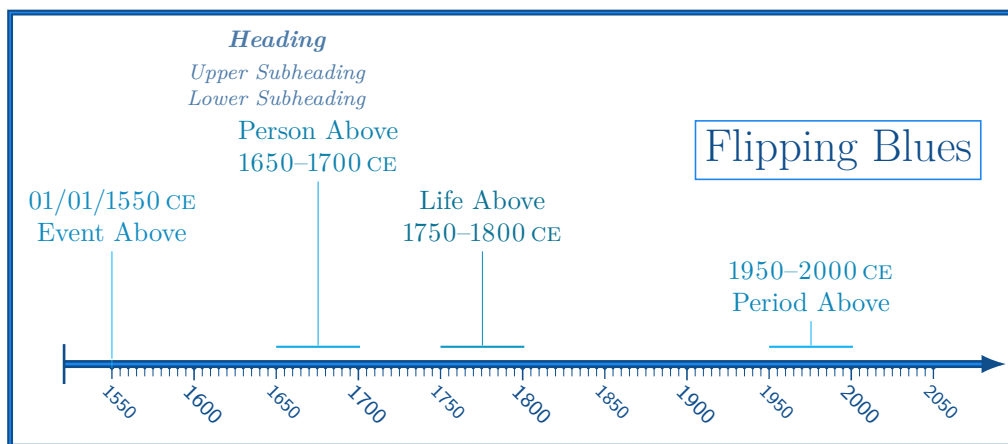
```
\begin{chronos}
[
```

<sup>18</sup>Based on my answer at [TeX StackExchange: 324453](https://tex.stackexchange.com/questions/324453).





(a) Chronos style: blues below.



(b) Chronos style: flipping blues.

Figure 10: Figure 10b is a variant of fig. 10a.

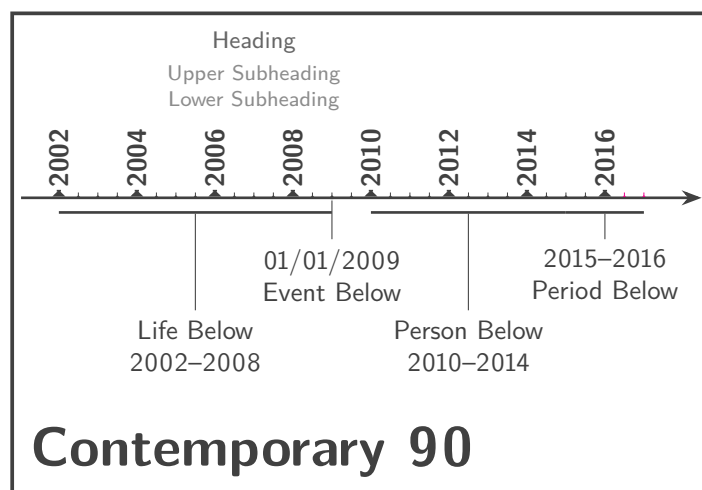
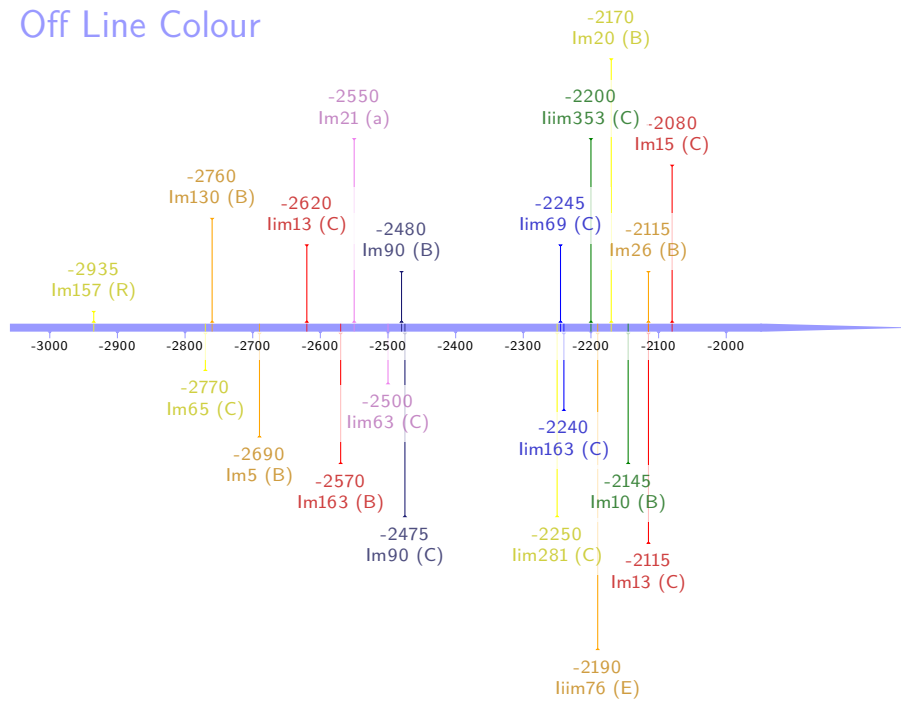


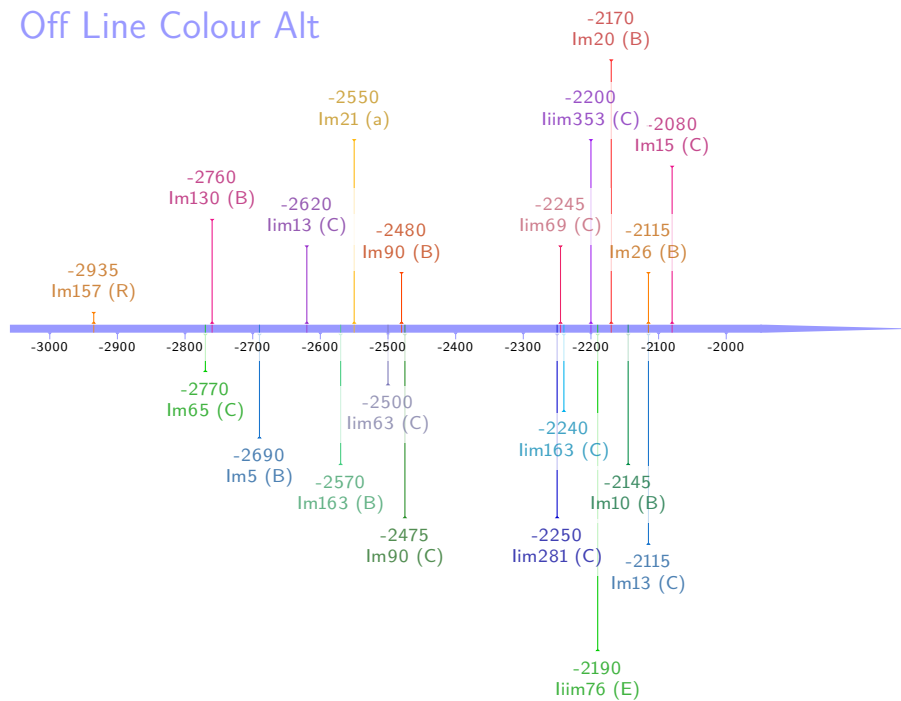
Figure 11: Chronos style: contemporary 90.

Off Line Colour



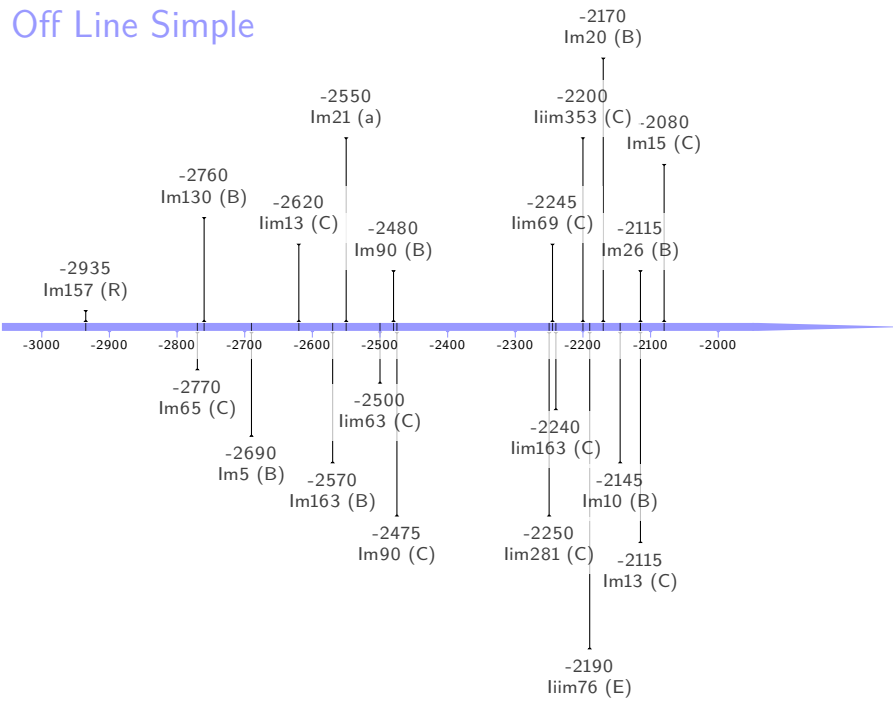
(a) Chronos style: off line colour.

Off Line Colour Alt



(b) Chronos style: off line colour alt.

Figure 12: Figures 12b and 12c are variants of fig. 12a.



(c) Chronos style: off line simple.

Continued Figure 12: Figures 12a and 12c are variants of fig. 12b.

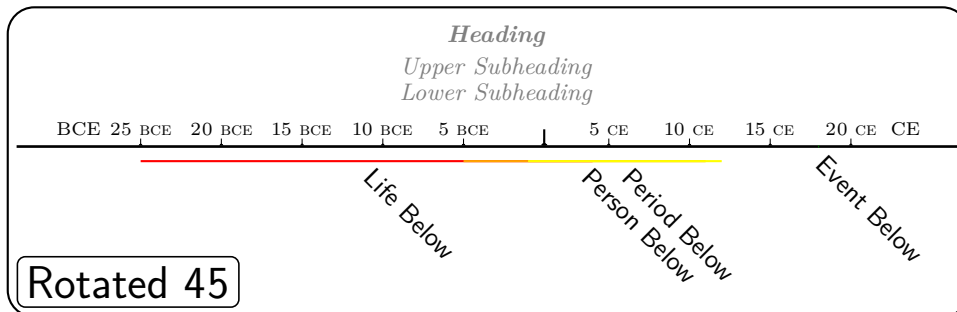


Figure 13: Chronos style: rotated 45.

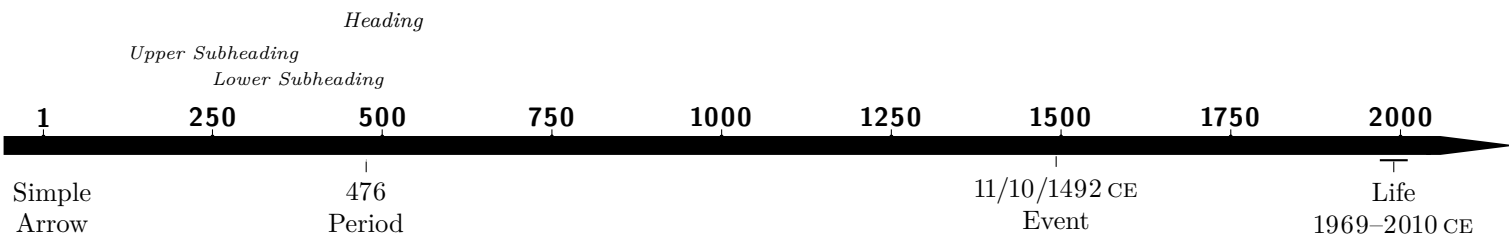


Figure 14: Chronos style: simple arrow.

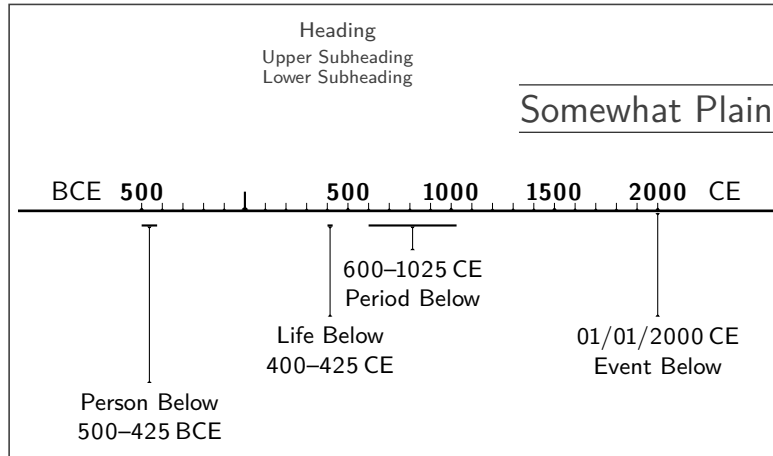


Figure 15: Chronos style: somewhat plain.

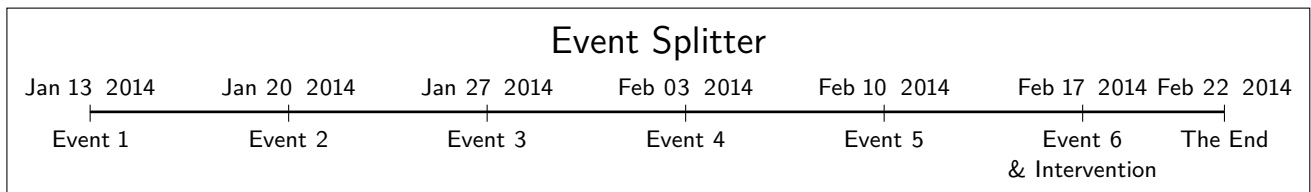
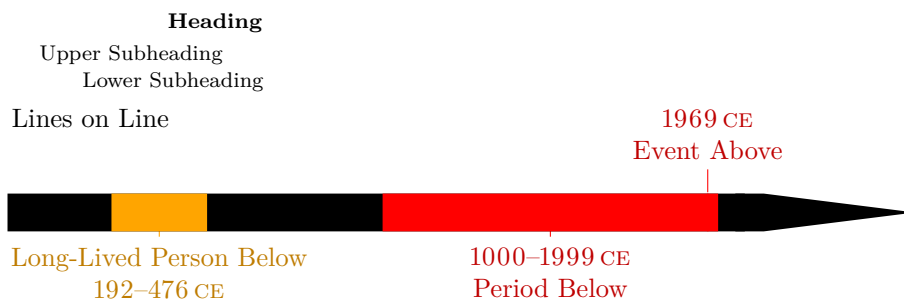


Figure 16: Chronos style: event splitter.



(a) Chronos style: lines on line.



(b) Chronos style: plain arrow.

Figure 17: Figure 17b is a variant of fig. 17a.

Table 2: Chronos Colour schemes.

Colour scheme	Variant Of	Default For	Examples
- (default)	-	rotated 45, serif on line and somewhat plain	figs. 4, 8b, 13 and 15
blues	-	blues below and flipping blues	figs. 1, 10a and 10b
contninety	-	contemporary 90	fig. 11
cronoleg	-	cronoleg	fig. 5
lavender	-	lavender menace	fig. 7a
modern	-	modern	fig. 7b
offlinebasic	-	off line colour and off line simple	figs. 12a and 12c
offlinealt	cronoleg	off line colour alt	fig. 12b
sobriety	-	sober judge	fig. 9
xcolseries	-	rainbow serif	fig. 8a

```

modern,
colour scheme=blues,
timeline={%
  dates=1066:1946,
},
event/default colour=ForestGreen,
every text tags+={draw=##1},
]
\end{chronos}

```

`colour scheme` =  $\langle name \rangle$

`color scheme`

*key*

$\langle name \rangle$  should be the name of a colour scheme. A small number of colour schemes are provided by `chronos` (section 7.2); others may be defined using the method explained in section 13.1.

Default: the default set of colours.

Example: `colour scheme=cronoleg`

`chronos` styles may load colour schemes and typically should if they wish to make significant changes.

In addition to the default colours, `chronos` currently provides `blues`, `contninety`, `cronoleg`, `lavender`, `modern`, `offlinebasic`, `offlinealt`, `sobriety` and `xcolseries` (table 2). New colour schemes may be created using the interface explained in section 13.1.

## 8 Configuration

`Chronos` was designed to be highly configurable. However, by far the *easiest* way to customise a timeline is to load a `chronos` style. See section 7.1.

Most configuration uses the standard key/value interface provided by `TikZ`. In addition, a `\chronosset` is provided for configuring defaults.

Most `chronos` options have local scope. That is, changes do not survive the current group.

However, a small number of options are set *globally*. In these cases, `chronos` keeps track of a list of defaults, as well as the current options, and restores the defaults at the beginning and end of each `chronos` environment. By default, `\chronosset` changes the default values of globalised options, whereas the  $\langle chronos preamble \rangle$  does not.

Globalised options saved as default are stored in `expl3` variables named with a package-specific prefix. A similar prefix is used for globalised colours.

`\chronosset`  $\{ \langle key-value list \rangle \}$   
*macro*

`\chronosset*`  $\{(key\text{-}value\ list)\}$

*macro*

This should be used to configure `chronos` *outside* the `chronos` environment. It should *not* be used within that environment. The starred version does *not* make any global changes. In general, there is no reason to use the starred version as altering these variables non-globally will have no effect and other variables are not set globally in any case. It is provided ‘just in case’, even though I can’t think of a use-case for it.

`Chronos` sets the following options globally. At the end of the preamble, the active values are saved. These are then restored at the end of each `chronos` environment. This means the results of typesetting a `timeline` should not depend on earlier `timelines` in the same document, a phenomenon which may otherwise result in changes of position and colour, for example. Options set globally:

- the list of `century` `subheadings` (but neither other subheadings nor headings are globalised);
- most colours and lists of colours;
- whether the last `text` `tag` of a particular kind (event or period) was placed above or below the `timeline`.

All other settings should behave as usual for PGF/TikZ as they are not handled specially and all other L<sup>A</sup>T<sub>E</sub>X 3 variables are declared locally.

This approach is intended to ensure that things behave as I expect you to expect, but it is obviously not unlikely you may expect something I don’t expect you to expect. For this reason, it is strongly recommended that document-wide settings be configured in the preamble of your document. `\chronosset` should be used in the document body *only* when you wish to change the document defaults partway through your document. If at all possible, I recommend the use of styles, configured in the preamble, instead, but there will be cases where such an approach may be sub-optimal. `\chronosset` may be used later in such cases.

In particular, you are urged to configure default colours and colour lists, in your preamble. See sections 8.3, 8.8 and 9.5. If you get unexpected colours, please remember that `chronos` defines most colours *globally*. They are *not* limited to the current `chronos` environment. That is, `chronos` lets you customise the colours in many different ways, including many you might wish it did not.

## 8.1 Documentation Notes

The following notes apply throughout this document.

### 8.1.1 Font Conventions

This document uses the following typographic conventions.

**Bold**/***Bold Italics*** are used to emphasise important points, especially ones which might be overlooked.

*Italics* are used with `<` and `>` for  $\{(mandatory\ arguments)\}$ ,  $[(optional\ arguments)]$  and  $\langle parameterised\ values \rangle$ . When used in the text without delimiters, they are used for emphasis in accordance with standard typographic conventions for English language texts.

**Monowidth Typewriter** is used for `\macros` (e.g. `\commands`), `environments`, `key names` and `code`.

**Sans Serif** is used for concepts, elements, package names and class names.

The distinction between a ‘concept’, an ‘element’ and a ‘key’ is not always obvious. Where discussion meanders through the borderlands of fuzzy concepts<sup>19</sup>, the font in which a word appears

<sup>19</sup>A ‘fuzzy concept’ is one whose extension cannot be precisely defined without arbitrariness. For example, there are clear cases where ‘bald’ applies and equally clear cases where it does not, but there is no non-arbitrary point at which non-baldness becomes baldness. ‘Bald’ is clear in the middle and clear well beyond its scope, but decidedly fuzzy at its edges.

is sometimes arbitrary and the choice should not be taken too seriously. Moreover, some words, such as ‘timeline’, are used for all three.

### 8.1.2 Keys and Values

Chronos provides a user interface for customisation based almost exclusively on `pgfkeys`.

**8.1.2.1 Keys** In case you have somehow come across this package shortly after landing in contemporary TeXland, the basic idea is that the package provides a set of **keys** which you use selectively to customise the output. Some of these keys are simple keywords.

Example: `no connections`,

**8.1.2.2 Values** When keys permit or require arguments, the arguments are called **values**. A given key will generally require a  $\langle value \rangle$  of some particular sort, as explained for each key below.

Some `chronos` keys permit an argument, but don’t require it.

Example: `frame`,

Example: `frame=true`,

Example: `frame=false`,

The above are all valid (with the first two being equivalent).

Other `chronos` keys require one or more arguments.

Example: `colour=Cerulean`,

Example: `heading={chronos year -150}{chronos year 250}{past}`,

`Chronos` frequently requires multiple arguments to be separated by colons, because this often seemed less error-prone than multiplying curly brackets in complex cases.

Example: `dates={{-100}-01-12}:{900-12-24}`,

In some instances, where a proliferation of colons seemed no less an invitation to error than one of curly brackets, the colon cases are convenience keys, which you can avoid through the use of two or more alternate keys to specify items separately.

**8.1.2.3 Key-Value Lists**  $\langle key\text{-}value\ list \rangle$ s are comma-separated lists of items, each of which is either a simple  $\langle key\text{-}name \rangle$  or a  $\langle key\text{-}name \rangle = \{ \langle comma\text{-}separated\ list\ of\ values \rangle \}$ . In general, the  $\langle comma\text{-}separated\ list\ of\ values \rangle$  will be a TikZ  $\langle key\text{-}value\ list \rangle$ , though it may sometimes be appropriate to include further `chronos` keys.

Example: `event/line={draw=blue,draw opacity=.75}`

### 8.1.3 Key Specifications

Key specifications in this document look like this:

```

key name =  $\langle argument\ specification \rangle$  tag1, tag2, tag3, ...
  key type
   $\langle Description\ of\ key\ and\ explanation\ of\ usage. \rangle$ 
  Default:  $\langle key's\ default\ value \rangle$ 
  Initially:  $\langle key's\ initial\ value \rangle$ 
  Example:  $\langle example\ of\ usage \rangle$ 
   $\langle Commentary. \rangle$ 

```

Table 3: chronos key types.

Key type	Description	Example
<i>boolean key</i>	Controls a boolean or toggle i.e. a conditional.	
<i>choice key</i>	Selects from a list of possible options.	
<i>comma-separated list key</i>	Processes or stores a comma-separated list of things.	
<i>colour key</i>	Specifies a colour.	
<i>colour list key</i>	Special kind of comma-separated list key which stores a list of colours.	
<i>date key</i>	Specifies a date or dates.	
<i>date format key</i>	Specifies one or more date output formats.	
<i>dimension key</i>	Specifies a T <sub>E</sub> X dimension.	
<i>key</i>	Some other kind of key.	
<i>style</i>	A PGF/TikZ style.	

Here, **key name** is the name of the key, *key type* is the type of key, *⟨argument specification⟩* specifies the number, kind and format of the value or values the key expects and *tag1, tag2, tag3, ...* indicates to elements of which **tag** or **tags** the key applies. See table 3 for an explanation of the types of key **chronos** uses. See sections 6 and 6.2 for information about **tags**.

*If no initial value is specified, the default value is also the initial value.* Where both an initial and a default value are specified, the default is the value used if the *⟨key name⟩* is given without an argument and the initial value is the value used if *⟨key name⟩* is not used at all. This terminology follows the usage in **pgfkeys** and is especially prevalent in the handling of boolean keys, where it is common for the initial value to be **false**, but the default value to be **true**.

Schematically,

```

\begin{chronos}% ^^A initial value used
[
  % ^^A other keys
]
\end{chronos}
\begin{chronos}% ^^A default value used
[
  % ^^A other keys
  key name,
]
\end{chronos}
\begin{chronos}% ^^A new value used
[
  % ^^A other keys
  key name=new value,
]
\end{chronos}

```

#### 8.1.4 Syntax Notes

See section 8.1.5 for the *syntax* of dimension keys, where *plus* and *prime* have different meanings.

**8.1.4.1 Slash (/)** Where a forward slash (/) occurs in a key, it indicates a context-specific key. For those familiar with PGF keys, this corresponds to a path under **/chronos**.

Example: **life/connection**

indicates a key affecting **connection(s)** belonging to elements of type **life**.

**8.1.4.2 Plus (+)** A plus sign (+) at the end of a key indicates that the key *adds* to any pre-existing list. This form is generally available when the base key replaces, rather than adding



to, any pre-existing list.

```
timeline line={draw=black,fill=green},
timeline line+={opacity=.8},
```

is equivalent to

```
timeline line={draw=black,fill=green,opacity=.8},
```

A plus at the end of a dimension key indicates that the dimension key *adds* the value given to the current value of the dimension.

**8.1.4.3 Prime (')** A prime (') at the end of a key indicates that the key *replaces* any pre-existing list. This form is generally available when the base key adds to, rather than replacing, any pre-existing list.

```
century subheadings={15,17,19}{th},
century subheadings'={13,14}{th},
century subheading={21}{st},
```

is equivalent to

```
century subheadings'={13,14}{th},
century subheading={21}{st},
```

and will result in subheadings being created for the 13<sup>th</sup>, 14<sup>th</sup> and 21<sup>st</sup> centuries (assuming the timeline covers these time periods and the relevant coordinates exist).

A prime at the end of a dimension key, or at the end except for a plus ('+), indicates that the dimension key expects a  $\text{\TeX}$  dimension, as opposed to an expression to be evaluated by `pgfmath`.

## 8.1.5 Dimension Notes

**8.1.5.1 Dimensions** Each key described as a dimension key is available in six forms<sup>20</sup>:

$\langle \text{dimension key} \rangle$  =  $\{ \langle \text{pgfmath-parsable dimension} \rangle \}$   
*dimension key*

The dimension key parses the  $\langle \text{specified value} \rangle$  using `pgfmath` and assigns the result in points as the dimension. This base form, which is typically the only form explicitly listed in this documentation, is slow but flexible. Unless otherwise noted, the existence of the base form implies the availability of all six variants.

$\langle \text{dimension key} \rangle'$  =  $\{ \langle \text{dimension} \rangle \}$   
*dimension key*

The dimension key expects a  $\text{\TeX}$   $\langle \text{dimension} \rangle$ , complete with units, which it assigns directly. This is faster but less flexible.

$\langle \text{dimension key} \rangle+$  =  $\{ \langle \text{pgfmath-parsable dimension} \rangle \}$   
*dimension key*

The dimension key parses the expression  $(\langle \text{specified value} \rangle + \langle \text{existing value} \rangle)$  with `pgfmath` and assigns the result in points. This is slower but more flexible.

$\langle \text{dimension key} \rangle'+$  =  $\{ \langle \text{dimension} \rangle \}$   
*dimension key*

The dimension key expects a  $\text{\TeX}$   $\langle \text{dimension} \rangle$ , complete with units, which it adds to the  $\langle \text{existing dimension value} \rangle$  directly. This is faster but less flexible.

$\langle \text{dimension key} \rangle-$  =  $\{ \langle \text{pgfmath-parsable dimension} \rangle \}$   
*dimension key*

<sup>20</sup>Occasionally, a convenience key may only support the prime, prime-plus and prime-minus forms. Where this applies, the limitation is noted in the description.

The dimension key parses the expression (*specified value*) – (*existing value*) with `pgfmath` and assigns the result in points. This is slower but more flexible.

`<dimension key>' - = {<dimension>}`  
*dimension key*

The dimension key expects a TeX *<dimension>*, complete with units, which it subtracts from the *<existing dimension value>* directly. This is faster but less flexible.

When dimension keys end in prime, prime-plus or prime-minus, *<dimension>*s must be given as TeX dimensions complete with units and may not require calculation.

Example: `timeline height'=10mm`

Example: `timeline border height'+=20pt`

Example: `timeline width'--=2em`

When dimension keys do not include prime, any value which can be parsed by `pgfmath` is valid.

Example: `timeline height=.01\textheight`

Example: `timeline border height+=1.5\headrulewidth`

Example: `timeline width-=0.05\linewidth+1.5pt`

### 8.1.6 Date Specification Notes

**8.1.6.1 Date Format Specifications** A *<date format specification>* (*<date format spec.>*) is an expression using the syntax explained in section 8.2.2.

Example: `date format={!d !B !Y !E}`

**8.1.6.2 Dates** *<date>*s must be specified using the syntax explained in section 8.2.1.

Example: `dates={{-200}-04-05}:{200-12-31}`

### 8.1.7 Colour Notes

**8.1.7.1 Colours** *<colour>*s should be colour names or mixtures supported by `xcolor`.

Example: `colour=WildStrawberry`

Example: `foreground=WildStrawberry!50!black`

**8.1.7.2 Colour Lists** *<colour list>*s are comma-separated lists of colour names or mixtures supported by `xcolor`.

Example: `life/colours above={blue,green,blue!50!green}`

**8.1.7.3 Colour** `colour` and `color` are synonyms in key names.

Example: `colours below={black,gray}`

Example: `colors below={black,gray}`

## 8.2 Dates

Chronos uses a fixed format for date input and offers a flexible format for date output.

### 8.2.1 Input

All date keys expect one or two arguments specifying a date or dates in the format `{Y-M-D}`. Y, M and D must be integers. If Y is negative, the date is interpreted as BCE; otherwise CE is assumed. The additional curly brackets around Y are *mandatory* for negative values.

Table 4: Date and year format specification codes.

code	meaning	example output	date format specifier?	year format specifier?
!a	short weekday name	Mon	✓	—
!A	full weekday name	Monday	✓	—
!b	short month name	Jan	✓	—
!B	full month name	January	✓	—
!c	semi-shortened year	900	✓	✓
!d	day of the month	23	✓	—
!E	era	BCE or CE label	✓	✓
!m	month number	01	✓	—
!q	minus if year is BCE	-	✓	✓
!Q	minus if year is BCE; plus for CE	+	✓	✓
!y	last two digits of year	66	✓	✓
!Y	year	1066	✓	✓

```
start date={{-3000}-05-23},
end date={1500-12-04},
```

It is also permissible to specify only a year, in which case `chronos` will specify values for the month and day. Hence,

```
dates={-245}:789,
```

is also valid. Where two dates are required, `dates` offers a more concise syntax, but dates may always be specified singly if this is preferred.

### 8.2.2 Output

All date format keys expect one or three arguments using the syntax specified in table 4.

Example: `date format={ B d, Y}`

This would result in a full month name followed by the day of the month, then a comma and finally the year.

Each character in the format is either translated into an element of the date format or passed through as is. This includes punctuation and spaces. (Note that macros etc. won't work here because the macro will be broken down and 'translated' token-by-token.)

The format codes, listed in table 4, are mostly a subset of the format codes provided by GNU's date command, with a few extras not relevant to GNU<sup>21</sup>.

A subset of the date-specification codes (as indicated in table 4) is available to customise the formatting of years on the timeline itself. In the case of the timeline, era labels may instead be added at each end to avoid the clutter of including BCE or CE with every year.

`date format` =  $\{ \langle \text{date format specification} \rangle \}$   
*date format key*

When used in the  $\langle \text{chronos preamble} \rangle$  or in `\chronosset`, sets the default format for dates.

Default: `!d!/m!/Y\thinspace !E` (with eras)

Default: `!d!/m!/Y` (without eras)

`event/date format` =  $\{ \langle \text{date format specification} \rangle \}$  *event*  
*date format key*

<sup>21</sup>I am grateful to Joseph Wright for providing the code implementing this at [T<sub>E</sub>X StackExchange: 327642](https://tex.stackexchange.com/questions/327642).

When used in the *<chronos preamble>* or in `\chronosset`, sets the default format for event dates. *This key overrides show eras, without eras, full dates and only years for elements of tag type event.*

Default: `!d/!m/!Y\thinspace !E` (with eras)

Default: `!d/!m/!Y` (without eras)

The following keys set `event/date format` conditionally. This may be used to switch between formats showing eras or only years and no eras or full dates while ensuring uniformity of all formats with or without eras, for example. For instance, it may make little sense to use full dates for events where only the year is known or which occurred when different calendars were used, but you might still want full dates for other cases. *These keys override show eras, without eras, full dates and only years for elements of tag type event.*

`event/show eras/full` = *{<date format specification>}* *event*  
*date format key*

When used in the *<chronos preamble>* or in `\chronosset`, sets the default format to use for event when showing full dates with eras.

Default: `!d/!m/!Y\thinspace !E`

`event/show eras/only years` = *{<date format specification>}* *event*  
*date format key*

When used in the *<chronos preamble>* or in `\chronosset`, sets the default format to use for event when showing only years with eras.

Default: `!Y\thinspace !E`

`event/without eras/full` = *{<date format specification>}* *event*  
*date format key*

When used in the *<chronos preamble>* or in `\chronosset`, sets the default format to use for event when showing full dates without eras.

Default: `!d/!m/!Y`

`event/without eras/only years` = *{<date format specification>}* *event*  
*date format key*

When used in the *<chronos preamble>* or in `\chronosset`, sets the default format to use for event when showing only years without eras.

Default: `!Y`

life and period are more complex as date ranges are involved, but the basic structure works in the same way.

`life/date formats` = *{<date format spec.>}{<date format spec.>}{<date format spec.>}* *life, period*  
`period/date formats`  
*date format key*

When used in the *<chronos preamble>* or in `\chronosset`, sets the default formats for life or period dates. In these cases, we have two dates — either a birth and death or a start and end. You might want different formats for the two and you might want different formats when the first date is BCE and the second CE. Hence, we need to specify three formats. The first argument specifies the format to use for the birth or start date when the death or end date occurs in the same era. The second specifies the format to use for the first date when the eras differ. The third specifies the format to use for the death or end date. *These keys override show eras, without eras, full dates and only years for elements of tag types life and period respectively.*

Default: `{!d/!m/!Y}:{!d/!m/!Y\thinspace !E}:{!d/!m/!Y\thinspace !E}` (with eras)

Default: `{!d/!m/!Y}:{!d/!m/!Y}:{!d/!m/!Y}` (without eras)

*The following keys override date formats for elements of tag types life and period respectively. They work in the same way as those explained above for event.*

`life/show eras/full` = *{<date format spec.>}{<date format spec.>}{<date format spec.>}* *life, period*  
`period/show eras/full`  
*date format key*

When used in the *<chronos preamble>* or in `\chronosset`, sets the default formats to use for life or period when showing full dates with eras.

Default: `{!d/!m/!Y}:{!d/!m/!Y\thinspace !E}:{!d/!m/!Y\thinspace !E}`

`life/show eras/only years` = `{(date format spec.):{(date format spec.):{(date format spec.)}}` *life, period*  
`period/show eras/only years`  
*date format key* When used in the `<chronos preamble>` or in `\chronosset`, sets the default formats to use for life or period when showing only years with eras.

Default: `{!Y}:{!Y\thinspace !E}:{!Y\thinspace !E}`

`life/without eras/full` = `{(date format spec.):{(date format spec.):{(date format spec.)}}` *life, period*  
`period/without eras/full`  
*date format key* When used in the `<chronos preamble>` or in `\chronosset`, sets the default formats to use for life or period when showing full dates without eras.

Default: `{!d/!m/!Y}:{!d/!m/!Y}:{!d/!m/!Y}`

`life/without eras/only years` = `{(date format spec.):{(date format spec.):{(date format spec.)}}` *life, period*  
`period/without eras/only years`  
*date format key* When used in the `<chronos preamble>` or in `\chronosset`, sets the default formats to use for life or period when showing only years without eras.

Default: `{!Y}:{!Y}:{!Y}`

`every date format` = `{(date format specification)}`  
*date format key*

Sets *all* date formats for *all* tags and the default format to `<date format specification>`. This key does not affect the formatting of years, minor years or eras on the timeline itself.

Default: none

Initially: none

`bce year label` = `<text>`  
*key*

The label to use if showing the BCE era in `text tags`. Note this is not the label used if marking eras on the timeline, unless including them as part of year labels.

Default: `\textsc{bce}`

```
\begin{chronos}
[
  bce year label=BCE,
]
\end{chronos}
```

The label is available as `\bceyearlabel` inside the environment `chronos`. In addition, it is made available at the end of the preamble if the command is not otherwise defined.

`ce year label` = `<text>`  
*key*

The label to use if showing the CE era in `text tags`. Note this is not the label used if marking eras on the timeline, unless including them as part of year labels.

Default: `\textsc{ce}`

```
\begin{chronos}
[
  ce year label=\textsc{ad},
]
\end{chronos}
```

The label is available as `\ceyearlabel` inside the `chronos` environment. In addition, it is made available at the end of the preamble if the command is not otherwise defined.

The timeline itself features only years (but see `event years` on line for a limited exception).

`year format` = `{(year format specification)}`  
*date format key*

When used in the `<chronos preamble>` or in `\chronosset`, sets the default format for years. This is the format used to format ‘major’ years on the timeline.

Default: `!Y\thinspace !E` (with eras)

Default: `!Y` (without eras)

`minor year format` = `{<year format specification>}`  
*date format key*

When used in the `<chronos preamble>` or in `\chronosset`, sets the default format for ‘minor’ years.

Default: `!c`

The idea is that you might want, say, four-digit years every half century and three-digit years every hundred years in between.

`timeline/timeline mark eras` = `true|false`  
*boolean key*

Should era labels be included at the end(s) of the timeline? Note that a label will only be shown if the dates the timeline covers include some in the relevant era. So if your timeline starts at 500 CE, the BCE will be omitted and if it ends at 200 BCE, the CE will be omitted.

Default: `true`

Initially: `false`

`timeline bce label` = `<text>`  
*key*

The label to use if marking the BCE era on the timeline. Note this is not the label used if showing eras in text tags.

Default: `BCE`

```
\begin{chronos}
[
  timeline bce label=BC,
]
\end{chronos}
```

The label is available as `\celabel` inside the `chronos` environment. In addition, it is made available at the end of the document preamble for general use if the command is not otherwise defined.

`timeline ce label` = `<text>`  
*key*

The label to use if marking the CE era on the timeline. Note this is not the label used if showing eras in text tags.

Default: `CE`

```
\begin{chronos}
[
  timeline ce label=AD,
]
\end{chronos}
```

The label is available as `\celabel` inside the `chronos` environment. In addition, it is made available for general use at the end of the document preamble if the command is not otherwise defined.

### 8.2.3 The Problem of the Non-Existent Year

Chronos uses `pgfcalendar` to calculate Julian day numbers from dates when constructing the timeline. Generally, this works well, but an issue occurs if your timeline spans the two eras (BCE

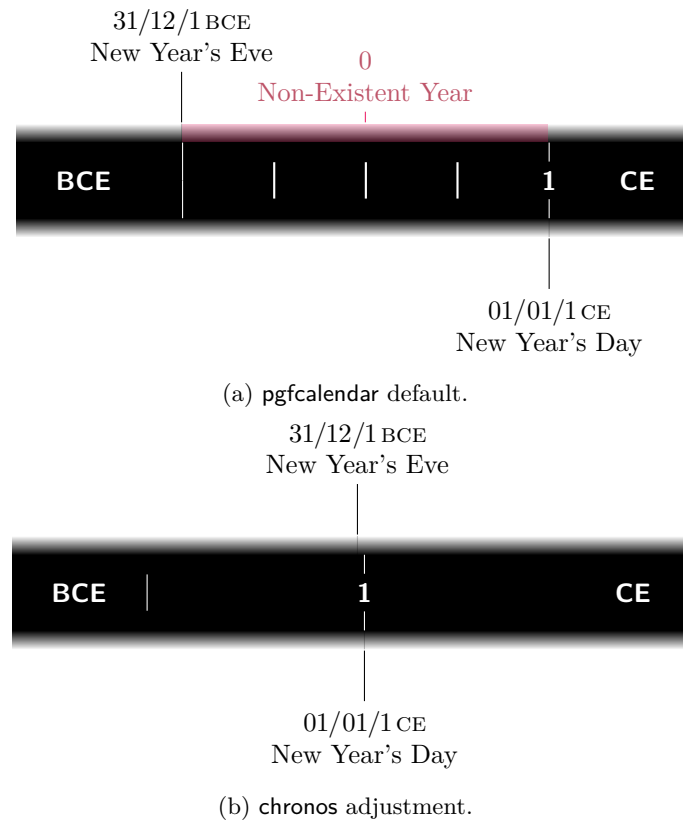


Figure 18: The problem of the non-existent year.

and CE). Pgfcalendar assumes there was a year zero (fig. 18a), which historians will assure you there was not.

By default, `chronos` corrects for this (fig. 18b), but the correction can be switched off if desired (fig. 18a).

```
timeline/year zero = true|false
    boolean key
```

Whether to tolerate the year zero.

Default: `true`

Initially: `false`

If there is no year zero, certain complications arise. First, what should be marked on the timeline at the ‘era switch’? Second, if you ask `chronos` to mark every hundredth year, say, you probably do not expect it to mark 200 BCE, 100 BCE, 1 CE, 101 CE and so on. Moreover, you might want to do something such as this

```
\foreach \i in {-100,-50,...,300} \node [red,inner sep=2.5pt] at (chronos year \i) {};
```

This seems reasonable, but will fail if `chronos year 0` doesn’t exist.

`Chronos` attempts to solve these problems by handling the ‘era switch’ as a special case. First, if there is no year zero, it will create *two* coordinates at the switch, provided you have asked it to mark something at this point. `chronos year 0` will exist, as far as `chronos` is concerned, at the same point as `chronos year 1`. This means you can loop over the era switch in the normal way and expect sensible output, but you can *also* refer to `chronos year 1`, even if you only asked every hundredth year to be marked from 100 BCE.

Second, `chronos` provides a special option for configuring what is marked on the timeline at the switch of eras.

`timeline/mark at era switch = true|false`  
*boolean key*

Whether to use a mark rather than a year at the era switch. If false, the year (e.g. ‘1’) is used; if true, a mark is used instead (illustrated in fig. 18b, though the format will depend on how the timeline is configured).

Default: `true`

Initially: `false` (if showing every year)

Initially: `true` (otherwise)

Note that this option only configures what is marked if something is. If you ask `chronos` to mark every hundredth year from 150 BCE to 400 CE, nothing will be marked at the era switch (but `chronos` will write a warning to the log). `Chronos` won’t do that by default, but, if you insist, it will take you at your word.

`timeline/year at era switch = true|false`  
*boolean key*

Whether to use a year rather than a mark at the era switch. This is simply a convenience key which does the opposite of `mark at era switch`.

Default: `true`

Initially: see `mark at era switch`.

### 8.3 Basic Colours

`Chronos` uses (or may use) two basic colours: one for foreground and one for background elements.

`background = <colour name>`  
*colour key*

This is the ‘main background colour’ for the picture as a whole. This colour is accessible within the `chronos` environment as `chronos main background colour` or `chronos main background color`. Whether it is used and, if so, how, depends on other settings. By default, it is used to determine the colours for the timeline itself and is the basis for the colours used in some tags. It is also used in some standard `chronos styles`.

Default: `white`

```
\begin{chronos}
[
  background=magenta,
]
\end{chronos}
```

`foreground = <colour name>`  
*colour key*

This is the ‘main foreground colour’ for the picture as a whole. This colour is accessible within the `chronos` environment as `chronos main colour` or `chronos main color`. Whether it is used and, if so, how, depends on other settings. By default, it is used to determine the colours for the timeline itself and is the basis for the colours used in some tags. It is also used as the default colour for connections, lines and text tags and in some standard `chronos styles`.

Default: `black`

```
\begin{chronos}
[
  foreground=red,
]
\end{chronos}
```



For other colours, see sections 8.4.5 and 8.8.

## 8.4 Timeline

See section 6.1 for an overview of the timeline’s components and construction.

Placing different elements on different layers enables the same basic building blocks to result in different styles, but the blocks may also be configured directly. The layers on which the connections and lines of items connected to the timeline are drawn also affects the appearance. For example, putting connections behind the border results in circular chronos connectors appearing as semicircles. Chronos’s use of layers is explained in sections 6.4 and 10.

`connections on` = background|middle ground|main|foreground|overlay  
`lines on`  
`timeline/timeline on` Which layer each type of element should be placed on. Aside from main these are not standard  
`timeline/border on` layers. In particular, background is not the standard TikZ background layer, but instead refers  
*choice key* to the chronos background layer.

Default: dependent on other options

See section 6.4.

The timeline should be configured using the following key.

`timeline` =  $\{(key\text{-value list})\}$   
*key*  
 $\langle key\text{-value list} \rangle$  should be a list of chronos keys from the timeline configuration options. These keys may also be accessed more verbosely as `/chronos/timeline/ $\langle key name \rangle$`  or, in the  $\langle chronos preamble \rangle$  or in `\chronosset` as `timeline/ $\langle key name \rangle$` . Some may also work without the `timeline/` prefix, but *this is not guaranteed and may break without notice in future releases*.

```
\begin{chronos}
[
  timeline={% timeline configuration
    dates={1310-02-03}:{1350-06-07},
    timeline foreground=black,
    timeline background=gray,
    minor years,
    timeline height=5pt,
    timeline width=\textwidth,
    timeline era margin=10pt,
    major step font=\sffamily\bfseries,
    minor step font=\sffamily\bfseries\small,
    timeline minor marks,
    timeline marks,
    timeline years=above,
  },
]
\end{chronos}
```

Timeline configuration keys are prefixed with `timeline/` in this manual.

### 8.4.1 Timeline Dates

`timeline/dates` =  $\langle start date \rangle:\langle end date \rangle$   
*date key*

The first and last date to be represented on the timeline. Dates must be specified as explained in section 8.2. This key offers a more compact syntax as an alternative to the keys `start date` and `end date` (or `start` and `end`) explained below. That is

```
\begin{chronos}
[
  timeline={%
```

```

    dates={1310-02-03}:{1350-06-07},
    % equivalent to
    start date={1310-02-03},
    end date={1350-06-07},
    % equivalent to
    start={1310-02-03},
    end={1350-06-07},
  },
]
\end{chronos}

```

`timeline/start date` = `{(date)}`

`timeline/start`  
*date key*

The first date to represent on the timeline, specified as explained in section 8.2.

```

\begin{chronos}
[
  timeline={%
    start date={1310-02-03},
    % equivalent to
    start={1310-02-03},
  },
]
\end{chronos}

```

`timeline/end date` = `{(date)}`

`timeline/end`  
*date key*

The last date to represent on the timeline, specified as explained in section 8.2.

```

\begin{chronos}
[
  timeline={%
    end date={1350-06-07},
    % equivalent to
    end={1350-06-07},
  },
]
\end{chronos}

```

### 8.4.2 Timeline Dimensions

See note 8.1.5.1.

The dimensions of the timeline line and border are illustrated in fig. 19.

The total height of the timeline is a function of the dimensions `timeline height` and `timeline border height`:

$$\text{timeline height} + 2 \cdot \text{timeline border height}$$

The total width is `timeline width`. The width includes the width used to represent the time covered by the timeline and twice the `timeline margin`. If era labels are used, the width also includes the space used for these<sup>22</sup> and the `timeline era margins`.

For example,

```

\begin{chronos}
[
  timeline={%
    timeline height=10mm,
    timeline border height=2.5mm,
  },
]
\end{chronos}

```

<sup>22</sup>I am grateful to Martin Scharrer for providing the code implementing this at [TeX StackExchange: 56405](https://tex.stackexchange.com/questions/56405).

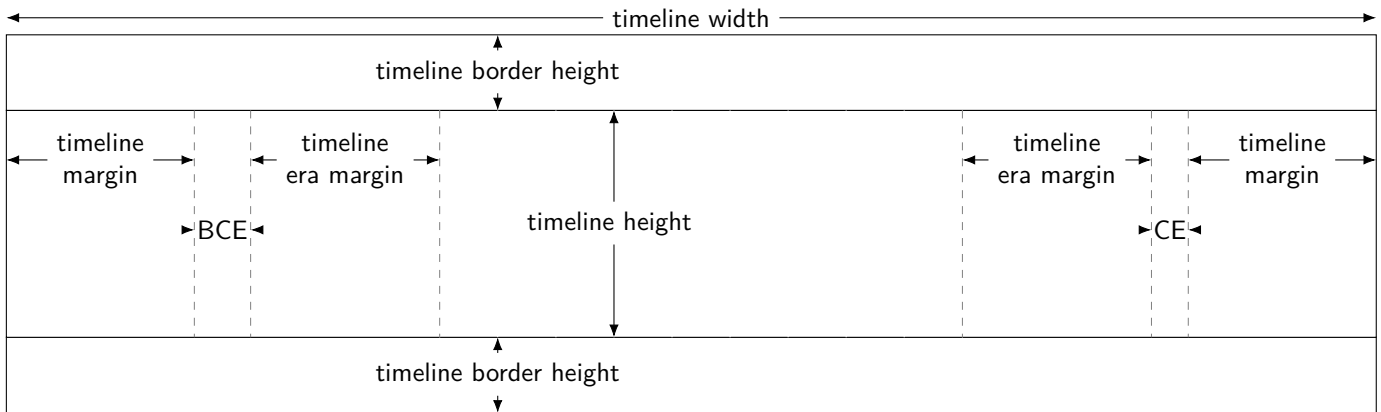


Figure 19: Timeline dimensions.

```

    timeline width=200mm,
    timeline mark eras,
    timeline margin=5mm,
    timeline era margin=2.5mm,
    dates={-200}:2000,
  },
]
\end{chronos}

```

would result in a total timeline height of 15mm and a total timeline width of 200mm. The width used to represent the years from 200 BCE to 2000 CE would be

$$200\text{mm} - 2 \cdot 5\text{mm} - 2 \cdot 2.5\text{mm} - \text{width of BCE label} - \text{width of CE label}$$

that is,

$$185\text{mm} - \text{width of BCE label} - \text{width of CE label}$$

`timeline/timeline height` = *<dimension>*

`timeline/height`  
*dimension key*

The height of the timeline excluding any border.

Default: dependent on other options

For example,

```

timeline={
  timeline height'=10mm,% we can use ' here
},

```

`\timelineht` *macro* The height of the timeline. This macro is available *only at the end of the <chronos preamble> and can be considered reliable only within the <timeline specification>*<sup>23</sup>. Despite its unreliability, early availability is essential to some chronos styles definitions. In these cases, the chronos style is responsible for ensuring accuracy (or compensating for inaccuracy). In standard cases, this happens automatically, even though it is not guaranteed. However, if you neither load a chronos style nor configure dimensions explicitly, you should not try to use this macro before the timeline is constructed.

`timeline/timeline border` = *<dimension>*

`height`  
*dimension key*

The height of each of the upper and lower borders.

<sup>23</sup>Note that the unreliability applies to the internal macro, too.

Default: dependent on other options

For example,

```
timeline={
  timeline border height'+=2.5pt,% we can use ' here
},
```

`\timelineborderht` macro The height of the border. This macro is available *only within the* `\timeline` specification).  
`timeline/timeline width` = `\langle dimension \rangle`

`timeline/width` dimension key The total width of the timeline, including margins.

Default: `\textwidth`

For example,

```
timeline={
  timeline width=.75\paperheight,% we cannot use ' here
  timeline width'-=10mm,% we can use ' here
},
```

`\timelinewd` macro The width of the timeline. This macro is available *only within the* `\timeline` specification).  
`timeline/timeline margin` = `\langle dimension \rangle`

`timeline/margin` dimension key The horizontal space to allow at each of the two ends of the timeline.

Default: 15pt

For example,

```
timeline={
  timeline margin'+=-2.5pt,% we can use ' here
},
```

`timeline/timeline era` = `\langle dimension \rangle`

`margin` dimension key The horizontal space to allow between the first/last point on the timeline and the era labels.

Default: 15pt

For example,

```
timeline={
  timeline era margin+=0.05,% we can't use ' here
},
```

The following keys determine dimensions of the chronos picture as a whole. They do not affect the dimensions of the timeline itself.

`headings border` = `\langle dimension \rangle`  
dimension key

The distance between the top of the highest level and the top of the space used for headers.

Default: 15pt + `\langle headings drop \rangle` + `\langle upper subheadings drop \rangle` + `\langle lower subheadings drop \rangle` (if there are one or more levels above the timeline)

Default: 5pt + `\langle headings drop \rangle` + `\langle upper subheadings drop \rangle` + `\langle lower subheadings drop \rangle` (otherwise)

`headings drop` = `\langle dimension \rangle`  
dimension key

The distance between the top of the border and the headings.

Default: 0pt (if headings are omitted)

Default: 15pt (if headings are used)

*Note that you should set this explicitly to 0pt if using subheadings without headings.*

`subheadings drops` =  $\{\langle dimension 1 \rangle\}:\{\langle dimension 2 \rangle\}$   
*dimension key*

The distances between the headings and upper subheadings and between the tops of the upper subheadings and lower subheadings.

Default: 0pt:0pt (if headings are omitted)

Default: 12pt:10pt (if headings are used)

*Note that you should set this explicitly to 0pt:0pt,  $\langle dimension \rangle:0pt$  or  $0pt:\langle dimension \rangle$  if using headings without upper subheadings and/or lower subheadings or only one of upper subheadings or lower subheadings.*

`headings drops'` =  $\{\langle dimension 1 \rangle\}:\{\langle dimension 2 \rangle\}:\{\langle dimension 3 \rangle\}$

`headings'+`

`headings'-`

*dimension key*

A convenience key equivalent to setting `headings drop'` to  $\langle dimension 1 \rangle$  and `subheadings drops'` to  $\langle dimension 2 \rangle$  and  $\langle dimension 3 \rangle$ . *Note that only the ' forms are available.* For pgfmath support, use `headings drop` and `subheadings drops`.

`outer border` =  $\langle dimension \rangle$

*dimension key*

If a frame is created, this is the outer border. In effect, the bounding box will be set to be this distance from the frame, less half the line width used to draw it.

Default: 5pt

`borders'` =  $\{\langle dimension \rangle\}:\{\langle dimension \rangle\}:\{\langle dimension \rangle\}:\{\langle dimension \rangle\}:\{\langle dimension \rangle\}:\{\langle dimension \rangle\}$

`borders'+`

`borders'-`

*dimension key*

Sets the headings border, top border, right border, bottom border, left border and outer border in one go. *Note that only the ' forms are available.* For pgfmath support, use `top border`, `right border`, `left border`, `bottom border` and `headings border`.

*If you're not sure what this key does or uncertain whether to use it, it is not the key you are looking for.* Setting the `outer border` and `headings border` suffices in most cases.

`top border` =  $\langle dimension \rangle$

`right border`

`bottom border`

`left border`

*dimension key*

If the frame does not use the bounding box, these dimensions determine the internal margin between each of the top of the headings, the timeline's right end, the bottom of the lowest level, the timeline's left end and the frame, less half the line width used to draw the frame.

Default: 0pt

*Most people should let the frame use the bounding box, which is the default, and leave these dimensions alone.*

### 8.4.3 Timeline Marks and Years

Chronos offers two primary styles of timeline. In one, the line has sufficient vertical depth (`timeline height`) for years, era labels and marks to be drawn on the timeline itself. In the other, the timeline may be much thinner, with marks, era labels and years drawn above or below the line. In this case, the marks appear to grow out from the line and the year labels float slightly above or below.

It is also possible to use `chronos` to draw a line with neither marks nor years. Alternatively, you might want to create 'invisible' marks or years, which may be useful for placement purposes<sup>24</sup>. Figure 19 shows a timeline in which this has been done by setting the foreground and background colours equal. The nodes are used to place the arrows and labels illustrating the various dimension keys.

<sup>24</sup>You don't need this simply to connect elements to the timeline. `chronos` doesn't depend on the creation of marks or years for that purpose.

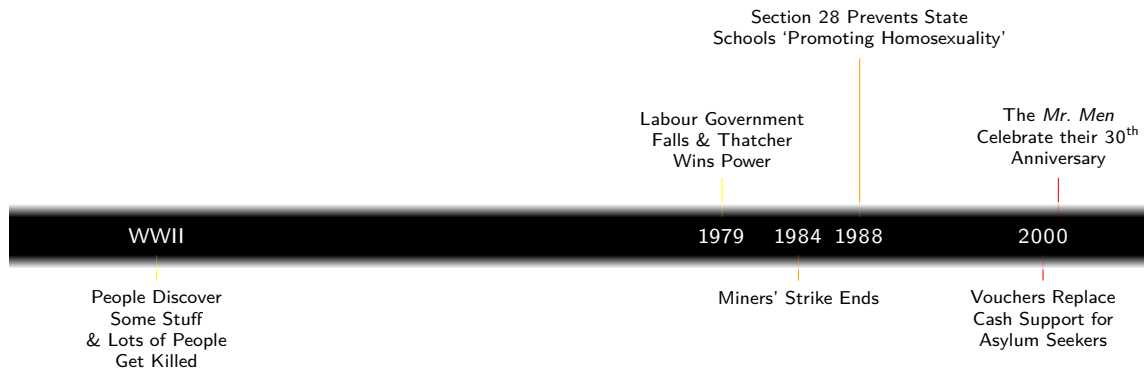


Figure 20: Illustration of event years on line.

`timeline/timeline years` = on line|off line|above|below|none  
*choice key*

Whether years (and any era labels and marks) should be created on the timeline, off it or not at all and, if they should be off the timeline, whether they should be above or below it. The options are mutually exclusive, except that `off line` implies either `above` or `below`. See also `minor years`, `timeline marks`, `timeline minor marks` and `timeline bare marks`, which further determine what exactly is shown.

Default: none

Initially: on line

it may actually make sense to write something like

```
\begin{chronos}
[
  timeline={%
    timeline years=off line,
    timeline years=none,
  },
]
\end{chronos}
```

if one wants an off-line style of line with no years or marks. I don't know why one *would* want such a thing, but the possibility is there.

`none` is actually intended to support a particular style of event-only timeline, in which the dates are created on the line itself.

`event years on line` *key* Don't create regular year labels or marks on the timeline itself. Instead, put the years of subsequently added events onto the line. This option creates a timeline suitable for showing years on the timeline, but doesn't create any labels when drawing the line itself.

Assuming `timeline years` is not set to `none`, as it is if `event years on line` is enabled, the following keys determine how and where `chronos` represents time on (or off) the timeline itself. The primary concepts here are those of `major steps` and `minor steps`. The space available to represent time on the timeline (see section 8.4.2) is divided into `major steps` and, optionally, further divided into `minor steps`. These can be highlighted with `timeline marks` and `timeline minor marks` and are set using `step major year` and `step minor year`.

In addition to years, `timeline bare marks` may be used to create unlabelled subdivisions at intermediate points. In the standard case, the value of `step divisions` is used to divide the distance equally. For example, if you specify 5, `chronos` will use 4 lines to subdivide each. No attempt is made to place these so they correspond to any particular date: if you request 12, `chronos` will not make the division for February smaller than the one for December.

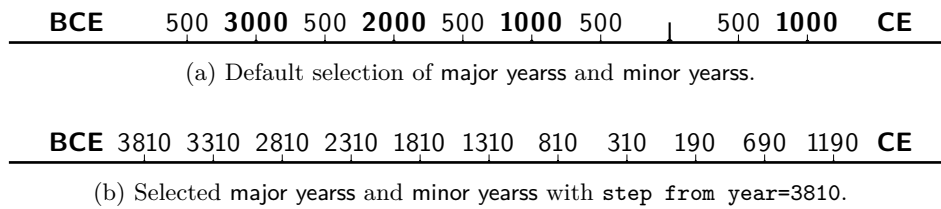


Figure 21: Default (fig. 21a) and non-default (fig. 21b) selection of major years and minor years when `dates={-3814}:1213`, `step major year=1000` and `step minor year=500`.

However, if a timeline is short, `chronos` proceeds differently. ‘Short’ refers to temporal duration rather than dimension and includes any timeline which begins and ends in the same year or in consecutive years.

`timeline/minor years` = `true|false`  
*boolean key*

Whether to label minor years, in addition to major years.

Default: `true`

Initially: `true`

`timeline/step major year` = `{(positive integer)}`  
`timeline/step major years`  
*key*

How often to label major years on the timeline if showing them. Use this key if you want a larger or bolder font and/or a different date format and/or thicker or longer marks to be used for some year labels. You can also use this key if you want all year labels on the timeline to use the same format. For example, you might want to print the full 4 digits of the year each thousand years.

Default: dependent on other options

`timeline/step minor year` = `{(positive integer)}`  
`timeline/step minor years`  
*key*

How often to label minor years on the timeline if displaying them. The idea is that you might want a smaller or lighter font and/or a different date format and/or thinner or shorter marks to be used for intermediate year labels. For example, you might want to print full years only every millennium and the last 3 digits of the year each century.

Default: dependent on other options

`Chronos` labels minor years only if labelling major years. Although the package attempts to correct the result if only `minor years` are requested, it is better to use `step minor year` only in conjunction with major years.

`timeline/step year` = `{(positive integer)}`  
`timeline/step years`  
*key*

How often to label years on the timeline, if you want them all to be formatted in the same way. This key sets `step major years` internally and unsets `step minor year`.

Default: dependent on other options

`Chronos` tries to label years *modulo* the `step major year` and `step minor year` (or `step year`). This means you can start the timeline at 3,814 BCE, request major years every millennium and minor years every half millennium without worrying about which year should be the first (labelled) year. Figure 21 illustrates `chronos`’s default choices in this case. Note that the first year is *not* determined by the start date alone in fig. 21a, but is determined in conjunction with `step major year` and `step minor year` so that -1 BCE ends (and 1 CE begins) at a major year and the turn of millennia generally occur at major years, while the first minor year is 3,500 BCE.

`timeline/step from year` = `{(integer)}`  
*key*

*Do not use this key unless `chronos` produces undesirable results by default.* If for some reason you do *not* want years on the timeline to be determined modulo `step major year` and `step`

minor year, you may tell `chronos` where to begin stepping from. In this case, `chronos` will issue a warning, but it will implement your choice.

Default: dependent on other options

Note that fig. 21b effectively includes no major yearss because `chronos` tests whether the current year is modulo the `step major year` when deciding how to format the year label and markss.

`chronos year <YYYY>` Every major year and minor year receives a name: a `node` or `coordinate` is created with the name `chronos year <YYYY>` for CE and `chronos year -<YYYY>` for BCE. No zeros are added, so years with fewer than four digits get nodes or coordinates with names such as `chronos year -1`. `Chronos` creates all years at the beginning of the year i.e. 1<sup>st</sup> January. (This is analogous to a ruler which marks each centimetre at its beginning.)

`chronos origin` If the timeline spans the switch of eras from BCE to CE *and* the years represented on the timeline are modulo an additional coordinate named `chronos origin` is created at the era switch point, `chronos year 1`.

`chronos year 0` If `year zero` is `false`, as it is by default, a third coordinate named `chronos year 0` is created at `chronos origin`<sup>25</sup>.

`timeline/step divisions` = `{<positive integer>}`  
*key*

Whether the timeline should be further subdivided between major and/or minor years using bare marks and, if so, how many sub-divisions should be made. These are simple subdivisions of the distance between points. Unlike the labels/marks made for years, they do not involve calculations involving dates and are not named.

Default: dependent on other options

`timeline/timeline year` = `{<key-value list>}`  
*key*

Adds `<key-value list>` to the common style used when putting major years and minor years onto the timeline. Do not specify `font` or `anchor` here as they will be overridden. Although both major and minor years use the same general style, they may and, by default do, use different fonts and date format keys.

Example: `timeline/timeline year=fill=chronos timeline background colour`

Default: `text=<timeline foreground>`, `text opacity=1`, `align=center`, `fill opacity=.75` (off line)

Default: `text=<timeline foreground>`, `anchor=center` (on line)

`timeline/timeline years` = `{<text>}`  
*anchor*  
*key*

The TikZ `anchor` to use when creating the nodes for years on or off the timeline. *Do not set this option unless you know you need to.* In most cases, `chronos` will pick a sensible default. The key is provided primarily for cases where you want to rotate the year labels in styles which place them off the line. Even then, you should not need to change the setting if using a style designed for rotation, unless you need to change the angle.

Default: dependent on other options

`timeline/timeline marks` = `true|false`  
*boolean key*

Whether to draw vertical marks on or off the timeline at major years using the style set with `timeline mark`.

Default: `true`

Initially: `true`

`timeline/timeline minor` = `true|false`  
*marks*  
*boolean key*

<sup>25</sup>So the non-existent year zero is marked at the same point as the existent year one. This avoids complications in `\foreach` loops.



Whether to draw vertical marks on or off the timeline at minor years using the style set with `timeline minor mark`.

Default: `true`

Initially: `true`

`timeline/timeline show` = `true|false`

`years`  
*boolean key*

Whether to represent years on or off the timeline at all. If false, neither labels nor marks will be added when the timeline is constructed. This is useful if you wish to use a style such as `event years on line`, but is the nuclear option otherwise.

Default: `true`

Initially: `true`

`timeline/timeline bare` = `true|false`

`marks`  
*boolean key*

Whether to draw bare marks on or off the timeline in between years<sup>26</sup> using the style set by `timeline bare mark`. If you specify `step divisions`, this key will be automatically enabled. If you don't want bare marks, don't set/set to zero `step divisions`.

Default: `true`

Initially: `false`

`timeline/timeline mark` = `{(key-value list)}`

*key*

Adds to the style used for the vertical lines drawn when `chronos` labels a major year on or off the timeline and `timeline marks` is true. These correspond to the major steps at which `chronos` puts years.

Example: `timeline mark=thick`

Default: `draw=(timeline foreground), Triangle[width=Opt 3,reversed,length=Opt 1.5]-, thin, shorten >=-2.5pt (off line)`

Default: `draw=(timeline foreground) (on line)`

`timeline/timeline minor` = `{(key-value list)}`

`mark`  
*key*

Adds `(key-value list)` to the style used for the vertical lines drawn when `chronos` labels a minor year on or off the timeline and `timeline minor marks` is true. These correspond to the minor steps at which `chronos` puts years.

Example: `timeline mark=thin, shorten >=-2pt`

Default: `draw=(timeline foreground), Triangle[width=Opt 3,reversed,length=Opt 1.5]-, very thin, shorten >=-2.5pt (off line)`

Default: `draw=(timeline foreground), thin (on line)`

`timeline/timeline bare mark` = `{(key-value list)}`

*key*

Adds `(key-value list)` to the style used to draw lines at `step divisions`, provided `timeline marks` is true.

Example: `timeline bare mark=thin, <-`

Default: `draw=(timeline foreground), Triangle[width=Opt 3,reversed,length=Opt 1.5]-, very thin, shorten >=-1.5pt (off line)`

Default: `draw=(timeline foreground), thick (on line)`

`timeline/timeline all marks` = `{(key-value list)}`

*key*

<sup>26</sup>If your timeline is very short and 12 `step divisions` are set, `chronos` will actually mark months. In other cases, marks simply divide the available space and are not placed by date.

Adds to the styles used to draw lines at major years, minor years and step divisions. This is equivalent to passing  $\langle$ key-value list $\rangle$  to each of `timeline mark`, `timeline minor mark` and `timeline bare mark`.

`event year on line` *style* The style used to mark years on the timeline if `event years on line` is enabled. By default, the style otherwise used for years when on the line is used. Redefine this if you wish, but you could also use `timeline years`, since no other years will be set on the line anyway.

`event year on line skip` *key* Don't put this particular event's year on the timeline. This can be used if the line would otherwise become too crowded. See section 9.3.

`timeline/era switch off` *line style* The style to use if years are 'off line' and `mark at era switch` is true. With the standard settings, you would get a small mark at the switch, no different from other intermediate marks. Likely you want something more similar in stature to the year labels. Redefine or supplement using standard TikZ techniques.

Default: `thick, shorten >=0pt`

```
\begin{chronos}
  [
    timeline={%
      era switch off line/.append style={ultra thick},% retain undoing of shortening
in default, but make mark thicker
      era switch off line/.style={ultra thick, shorten>=-2pt},% make mark thicker and
longer
      era switch off line/.style={shorten>=-2pt},% make mark longer but use whatever
thickness is used for other marks
    },
  ]
\end{chronos}
```

#### 8.4.4 Timeline Fonts

`major step font` =  $\langle$ key-value list $\rangle$   
*key*

The font used for major years.

Default:

```
\begin{chronos}
  [
    timeline={%
      major step font=\sffamily,
    },
  ]
\end{chronos}
```

`timeline/minor step font` =  $\langle$ key-value list $\rangle$   
*key*

The font used for minor years.

Default:

```
\begin{chronos}
  [
    timeline={%
      minor step font=\sffamily\small,
    },
  ]
\end{chronos}
```

`timeline/eras font` =  $\langle$ key-value list $\rangle$   
*key*

The font used for era labels on the timeline.

Default:

```
\begin{chronos}
[
  timeline={%
    eras font=\sffamily\bfseries\large,
  },
]
\end{chronos}
```

#### 8.4.5 Timeline Colours

`timeline/timeline border` = *<colour name>*

`inner colour`

`timeline/timeline border`

`inner color`

*colour key*

The innermost colour used for the gradient used to shade the timeline borders, if any. This colour is accessible within the `chronos` environment as `chronos timeline border inner colour` or `chronos timeline border inner color`.

Default: the `timeline background colour`, which is itself `black` by default.

```
\begin{chronos}
[
  timeline={%
    timeline border inner colour=blue,
  },
]
\end{chronos}
```

`timeline/timeline border` = *<colour name>*

`outer colour`

`timeline/timeline border`

`outer color`

*colour key*

The outermost colour used for the gradient used to shade the timeline borders, if any. This colour is accessible within the `chronos` environment as `chronos timeline border outer colour` or `chronos timeline border outer color`.

Default: the `background colour`, which is itself `white` by default.

```
\begin{chronos}
[
  timeline={%
    timeline border outer colour=green!5!white,
  },
]
\end{chronos}
```

`timeline/timeline border` = *<colour name>*

`middle colour`

`timeline/timeline border`

`middle color`

*colour key*

The middle colour used for the gradient used to shade the `idx post=colour configuration[type=element,idx as=timeline border]timeline` borders, if any. This colour is accessible within the `chronos` environment as `chronos timeline border middle colour` or `chronos timeline border middle color`.

Default: a 50-50 mix of the `timeline border outer colour` and `timeline border inner colour`.

```
\begin{chronos}
[
  timeline={%
    timeline border middle colour=blue!20!green,
  },
]
\end{chronos}
```

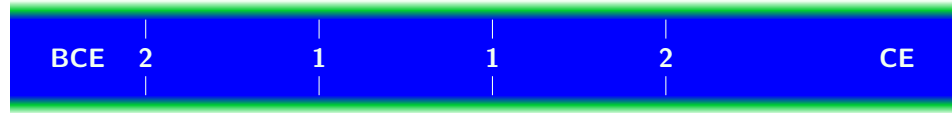


Figure 22: Cumulative effect of colour settings given as examples in sections 8.4.5 and 8.8.

`timeline/timeline` =  $\langle$ colour name $\rangle$

`background`  
colour key

The colour used for the background of the central part of the timeline. This colour is accessible within the `chronos` environment as `chronos timeline background colour` or `chronos timeline background color`.

Default: the foreground colour, which is itself `black` by default (if putting years/marks on the line).

Default: the background colour, which is itself `white` by default (otherwise).

```
\begin{chronos}
[
  timeline={%
    timeline background=blue,
  },
]
\end{chronos}
```

`timeline/timeline` =  $\langle$ colour name $\rangle$

`foreground`  
colour key

The colour used for the foreground of the central part of the timeline. This colour is accessible within the `chronos` environment as `chronos timeline foreground colour` or `chronos timeline foreground color`.

Default: the background colour, which is itself `white` by default (if putting years/marks on the line).

Default: the foreground colour, which is itself `black` by default (otherwise).

```
\begin{chronos}
[
  timeline={%
    timeline foreground=green!5!white,
  },
]
\end{chronos}
```

The cumulative effect of the colour settings given in the examples in this section, together with the `background` and `foreground` from section 8.8 is shown in fig. 22.

#### 8.4.6 Timeline Style

The timeline's overall style can be customised using the following keys, which should (and, by default, do) utilise colours from the colour scheme (see section 13.2). Unless you are creating a `chronos` style, it is best to *add to* rather than *replacing* the existing configuration. For example, if you wish the line to take the form of an arrow, you can simply add the use of an appropriate arrow tip, without modifying the colours, dimensions or markings.

`timeline/timeline line` =  $\{ \langle$ key-value list $\rangle \}$

`timeline/timeline line'`  
`timeline/timeline line+`  
key

The style of the timeline line. `timeline/timeline line+` adds to the current list; `timeline/timeline line'` and `timeline/timeline line+` replace it.

Default: `empty`

Initially: dependent on other options

This key makes it possible to override the default drawing or filling of the timeline lines.

For example, `blues` below includes the following in its timeline configuration,

```

timeline={%
  ...
  timeline line={Bar-Latex,chronos timeline foreground colour,double=chronos timeline
background colour,line width=\timelineht/3,double distance=\timelineht/3,shorten <=-\
timelineht/3,shorten >=-3pt-2.1\timelineht},
  timeline config+={\pgfqkeys{/chronos/timeline}{timeline width-={3pt+2.43\timelineht}}},
  ...
}

```

To make the timeline line into an arrow, without otherwise modifying the existing style, use, for example,

```

timeline={%
  ...
  timeline line+={shorten >={-10mm}, -{Triangle Cap[length=10mm]}},
  timeline config+={\pgfqkeys{/chronos/timeline}{timeline width-=10mm}},
  ...
}

```

The adjustments are required to ensure that the tapered part is not counted when `chronos` calculates how much of the total `timeline width` is available to represent time.

`timeline/timeline arrow` = true|false  
boolean key

Whether the timeline should be or have an arrow or arrows.

Default: true

Initially: false

*Whether this has any effect depends entirely on the `chronos` style. With the default settings, it does nothing but trigger a warning, since `on line` styles cannot have arrows.*

`timeline/no timeline arrow` A convenience key which sets `timeline/timeline arrow` false. *Whether this has any effect depends entirely on the `chronos` style.*  
key

`timeline/timeline border` = {(key-value list)}

The style of the timeline border. `timeline/timeline border+` adds to the current list; `timeline/timeline border` and `timeline/timeline border'` replace it.  
key

Default: empty

Initially: dependent on other options

This key makes it possible to override the default gradients used to fill the borders.

## 8.5 Frame

`frame` = true|false  
boolean key

Whether to draw a frame. This is initially false, but use of `main/frame` will automatically set it to true.

Default: true

Initially: false

`frame uses bb` = true|false  
boolean key

Whether the bounding box should be used to determine any frame at the end of the `chronos` environment. This is true by default and almost certainly what you want unless you are smuggling code into the end of the environment or using the frame for nefarious purposes.

Default: `true`

Initially: `true`

`main/frame` =  $\{(key\text{-value list})\}$

`main/frame'` The style of the TikZ node used to draw the frame. This may be freely redefined as desired.

`main/frame+`  
*key* Default: empty

Example: `main/frame={draw=black,ultra thick,inner sep=5pt}`

Example: `main/frame+={double=blue}`

The second form may be useful if you wish to modify, rather than replace, a style defined by a `chronos` style. `main/frame` and `main/frame'` replace any current list; `main/frame+` adds to it.

## 8.6 Placing Things: Levels & Coordinates

Knowing where to put things may get tricky in complicated or densely-packed timelines. `Chronos` offers several techniques to help. The simplest is to simply use existing items as reference points. `Chronos` names coordinates and nodes routinely and predictably, as explained throughout this documentation. However, sometimes this isn't quite enough. Levels and `chronos` coordinates offer additional help with vertical and horizontal placement respectively.

### 8.6.1 Levels

Levels are not (generally) visible elements. They are instead part of the structure behind-the-scenes. They are, if you like, minimal stage-hands.

The idea is to tell `chronos` how many tiers (approximately) of elements you will create above and below the timeline. For each of these levels, `chronos` creates a standardised node or placeholder based on the settings used for elements of type `life` when the timeline is constructed. Each of these nodes is named: `level 1`, `level 2`, ... above the timeline and `level -1`, `level -2`, ... below<sup>27</sup>. The first node in each direction is shifted `2pt` from the timeline. Subsequent nodes are created directly above each other, with no separation between.

Together with points on the timeline, you then have a crude system for placing things horizontally and vertically. It also enables you to 'stack' text tags, but create them in any order.

`levels` =  $\{(number\ above)\}:\{(number\ below)\}$

*key*  $\langle number\ above \rangle$  and  $\langle number\ below \rangle$  should be non-negative integers specifying how many levels to create above and below the timeline respectively.

Default:

no number of `levels` are created by default (not even zero).

```
\begin{chronos}
[
  levels=4:4,
]
\end{chronos}
```

`levels at` =  $\{(coordinate)\}$

*key*

<sup>27</sup>You can also refer to the nodes above as `u1`, `u2` etc. and those below as `i1`, `i2` etc.

Although they are not intended to be visible in the timeline, placeholder nodes may be rendered visible for debugging or development purposes. As such, it may be useful to move them from their default location.

Default: `chronos mid`

```
\begin{chronos}
[
  levels at=chronos year -200,% make sure this exists!
]
\end{chronos}
```

To render the nodes temporarily visible, see section 14.

### 8.6.2 Chronos Coordinates

In addition to the coordinates and nodes shown in fig. 3, `chronos` names a coordinate or node `chronos year <year>` for each year represented on the timeline. However, depending on your preferred style, this may not provide sufficient horizontal reference points. In that case, you can create additional coordinates. Like `levels`, `chronos` coordinates are not ordinarily visible; unlike `levels`, there is nothing there to see<sup>28</sup>.

`chronos coords` = `{<comma-separated list of years>}`  
*comma-separated list key*

For each `<year>` in `<comma-separated list of years>`, `chronos` will place a single coordinate named `chronos year <year>` at the appropriate point on the timeline. These may be used together with `levels` to specify coordinates e.g. `(chronos year <year> |- level <n>)` is the point vertically aligned with `level <n>` and horizontally aligned with `chronos year <year>`.

Default: `empty`

### 8.6.3 Miscellaneous

`\chronosbaselineskip` The `chronos` environment sets this macro equal to the current `\baselineskip`. It may be used to fine-tune placement in the same way you might use `\baselineskip` outside a `tikzpicture`.  
*macro*

## 8.7 Headings

`headings` = `{<text>/<coordinate 1>/<coordinate 2>,<text>/<coordinate 1>/<coordinate 2>,...}`  
`headings+`  
`headings'`  
*comma-separated list key*

List of value triplets in the format used by PGF's `\foreach`. The list should consist of one or more triplets where `<text>` is used in capitalised form for the content of a node which will be aligned with `chronos main headings` vertically and placed midway between the horizontal positions of `<coordinate 1>` and `<coordinate 2>`. `headings` and `headings+` add to the current list; `headings'` replaces it.

Default: `none`

See section 8.7.1 for an example.

`heading` = `{<text>}{<coordinate 1>}{<coordinate 2>}`  
`heading+`  
`heading'`  
*key*

Add or set a single heading. These forms require the same information as `headings`, `headings+` and `headings'` but as three separate arguments.

Default: `none`

See section 8.7.1 for an example.

`subheadings` = `{<text>/<coordinate 1>/<coordinate 2>/<coordinate 3>,<text>/<coordinate 1>/<coordinate 2>/<coordinate 3>,...}`  
`subheadings+`  
`subheadings'`  
*comma-separated list key*

<sup>28</sup>You could label them, of course, but they are just regular PGF/TikZ coordinates and so naturally invisible.

List of value quadruplets in the format used by PGF's `\foreach`. The list should consist of one or more quadruplets where  $\langle text \rangle$  is used in capitalised form for the content of a node which will be aligned with  $\langle coordinate 4 \rangle$  vertically and placed midway between the horizontal positions of  $\langle coordinate 1 \rangle$  and  $\langle coordinate 2 \rangle$ .  $\langle coordinate 4 \rangle$  should be either `chronos upper subheadings` or `chronos lower subheadings`. `subheadings` and `subheadings+` add to the current list; `subheadings'` replaces it.

Default: none

See section 8.7.1 for an example.

```
subheading = { $\langle text \rangle$ }{ $\langle coordinate 1 \rangle$ }{ $\langle coordinate 2 \rangle$ }{ $\langle coordinate 3 \rangle$ }
subheading+
subheading'
key
```

Add or set a single subheading horizontally aligned with the midpoint between the horizontal positions of  $\langle coordinate 1 \rangle$  and  $\langle coordinate 2 \rangle$  and vertically aligned with  $\langle coordinate 3 \rangle$ .  $\langle coordinate 3 \rangle$  should be either `chronos lower subheadings` or `chronos upper subheadings`, though this is not enforced. These forms require the same information as `subheadings`, `subheadings+` and `subheadings'` but as four separate arguments.

Default: none

See section 8.7.1 for an example.

```
century subheadings = { $\langle number list \rangle$ }{ $\langle text \rangle$ }
century subheadings+
century subheadings'
comma-separated list key
```

Create a subheading aligned with `chronos lower subheadings` for each of the centuries specified in  $\langle number list \rangle$ , using  $\langle text \rangle$  as the superscript for each. Note that for the  $n$ th century `chronos year` coordinates much exist for both the year  $n00$  and the year  $(n+1)00$ . `century subheadings` and `century subheadings+` add to the current list; `century subheadings'` replaces it.

Default: none

See section 8.7.1 for an example.

```
century subheading = { $\langle number \rangle$ }{ $\langle text \rangle$ }
century subheading+
century subheading'
key
```

Add or set a single century subheading. These forms require the same information as `century subheadings`, `century subheadings+` and `century subheadings'` but expect a single  $\langle number \rangle$ .

Default: none

See section 8.7.1 for an example.

### 8.7.1 Example

For example, here's an excerpt from the code used for fig. 2 which demonstrates the use of keys to create headings and subheadings.

```
\begin{chronos}
[
  timeline={%
    dates={-500}:1500,
  },
  chronos coords={-500,-450,...,1500},
  headings={heading/chronos year 800/chronos year 1500,another heading/chronos year
-450/chronos year 1,a third heading/chronos year 100/chronos year 800},
  subheadings={subheading on upper level/chronos year -250/chronos year 500/chronos
upper subheadings,subheading on lower level/chronos start/chronos year -100/chronos
lower subheadings,another subheading/chronos year 1000/chronos year 1500/chronos upper
subheadings,yet another subheading/chronos year 500/chronos year 1000/chronos lower
subheadings},
  century subheadings={12,13,...,15}{th},
  century subheading={1}{st},
]
```



```
\end{chronos}
```

Note the use of `chronos coords` to add coordinates for years which may not be visibly represented on the timelines. This ensures the `chronos year` coordinates needed to place headings, subheadings and century subheadings exist. It is permissible for coordinates to lie beyond the timeline's end date, though you may get strange results if you create coordinates too distant from the endpoint.

### 8.7.2 Headings Configuration

```
headings style = {(key-value list)}
```

```
headings style+
```

```
headings style' PGF/TikZ options to apply to headings. headings style and headings style' replace the
key current list; headings style+ replaces it.
```

Default: empty

Example: `headings style={align=center, anchor=base, inner sep=0pt, outer sep=0pt, color=chronos main colour, opacity=.8, font=\bfseries}`

Although the style is empty by default, `anchor=base` is passed to the node prior to the style. If you do not want this alignment, therefore, you must specify an alternative anchor.

```
subheadings style = {(key-value list)}
```

```
subheadings style+
```

```
subheadings style' PGF/TikZ options to apply to subheadings. subheadings style and subheadings style'
key replace the current list; subheadings style+ replaces it.
```

Default: empty

Example: `subheadings style={align=center, anchor=base, inner sep=0pt, outer sep=0pt, font=\bfseries\itshape\footnotesize, color=chronos main colour!75!chronos main background colour, opacity=.8}`

Although the style is empty by default, `anchor=base` is passed to the node prior to the style. If you do not want this alignment, therefore, you must specify an alternative anchor.

## 8.8 Colours

For timeline colours, see section 8.4.5. For basic colours, see section 8.3.

The *easiest* way to customise colours is to load a colour scheme as explained in section 7.2.

The *simplest* way to make use of colours is to specify colours for elements manually. Defaults can be configured in the timeline setup.

```
life/default colour = (colour name)
```

```
event/default colour
```

```
period/default colour
```

```
theory/default colour
```

```
info/default colour
```

```
life/default color
```

```
event/default color
```

```
period/default color
```

```
theory/default color
```

```
info/default color
```

```
colour key
```

Sets the default colour for elements of the specified type. This provides a fall-back colour and ensures some colour is always found, even when none is specified.

Default: `chronos main colour`

See foreground in section 8.4.5. For example,

```
\begin{chronos}
[
  life/default colour=chronos timeline foreground colour,
  event/default colour=chronos timeline foreground colour!50!chronos main colour,
  period/default colour=chronos main colour,
  theory/default colour=chronos timeline background colour,
  info/default colour=chronos main colour!50!chronos main background colour,
]
\end{chronos}
```

Alternatively or in addition, colours can be set on a per-element basis (sections 9.3 to 9.5).

### 8.8.1 Colour Rotation

More complex configuration can be achieved using lists of colours from which `chronos` selects when adding elements to the timeline. If you wanted to typeset all elements of type `life` in the colours of the rainbow taken in order, for example, it would be error prone and inflexible to assign colours manually. Instead, we would like `chronos` to select the colours in turn, keep track of which colour is used for which element and automatically adjust the assignments if items are inserted or removed from the timeline.

To achieve this, `chronos` supports colour rotation for text tags, connections and lines of type `life`, `event`, `period` and `theory`.

`Chronos` assigns all elements belonging to tags `life`, `event`, `period`, `theory` and `info` a colour with a predictable colour name. `Chronos` determines the colour to assign to the element as follows.

1. First, `chronos` checks whether a `colour` has been specified for the element.
  - ↳ If it has, that `colour` is assigned.
2. If not, `chronos` checks whether colour rotation is enabled for the relevant type of element.
  - ↳ If it is, `chronos` assigns the next colour from the specified colour list for the type of element in question and according to whether the element will be placed above or below the timeline. That colour is then moved to the bottom of the list.
3. If rotation is not enabled, a configurable `default` colour is assigned instead.

8 sets of colours can be configured which correspond to material placed above and below the timeline for each of `default`, `life`, `event` and `period`. See section 8.8.3 for details.

### 8.8.2 Using Colours

There are at least two things you might want `chronos` to tell you about elements' colours. First, you might want to know the `colour` assigned to a particular element *after* the element is created. Second, you might want to know the `colour` assigned to the current element during creation. Note 8.8.2.1 addresses the first, note 8.8.2.2 the second.

**8.8.2.1 Colours by Element Name** Regardless of how the colour assigned to an element ends up being determined, `chronos` assigns the colour a name derived from the element so that it can be used later, if required.

The result of this is that, assuming we have created an element of type `life` with `name=donald knuth`, we can write

```
\draw [chronos connect=life:donald knuth] (text tag connector donald knuth1) -- (text tag connector metafont2);
```

to connect Donald Knuth with an element named `metafont`, which might be of type `theory`. The code used to draw the connection will use the same style and colour as any connection drawn between Donald Knuth and the timeline<sup>29</sup>. This colour can also be (and, by default, is) passed to the text tag. For example, a darker shade might be used for the text and outline of the node, and a paler one as a filling. The colour may also be accessed directly using `colour donald knuth`, `color donald knuth` or, if simple colour names are enabled<sup>30</sup>, simply `donald knuth`.

`colour` *<name>* Colour names assigned to the element created with `name= <name>`. *life, event, period, theory, info*  
`color` *<name>*  
*colour* *<name>* Note these names cannot be used during the element's creation in `\chronos{tag}`.

<sup>29</sup>See section 9.6

<sup>30</sup>See sections 5 and 8.8.4.

`<name>` An additional name for colour `<name>`. *life, event, period, theory, info*  
*colour*  
 Requires simple colour names.

**8.8.2.2 The Current Tag Colour** You may also wish to refer to an element’s assigned colour while creating it.

`chronos current tag colour` The colour assigned to the current element during creation. *life, event, period, theory, info*

`chronos current tag color`  
*colour* This colour is available when creating an element belonging to an appropriate tag i.e. inside the tag context setup when using `\chronoslif`, `\chronosevent`, `\chronosperiod` or `\chronostheory`. Outside a tag context, `chronos current tag colour` and `chronos current tag color` are equivalent to `chronos main colour`.

Example: `\hypersetup{urlcolor=chronos current tag colour}`

Figure 1 uses this code within a `figure` to override the colour of URL links locally in such a way that each hyperlink’s colour is the colour of the text tag to which it belongs.

### 8.8.3 Colour Lists

The lists of colours for colour rotation (section 8.8.1) may be loaded from provided styles, specified directly.

No specific lists are provided for *theory*, but you can obviously reserve the default lists for this type, if you want distinct lists for everything.

`colours above` = *<list of colour names>*

`colors above`  
*colour list key* When given in the *<chronos preamble>* or to `\chronosset`, sets the default colour list for use above the timeline to *<list of colour names>*.

Default: Red,Orange,Yellow,Green,Blue,MidnightBlue,Violet

`colours below` = *<list of colour names>*

`colors below`  
*colour list key* When given in the *<chronos preamble>* or to `\chronosset`, sets the default colour list for use below the timeline to *<list of colour names>*.

Default: Red,Orange,Yellow,Green,Blue,MidnightBlue,Violet

`colour rotation` = true|false

`color rotation`  
*boolean key* When given in the *<chronos preamble>* or to `\chronosset`, determines whether colours are rotated by default or not.

Default: true

This key does not override tag-specific settings. Depending on other settings, therefore, using this key may have no effect or it may enable colour rotation for everything.

`rotate all colours` When given in the *<chronos preamble>* or to `\chronosset`, enables both default colour rotation and colour rotation for all supported tags. This key overrides tag-specific settings.

`rotate all colors`  
*key*  
`no colour rotation` When given in the *<chronos preamble>* or to `\chronosset`, disables default colour rotation. This key does not override tag-specific settings. Depending on other settings, therefore, using this key may have no effect or it may prevent colour rotation completely.

`no colour rotation`  
*key*  
`rotate no colours` When given in the *<chronos preamble>* or to `\chronosset`, disables both default colour rotation and colour rotation for all tags. This key overrides tag-specific settings.

`rotate no colors`  
*key*  
 Note that, like many `chronos` keys, the effect of setting these depends on the current key path. That means that using a key when creating a tag of type *life*, for example, the key will have a different effect from using in in the *<chronos preamble>*.

`life/colours above` =  $\langle$ list of colour names $\rangle$   
`life/colors above`  
*colour list key* Sets the colour list for use with elements of type `life` placed above the timeline to  $\langle$ list of colour names $\rangle$ .  
 Default: `empty`

`life/colours below` =  $\langle$ list of colour names $\rangle$   
`life/colors below`  
*colour list key* Sets the colour list for use with elements of type `life` placed below the timeline to  $\langle$ list of colour names $\rangle$ .  
 Default: `empty`

`event/colours above` =  $\langle$ list of colour names $\rangle$   
`event/colors above`  
*colour list key* Sets the colour list for use with elements of type `event` placed above the timeline to  $\langle$ list of colour names $\rangle$ .  
 Default: `empty`

`event/colours below` =  $\langle$ list of colour names $\rangle$   
`event/colors below`  
*colour list key* Sets the colour list for use with elements of type `event` placed below the timeline to  $\langle$ list of colour names $\rangle$ .  
 Default: `empty`

`period/colours above` =  $\langle$ list of colour names $\rangle$   
`period/colors above`  
*colour list key* Sets the colour list for use with elements of type `period` placed above the timeline to  $\langle$ list of colour names $\rangle$ .  
 Default: `empty`

`period/colours below` =  $\langle$ list of colour names $\rangle$   
`period/colors below`  
*colour list key* Sets the colour list for use with elements of type `period` placed below the timeline to  $\langle$ list of colour names $\rangle$ .  
 Default: `empty`

#### 8.8.4 Simple Colour Names

If you wish to enable or disable `simple colour names` (see sections 5 and 8.8) for a particular timeline, use one of the following two options.

`simple colour names` = `true|false`  
`simple color names`  
*boolean key* Enable or disable `simple colour names`.  
 Default: `true`  
 Initially: `true`  
 Example: `simple colour names=false,`  
 See section 5 for details, but note that the keys here are implemented differently.

`no simple colour names` Disable `simple colour names`.  
`no simple color names`  
*key* Example: `no simple colour names,`  
 See section 5 for details, but note that the keys here are implemented differently. In particular, unlike both `simple colour names` and the load-time option, `no simple colour names` does *not* take an argument.

## 9 Adding Elements to the Timeline

See section 6.2 for an overview of the components available for use in the `timeline`'s *(`timeline additions specification`)*.

Seven macros are provided for adding elements to the `timeline`. Conceptually, these are always 'above' or 'below', though they could also be created to the left or right. For an overview of the way these commands work, see section 6.

### 9.1 Adding Connectable Elements

The most important kinds of additions `chronos` supports are those which can be connected to the `timeline` itself.

#### 9.1.1 Timeline-Connectable Elements

`\chronoslife` *{(key-value list)}*  
macro

*life*

Create an element of type `life`. The *(key-value list)* should specify values for `chronos` keys and may include arbitrary `TikZ` keys. At a minimum, `name` and `birth` must be specified for a living person. If the person is dead, both `birth` and `death` or `dates` should be given. If no date of death is specified, `chronos` assumes the person is living and uses the current date when placing the element on the `timeline`.

Table 5 summarises the `chronos` keys supported by elements of type `life`, with detailed usage information provided in sections 9.3 and 9.5.

Creating the element involves constructing, naming and connecting several components. These are described in table 6 for a typical case, but note that additional connectors require `connectors` to be set, the connection is drawn only if `connect` is `true` and some components may be rendered invisibly.

For example,

```
\chronoslife{%
  name=leslie lampport,
  birth={1941-02-07},
  at=leslie lampport |- u1.north,
  connectors=east,
  tag anchor=west,
  xshift=10pt,
}
```

This will create a text node (text tag) named `tag leslie lampport` with two connectors, `10pt` to the right of coordinate `(leslie lampport |- u1.north)`, using the settings for `life`. The main connector, named `main connector leslie lampport` or `connector leslie lampport0`, will be at the `TikZ` anchor `west`. This will be used as the `TikZ` anchor when placing the node and used to connect it to the `timeline`. A second connector, named `connector leslie lampport1` will be created at the `east`, which may be used to connect the text tag to other elements.

A `chronos` connector, named `chronos connector leslie lampport` will be created on the `timeline` at the midpoint between `1941-02-07` and today's date. A line will also be marked on the `timeline border`, on the `timeline` or near the `timeline`, between these dates.

Note that the coordinate `leslie lampport` need not (and generally should not) exist when this command is given. A coordinate of this name will be created on the `timeline` midway between the birth and death dates (or, in this case, between the birth date and today's date) prior to creation of the text tag. However, `u1` must exist. In this case, it refers to a node created using the `levels` option. `u1` is also known as `level 1` and refers to the first level above the `timeline`. `Lampport` will be a bit higher because the text tag's `west` anchor will be aligned with the north of node `level 1`.

Table 5: Keys which are enabled (✓) and disabled (–) for tag contexts associated with `chronos` macros.

Option	life	event	period	theory	theory circle	info	main	copyright copyleft
primarily per item configuration	name	✓	✓	✓	✓	✓	✓	✓
	as is	✓	✓	✓	✓	–	–	–
	at	✓	✓	✓	✓	✓	✓	✓
	tag anchor	✓	✓	✓	✓	–	✓	✓
	colour   color	✓	✓	✓	✓	–	✓	–
	connect	✓	✓	✓	–	–	–	–
	connectors   connectors+   connectors'	✓	✓	✓	✓	–	–	–
	place above	✓	✓	✓	✓	–	–	–
	place below	✓	✓	✓	✓	–	–	–
	dates	✓	–	✓	–	–	–	–
	date	–	✓	–	–	–	–	–
	birth	✓	–	–	–	–	–	–
	death	✓	–	–	–	–	–	–
	start	–	–	✓	–	–	–	–
	end	–	–	✓	–	–	–	–
	dates content	✓	✓	✓	–	–	–	–
	name content	✓	✓	✓	✓	–	✓	✓
	text content	✓	✓	✓	✓	–	✓	–
	event year on line skip	–	✓	–	–	–	–	–
	caption	–	–	–	–	–	✓	–
	labels	–	–	–	–	✓	–	–
	circle texts	–	–	–	–	✓	–	–
	sizes	–	–	–	–	✓	–	–
	author	–	–	–	–	–	–	✓
	copyleft	–	–	–	–	–	–	✓
	notice	–	–	–	–	–	–	✓
	rotate	–	–	–	–	–	–	✓
	year	–	–	–	–	–	–	✓
primarily all-of-type-tag configuration	date format	–	✓	–	–	–	–	–
	date formats	✓	–	✓	–	–	–	–
	full dates	✓	✓	✓	–	–	–	–
	only years	✓	✓	✓	–	–	–	–
	show eras	✓	✓	✓	–	–	–	–
	without eras	✓	✓	✓	–	–	–	–
	only text	✓	✓	✓	–	–	–	–
	tag   tag+	✓	✓	✓	✓	–	✓	–
	connection   connection+	✓	✓	✓	✓	–	–	–
	line   line+	✓	✓	✓	–	–	–	–
	text tag   text tag+	✓	✓	✓	✓	–	✓	–
	default colour   color	✓	✓	✓	✓	–	✓	–
	colours   colors above	✓	✓	✓	✓	–	–	–
	colours   colors below	✓	✓	✓	✓	–	–	–
	colour   color rotation	✓	✓	✓	✓	–	–	–
text tag yshift	✓	✓	✓	✓	–	–	–	

Table 6: Components of elements of tag types life and period.

Element	Name	Description	TikZ Type
–	$\langle name \rangle$	Point on timeline midway between $\langle birth \rangle$ and $\langle death \rangle$ (life) or $\langle start \rangle$ and $\langle end \rangle$ (period).	coordinate
line	–	Line or rectangle on or near timeline or timeline border from $\langle birth \rangle$ to $\langle death \rangle$ (life) or $\langle start \rangle$ to $\langle end \rangle$ (period).	$\backslash path$
chronos connector text tag	chronos connector $\langle name \rangle$ tag $\langle name \rangle$	Connection point midway along line. Main box representing element. By default, contains dates above capitalised $\langle name \rangle$ (life) or capitalised $\langle name \rangle$ above dates (period).	node node
main connector connection	main connector $\langle name \rangle$ –	Connection point at TikZ anchor of text tag. Line between the chronos connector and main connector.	node $\backslash draw$
connectors	connector $\langle name \rangle n$	Secondary connection point(s) at TikZ anchor(s) of text tag, named in order with $n = 1, 2, \dots$	node

Since the `text tag` is shifted right, the connection will be drawn using `|–` rather than `--`. If more complex paths are required, `connect=false` may be used and the `text tag` connected to the timeline manually. A `chronos connector`, `chronos connector leslie lampport`, would then be created on the timeline, as would the `connectors` on the text tag, but the connection itself would be omitted.

In addition, a colour named `colour leslie lampport` or `color leslie lampport` will be created. This is typically used in the styles responsible for the appearance of the `text tag`, `line`, `connection` and `connectors` and may be referenced and reused later. If simple colour names or simple color names are used, it may also be referenced as `leslie lampport`.

`\chronosevent`  $\{ \langle key-value list \rangle \}$  *event*  
macro

Create an element of type `event`. This is intended for events spanning no more than a day. The  $\langle key-value list \rangle$  should specify values for `chronos` keys and may include arbitrary TikZ keys. At a minimum, `name` and `date` should be specified.

Table 5 summarises the `chronos` keys supported by elements of type `event`, with detailed usage information provided in sections 9.3 and 9.5.

Creating the element involves constructing, naming and connecting several components. These are described in table 7 for a typical case, but note that additional `connectors` require `connectors` to be set, the connection is drawn only if `connect` is `true` and some components may be rendered invisibly.

For example,

```
\chronosevent {%
  name=\emph{Common Sense},
  as is,
  yshift=5pt,
  date=1776,
  text=WildStrawberry,% will affect text for the element itself but not drawing,
  filling or the assigned colour
  place below,% does nothing because the positive yshift pushes the element above the
  timeline
}%
```

Note the use of `as is` to prevent errors trying to capitalise `\emph`. `place below` has no effect here: the item still ends up above the timeline due to `yshift=5pt`. Note the use of only a year in

Table 7: Components of an element of tag type event.

Element	Name	Description	TikZ Type
–	$\langle name \rangle$	Point on timeline at $\langle date \rangle$ .	coordinate
line	–	Line from timeline to the edge of timeline border at $\langle date \rangle$ .	$\backslash path$
chronos connector	<code>chronos connector</code> $\langle name \rangle$	Connection point at end of line.	node
text tag	<code>tag</code> $\langle name \rangle$	Main box representing element. By default, contains the date above the capitalised $\langle name \rangle$ .	node
main connector	<code>main connector</code> $\langle name \rangle$	Connection point at TikZ anchor of text tag.	node
connection	–	Line between the chronos connector and main connector.	$\backslash draw$
connectors	<code>connector</code> $\langle name \rangle n$	Secondary connection point(s) at TikZ anchor(s) of text tag, named in order with $n = 1, 2, \dots$	node

`date`. If you only specify years, you probably want to configure your `timeline` to avoid printing full dates or you will end up with everything happening on January 1<sup>st</sup>. See section 8.2.2.

`\chronosperiod`  $\{ \langle key-value list \rangle \}$   
*macro*

*period*

Create an element of type `period`. This is intended for extended events spanning more than one day. The  $\langle key-value list \rangle$  should specify values for `chronos` keys and may include arbitrary TikZ keys. At a minimum, `name` and `start` must be specified for an ongoing period. If the extended event has ended, both `start` and `end` or `dates` should be given. If no end date is specified, `chronos` assumes the period is ongoing and uses the current date when placing the element on the timeline.

Table 5 summarises the `chronos` keys supported by elements of type `period`, with detailed usage information provided in sections 9.3 and 9.5.

Creating the element involves constructing, naming and connecting several components. These are described in table 6 for a typical case, but note that additional `connectors` require `connectors` to be set, the connection is drawn only if `connect` is `true` and some components may be rendered invisibly.

For example,

```
\chronosperiod {%
  dates={476-01-01}:{476-10-31},
  name=Fall of the\Roman Empire,
  colour=blue,
  line+={draw=gray},% draw ugly grey border around line
}
```

This will construct an element analogous to the one created for `Lamport`. Note that the names of nodes and coordinates will be based on `Fall of theRoman Empire` because `chronos` will remove the `\` and the capitalisation won't change. `colour` `Fall of theRoman Empire` will be `blue` and the line representing the period on the timeline will be drawn in `gray` but potentially filled in `blue`. This is because `line+` adds to any existing style rather than replacing it.

### 9.1.2 Adding Other Connectable Elements

Of the remaining elements, only those of type `theory` are connectable. While they cannot be connected to the timeline<sup>31</sup>, `chronos` can create `connectors` for them to enable easy connections to other elements.

`\chronostheory`  $\{ \langle key-value list \rangle \}$   
*macro*

*theory*

<sup>31</sup>At least, `chronos` won't connect them for you.



Table 8: Components of an element of tag type theory.

Element	Name	Description	TikZ Type
–	$\langle name \rangle$	Alias for <code>text tag</code> .	node
text tag	<code>tag</code> $\langle name \rangle$	Main box representing element. By default, contains the capitalised $\langle name \rangle$ .	node
main connector	<code>main connector</code> $\langle name \rangle$	Connection point at TikZ anchor of text tag.	node
connectors	<code>connector</code> $\langle name \rangle n$	Secondary connection point(s) at TikZ anchor(s) of text tag, named in order with $n = 1, 2, \dots$	node

Table 9: Components of an element of tag type theory circle.

Element	Name	Description	TikZ Type
–	$\langle name \rangle$	A (rectangular!) box containing all other components.	node
–	<code>label above</code> $\langle name \rangle$	Label above the ring.	nodes
–	<code>label below</code> $\langle name \rangle$	Label below the ring.	nodes
–	$\langle name \rangle 1$	Centre of the ring.	coordinate

Create an element of type theory. The  $\langle key-value list \rangle$  should specify values for `chronos` keys and may include arbitrary TikZ keys. At a minimum, `name` must be specified, but `at` is required for placement. If left unspecified, `chronos` will place the theory at `chronos origin` and issue a warning.

Table 5 summarises the `chronos` keys supported by elements of type theory, with detailed usage information provided in sections 9.3 and 9.5.

Creating the element involves constructing and naming components of up to two kinds. These are described in table 8 for a typical case, but note that a `connector` requires `tag anchor` or `connectors` to be set. Connectors may be rendered invisibly.

## 9.2 Adding Non-Connectable Elements

The remaining elements are non-connectable.

`\chronostheorycircle`  $\{ \langle key-value list \rangle \}$  *theory circle*  
*macro*

Create a theory circle. The  $\langle key-value list \rangle$  should specify values for `chronos` keys and may include arbitrary TikZ keys. At a minimum, `name` must be specified, but `at` is required for placement.

Table 5 summarises the `chronos` keys supported by elements of type theory circle, with detailed usage information provided in sections 9.3 and 9.5.

Creating the element involves constructing and naming components of several kinds. Depending on the style, the element is intended to consist of a ring with text placed on the upper and lower semicircles and labels above and below. A symbol or picture can then be placed at the centre. The components are described in table 9 for a typical case, but note that these are style-dependant. In practice, this element could be used in other ways since it depends primarily on re-definable styles. However, in that case, there's no reason to avoid — and every reason to prefer — a new name.

For example,

```
\chronostheorycircle{
  name=gutenberg revolution,
  at=chronos end |- printing press.center,
  sizes=15pt:9pt,
  circle texts=Gutenberg:Revolution,
  labels=15\textsuperscript{th}c.\thinspace \celabel:21\textsuperscript{st}c.\thinspace \celabel,
```

Table 10: Components of an element of tag type info.

Element	Name	Description	TikZ Type
–	$\langle name \rangle$	Alias for text tag.	node
text tag	tag $\langle name \rangle$	Main box representing element. Empty by default.	node
caption	caption $\langle name \rangle$	By default, contains the capitalised $\langle name \rangle$ .	node

Table 11: Components of an element of tag type main.

Element	Name	Description	TikZ Type
text tag	$\langle name \rangle$	By default, contains the capitalised $\langle name \rangle$ .	node

```
}
}
```

`\chronosinfo`  $\{(key\text{-}value\ list)\}$  *info*  
*macro*

Create an element of type `info` i.e. an information box with a distinct caption. The  $\langle key\text{-}value\ list \rangle$  should specify values for `chronos` keys and may include arbitrary TikZ keys. At a minimum, `name` and `at` must be specified.

Table 5 summarises the `chronos` keys supported by elements of type `info`, with detailed usage information provided in sections 9.3 and 9.5.

Creating the element involves constructing and naming two components. These are described in table 10 for a typical case.

For example,

```
\chronosinfo{%
  name=syllogism,
  at=chronos year 200 |- u4,
  text content={All men are\[-.25em]\hspace*{1.5em}mortal.\Socrates is a\[-.25em]
] \hspace*{1.5em}man.\$\therefore$ Socrates is\[-.25em]\hspace*{1.5em}mortal.},
  anchor=north,
  caption=A Syllogism,
}
```

Note the use of `caption` to override the default reuse of `name`. This allows the box to be captioned ‘A Syllogism’, while allowing references simply to `syllogism`.

`\chronosmaintitle`  $\{(key\text{-}value\ list)\}$  *main*  
*macro*

Create the main title. The  $\langle key\text{-}value\ list \rangle$  should specify values for `chronos` keys and may include arbitrary TikZ keys. At a minimum, `name` and `at` must be specified.

Table 5 summarises the `chronos` keys supported by elements of type `main`, with detailed usage information provided in sections 9.3 and 9.5.

The result is simply a TikZ node, as described in table 11.

`\chronoscopyright`  $\{(key\text{-}value\ list)\}$  *copyleft, copyright*  
*macro*

Create a `copyleft` or `copyright` notice. The  $\langle key\text{-}value\ list \rangle$  should specify values for `chronos` keys and may include arbitrary TikZ keys. At a minimum, `at` should be specified to avoid a warning.

Table 5 summarises the `chronos` keys supported by elements of type `copyleft` and `copyright`, with detailed usage information provided in sections 9.4 and 9.5.

The result is simply a TikZ node, as described in table 12.

`\chronoscopyleft`  $\{(key\text{-}value\ list)\}$  *copyleft, copyright*  
*macro*

Table 12: Components of an element of tag type `copyleft` and `copyright`.

Element	Name	Description	TikZ Type
text tag	<code>&lt;name&gt;</code>	By default, contains a standard copyright or copyleft notice utilising whatever details are provided or default values and dummy texts.	node

Create a copyleft notice. Sets `copyleft true` before passing `{<key-value list>}` to `\chronoscopyright`.

### 9.3 Additional Elements: Local Configuration

These keys are designed for use when creating specific elements. That is, they should be used in the argument of a `chronos` command such as `\chronoslife`, `\chronosevent`, `\chronosperiod`, `\chronostheory`, `\chronosinfo`, `\chronostheorycircle`, `\chronosmaintitle`, `\chronoscopyleft` or `\chronoscopyright`. If used globally (e.g. in `\chronosset` or the `<chronos preamble>`), they will determine defaults for all elements (belonging to the relevant tag). Where this makes sense, the possibility is noted below; where it is not noted, global usage is unsupported.

**name** = `<text>` *life, event, period, theory, info, theory circle, main, copyleft, copyright*  
*key*

The base name of the element. Except for `\chronosmaintitle`, `\chronoscopyleft` and `\chronoscopyright`, **this key is required**.

Default: `main title` (main)

Default: `copyleft and copyright` (copyleft and copyright)

By default, `<text>` is used multiple times.

First, it is capitalised and used for (part of) the content created for the element added to the timeline. `as is` prevents capitalisation. In the case of `life`, `event` and `period`, it is used for the non-date part of the content. In the case of `theory` and `main`, it is used for the whole content of the title. In the case of `info`, it is used to create the caption. In the case of `copyleft` and `copyright`, it is used as the author's name if `author` is unset. It is not used to create content in the case of `theory circle`.

Second, it is processed to create multiple names for different parts of the element e.g. names for `connectorss`, `text tags` etc. Processing attempts to remove some things which would be problematic when used as part of the names for coordinates and nodes, but markup can still cause problems. In this case, use `name content` or `text content` for the marked-up version and give `<name>` a suitably simplified version.

**as is** = `true|false` *life, event, period, theory*  
*boolean key*

Whether to skip capitalisation of `name` if using it in the textual content of the element. If true, the `name` will *not* be capitalised; if false, it will be. Capitalisation is never used when setting the names of coordinates, nodes etc.

Default: `false`

**at** = `<coordinate>` *life, event, period, theory, info, theory circle, main, copyleft, copyright*  
*key*

Where to place the element. This key is mandatory for `theory circle`, `info`, `main`, `copyleft` and `copyright`.

For `life`, `event`, `period` and `theory`, the key is optional. By default, the text tag will be placed at `<name>`, which is a point on the timeline calculated according to date, offset vertically by either `yshift` or `text tag yshift`. Since `theory` text tags do not have dates, they are placed at the `(chronos origin)` and a warning is issued.

Example: `at=<name> |- level -2`

This will align  $\langle name \rangle$  horizontally with its placement point on the timeline and vertically with level  $-2$ , assuming at least two levels exist below the timeline. See section 8.6.

**tag anchor** =  $\langle node anchor \rangle$  *life, event, period, theory, info, main, copyleft, copyright*  
*key*

The PGF/TikZ anchor to use for the element's main connector. This is the point chronos uses to connect life, event and period text tags to the timeline. By default, this anchor is also used when placing the text tag. That is, **tag anchor** is used as the TikZ **anchor**. If you want different anchors to be used for the connection point and for placement, you can use both keys.

```
\chronoslife{%
  name=friedrich gottlob koenig,
  dates={1774-04-17}:{1833-01-17},
  at=friedrich gottlob koenig |- i1.north,
  tag anchor=east,
  anchor=north east,
  xshift=-5pt,
}
```

Default[for elements below the timeline]north Default[for elements above the timeline]south These defaults may be overridden on a per-tag basis by setting the key globally. For example,

```
\begin{chronos}[%
  life/tag anchor=50,
  event/tag anchor=north east,
  period/tag anchor=south,
]
\end{chronos}
```

**colour** =  $\langle colour name \rangle$  *life, event, period, theory, info*  
**color**  
*colour key*

The colour to assign to the element. The effect depends on the type of element being created and other settings. To modify the default colours, see sections 8.8 and 9.5.

**connect** = true|false *life, event, period*  
*boolean key*

Whether to connect the element to the timeline.

Default: true

**connectors** =  $\langle list of node anchors \rangle$  *life, event, period, theory*  
**connectors+**  
**connectors'** *key*

Connection points to create on the element's text tag. Applies to life, event, period and theory. **connectors** and **connectors+** add to the existing list (if any). **connectors'** replaces it.

Default: empty

```
connectors={north,south,east,west},
connectors'={north},
connectors+={south},
connectors={east},
```

This code would result in connection points at the node's **north**, **south** and **east** anchors.

Note that one connection point is always created if the element is of a kind which could be connected to the timeline.

**default colour** Use the default colour assigned to elements of this tag type. *life, event, period, theory, info, main*  
**default color**  
*key*

This key does something quite different if used in a global configuration context. See section 9.5 and section 8.8 for details. For example,

```
\begin{chronos}
[
  life/colour rotation=true,
```

```

    life/default colour=gray,
  ]
  \chronoslife{% use colour from life's colours above colour list
    name=chris,
    dates={1038-01-10}:{1066-11-19},
    at=u2 -| chris,
  }
  \chronoslife{% use gray
    name=sandy,
    dates={1345-11-23}:{1378-12-24},
    at=u3 -| sandy,
    default colour,
  }
  \chronoslife{% use blue
    name=alex,
    dates={1246-09-22}:{1295-02-07},
    at=u5 -| alex,
    colour=blue,
  }
  \chronoslife{% use colour from life's colours below colour list
    name=hilary,
    dates={1156-06-12}:{1201-04-01},
    at=i4 -| hilary,
  }
\end{chronos}

```

Note the lack of an argument when used locally.

Note that there is no reason to use this key unless you wish to override colour rotation for a particular element. It suffices not to specify a colour.

`place below` = true|false  
boolean key

*life, event, period, theory*

By default, `chronos` alternates putting elements of a particular type above and below the timeline, but you may wish to put everything above or below, all elements of particular type above or below. Furthermore, you may wish to override the default for particular elements. Densely-packed timelines, especially, can require considerable intervention in order to make best use of the space while arranging things in a clear and (hopefully) visually appealing way.

```

\chronosevent {%
  name=red letter day,
  date=1750,
  place below=false,
}

```

Default: true

Initially: dependent on other options

`place above` A convenience key equivalent to `place below=false`.  
key

*life, event, period, theory*

Thus the previous code could be rewritten as

```

\chronosevent {%
  name=red letter day,
  date=1750,
  place above,
}

```

`dates` = {(birth date)}:{(death date)}  
date key  
={ (start date) }:{ (end date) }

*life*

*period*

Dates of a life or period, specified as explained in section 8.2. The second date may be empty for a living person or ongoing occurrence. This key offers a more compact syntax as an alternative to the keys `birth` and `death` or `start` and `end` explained below. That is

```
dates={1310-02-03}:{1350-06-07},
```

is equivalent to

```
birth={1310-02-03},
death={1350-06-07},
```

for life or

```
start={1310-02-03},
end={1350-06-07},
```

for period.

By default, these dates are used for both placement on the timeline and the date content of the element's text tag, but see `dates content`.

`birth` = `{<birth date>}` life  
*date key*

The date of birth for a life, specified as explained in section 8.2. See `dates` above.

`death` = `{<death date>}` life  
*date key*

The date of death for a life, specified as explained in section 8.2. See `dates` above.

`start` = `{<start date>}` period  
*date key*

The start date of a period, specified as explained in section 8.2. See `dates` above.

`end` = `{<end date>}` period  
*date key*

The end date of a period, specified as explained in section 8.2. See `dates` above.

`date` = `{<date>}` event  
*date key*

The date of an event, specified as explained in section 8.2. By default, the date is used for both placement on the timeline and the date content of the element's text tag, but see `dates content`.

`event year on line skip` Don't put this particular event's year on the timeline. event  
*key*

This can be used if the line would otherwise become too crowded when using `event years on line`. Cf. `special date`. See section 8.4.3. Figure 20 illustrates the effect of using this key.

`special date` = `{<text>}` event  
*key*

Use `<text>` rather than the `date` for a particular event when using `event years on line`. Cf. `event year on line skip`. See section 8.4.3. Figure 20 illustrates the effect of using this key.

`dates content` = `{<text>}` life, event, period  
*key*

Override the use of specified dates when creating content for the element's text tag. This is intended for 'special' cases e.g. uncertain, approximate or non-standardly specified dates. By default, the value is derived from `dates` or `date`.

Example: `dates content={c600-1450\, \celabel}`

`name content` = `{<text>}` life, event, period, theory, info, main  
*key*

Override the use of the element's name when creating content for the element's text tag. This might be necessary if special markup is required. For example,

```
name content=\LaTeX3 Hummingbird,
```

It may also be desirable where longer content would render reuse of a `name` unwieldy.

`text content` = `{\langle text \rangle}` *life, event, period, theory, info*  
*key*

Override the use of both element's name and dates when creating content for the element's text tag.

```
name=block printing,
text content={Block printing, originally used to print pictures and text onto cloth,
developed into a method of printing books on paper.},
```

`phantom` = `true|false` *life, event, period*  
*boolean key*

Create a 'phantom' element. Phantoms have assigned colours, require names and potentially feature lines, but they do not have text tags or connections. Note that these components are not invisible; *they are not constructed at all*.

Default: `true`

Initially: `false`

Example: `\chronosperiod{\langle name=c17,dates=1600:1699,colour=cyan,phantom \rangle}`

This key may be used globally to set a different tag-specific default.

```
\begin{chronos}[%
  period/phantom,% make periods are phantoms by default
  event/phantom=true,% make events are phantoms by default
  life/phantom=false,% make lives non-phantoms by default (this matches the package
default)
]
\end{chronos}
```

For example, this key may be used to colour stretches of time without visibly labelling them, in conjunction with non-phantom lives or events<sup>32</sup>.

```
\begin{chronos}[% https://tex.stackexchange.com/a/701743/
...
  period={%
    phantom,
    colours below={orange,cyan,green,green},
  },
...
]
% these must be named, even though they invisible, detached phantoms
\chronosperiod{dates=2018:2019,name={n1}}
\chronosperiod{dates=2019:2022,name={n2}}
\chronosperiod{dates=2022:2023,name={n3}}
\chronosperiod{dates=2023:2024,name={n4}}
...
\end{chronos}
```

`caption` = `{\langle text \rangle}` *info*  
*key*

The caption for an element of type info.

`labels` = `{\langle upper label \rangle}:\langle lower label \rangle` *theory circle*  
*key*

Labels to be placed above and below a theory circle.

`circle texts` = `{\langle upper text \rangle}:\langle lower text \rangle` *theory circle*  
*key*

<sup>32</sup>Based on my answer at [TeX StackExchange: 701743](https://tex.stackexchange.com/a/701743/).

The text to place in the upper and lower parts of a theory circle. By default, this uses `text effects along path`, so the content must be consistent with the restrictions imposed by use of this TikZ decoration.

`sizes` =  $\langle \text{outer circle dimension} \rangle : \langle \text{inner circle dimension} \rangle$  *theory circle*  
*dimension key*

The sizes of the inner and outer circles used to create a theory circle.

Default: 15pt:9pt

The difference between the two dimensions gives the thickness of the ring around which text is placed; the size of the inner circle gives the dimension of the hole in which a symbol or similar may be placed. This key may be used globally to set defaults.

```
\begin{chronos}[%
  theory/circles/sizes'+=10pt:5pt,
]
\end{chronos}
```

## 9.4 Additional Elements: Local/Global Configuration

Although you will generally want to use the following keys in the  $\langle \text{chronos preamble} \rangle$  or in `\chronosset`, they can also be used to influence the format of a particular element.

$\langle \text{tag} \rangle / \text{date format}$  =  $\{ \langle \text{date format specification} \rangle \}$  *event*  
*date format key*

Use  $\langle \text{date format specification} \rangle$  to format date.

```
\chronosevent{%
  ...,
  date format={!a, !d !b},% show short day of week, day of month and short month
}
\end{chronos}
```

See section 8.2 for details and defaults.

$\langle \text{tag} \rangle / \text{date formats}$  =  $\{ \langle \text{date format spec.} \rangle : \langle \text{date format spec.} \rangle : \langle \text{date format spec.} \rangle \}$  *life, period*  
*date format key*

Use  $\langle \text{date format spec.} \rangle$ s to format date range.

```
\chronosevent{%
  ...,
  date formats={!d}:{!d !B},% show day of month for start/birth date and day of month
and month name for end/death date
}
\end{chronos}
```

See section 8.2 for details and defaults.

`full dates` Show full dates. *life, event, period*  
 $\langle \text{tag} \rangle / \text{full dates}$  *key*

```
\chronoslife{%
  ...,
  full dates,
}
\end{chronos}
```

See section 8.2 for details and defaults.

`only years` Show only years. *life, event, period*  
 $\langle \text{tag} \rangle / \text{only years}$  *key*



```
\chronoslife{%
  ...,
  only years,% use only years in all dates
  event/full dates,% override to use full dates for events
}
\end{chronos}
```

See section 8.2 for details and defaults.

`show eras` Show eras. *life, event, period*

`<tag>/show eras`

```
key \chronoslife{%
  ...,
  show eras,% show eras in all text tags
}
\end{chronos}
```

See section 8.2 for details and defaults.

`without eras` Omit eras. *life, event, period*

`<tag>/without eras`

```
key \chronoslife{%
  ...,
  without eras,% omit eras in all text tags
  life/show eras,% override to show eras in life text tags
}
\end{chronos}
```

See section 8.2 for details and defaults.

`only text` Omit all date information. *life, event, period*

`<tag>/only text`

key Default: disabled

```
\chronoslife{%
  ...,
  only text,% omit all dates from all tags
}
\end{chronos}
```

The following six sets of keys all work in the same way<sup>33</sup>. If used when creating a specific element, they affect that element. If set in the `<chronos preamble>` or `\chronosset` with a `tag` prefix, they set the `tag`-specific setting and will affect all elements belonging to that tag unless overridden locally.

*Note these keys require a tag prefix if used in a global context, such as the <chronos preamble>. They do not need a prefix if used when creating a particular element.* For example,

```
\begin{chronos}
[
  event/line+={semithick},% prefix required ; event/ explicit
]
\chronosevent{%
  name=dydd dewi sant,
  date={1982-03-01},
  line+={double},% no prefix ; event/ implicit
}
```

<sup>33</sup>There is a seventh set, `<tag>/tag`, `<tag>/tag+` and `<tag>/tag'`, which may be of interest to advanced users. These keys are also potentially destructive. Not only `<tag>/tag'`, but also `<tag>/tag` and even `<tag>/tag+`, can overwrite default settings for such things as colour rotation.

```
\end{chronos}
```

```
<tag>/connection = {(key-value list)} life, event, period, theory
```

```
<tag>/connection+
<tag>/connection'
  key
  (key-value list) to apply to this element's connection. This affects the line drawn between the
  element's connector on the timeline and the text tag's main connector. This is intended for
  arbitrary TikZ keys; it should not be used for chronos keys as they may not be processed correctly.
  <tag>/connection and <tag>/connection' replace any current list; <tag>/connection+ adds to
  it.
```

```
<tag>/line = {(key-value list)} life, event, period
```

```
<tag>/line+
<tag>/line'
  key
  (key-value list) to apply to this element's line on or parallel to the timeline. This is the line
  representing the temporal extension of a life or period. This is intended for arbitrary TikZ keys;
  it should not be used for chronos keys as they may not be processed correctly. <tag>/line and
  <tag>/line' replace any current list; <tag>/line+ adds to it.
```

Default: `fill=##1,fill opacity=.25,draw=none` (on line, life/period)

Default: `draw=##1,fill=none,opacity=.25` (on line, event)

Default: `draw=##1,thick,fill opacity=.75` (off line, life/period)

Default: `draw=##1,draw opacity=.75,fill=none` (off line, event)

```
<tag>/line yshift = {(dimension)} life, period
```

*dimension key*

Default vertical displacement of lines from the timeline. Whether the displacement is reckoned from the centre or border of the timeline depends on the default placement.

`\lineyshift` The `line yshift`. This macro is available *only within the <timeline specification>*.

*macro*

```
<tag>/text tag = {(key-value list)} life, event, period, theory, info
```

```
<tag>/text tag+
<tag>/text tag'
  key
  (key-value list) to apply to this element's text tag. This is intended for arbitrary TikZ keys; it
  should not be used for chronos keys as they may not be processed correctly. <tag>/text tag and
  <tag>/text tag' replace any current list; <tag>/text tag+ adds to it.
```

```
\chronosset{%
  life/text tag+={font=\scshape\small},
  event/text tag+={font=\scshape\footnotesize},
  period/text tag+={font=\itshape\footnotesize},
}
```

See also `<tag>/date font` and `<tag>/text font`.

```
<tag>/chronos connector = {(key-value list)} life, event, period
```

```
<tag>/chronos connector+
<tag>/chronos connector'
  key
  Specify TikZ settings to be used when creating chronos connectors on the timeline. Note that
  <tag>/chronos connector adds options to the current list. If, for some reason, you want to
  override this, you must do so explicitly. In general, it does not make sense to change this base
  option, so consider carefully whether you wish to do so.
```

Default: `anchor=center,inner sep=0pt,outer sep=0pt`

```
<tag>/text tag connector = {(key-value list)} life, event, period, theory
```

```
<tag>/text tag connector+
<tag>/text tag connector'
  key
  Specify TikZ settings to be used when creating text tag connectors on the timeline. Note that
  <tag>/text tag connector adds options to the current list. If, for some reason, you want to
  override this, you must do so explicitly. In general, it does not make sense to change this base
  option, so consider carefully whether you wish to do so.
```

Default: `anchor=center,inner sep=0pt,outer sep=0pt`

```
<tag>/main text tag connector = {(key-value list)} life, event, period, theory
```

```
<tag>/main text tag
connector
connector+
<tag>/main text tag
connector'
  key
```

Specify *additional* TikZ settings to be used when creating the main connectors on text tags. `<tag>/main text tag connector` and `<tag>/main text tag connector'` replace any current list; `<tag>/main text tag connector+` adds to it. The 'main' connector is the one which connects (or would connect) the text tag to the timeline. These keys are rarely needed because, usually, you want all the text tag connectors to look the same. Only use one of these three keys rather than one from the previous set if you *don't* want `<key-value list>` to apply to all of them. You do *not* need to duplicate settings here.

Note that `<tag>/main text tag connector` *adds* options to the current list. If, for some reason, you want to override this, you must do so explicitly. In general, it does *not* make sense to change this base option, so consider carefully whether you wish to do so.

Default: `anchor=center,inner sep=0pt,outer sep=0pt`

`<tag>/label` = `{<key-value list>}` *info, theory circle*

`<tag>/label'`  
`<tag>/label+` *key* Style to apply to the caption of an element of tag type `info` or the labels of an element of type `theory circle`. In the latter case, the style applies to both the upper and lower label.

Default: empty

`label` and `label'` replace the current list; `label+` replaces it.

`<tag>/title` = `{<key-value list>}` *main*

`<tag>/title'`  
`<tag>/title+` *key* Style to apply to the main title, an element of tag type `main`.

Default: empty

`main/title` and `main/title'` replace the current list; `main/title+` replaces it.

`<tag>/title lines` *style* Place main title between two parallel lines aligned to the width of the text. *main*

This style is available when creating a text tag of type `main` and draws lines along the northern and southern sides of the node. It is used in `somewhat plain` and `date centric`.

`<tag>/author` = `{<text>}` *copyleft, copyright*  
*key*

The author's name for a `copyleft` or `copyright` notice. This is used only if `name content` is unset.

Default: `Author` (as a last resort)

If `author` and `name content` are unset, `chronos` first tries to figure out a suitable author. If `name` is set, a capitalised version is used. Otherwise, if `\svnauthor` is defined, `\svnFullAuthor{\svnauthor}` is used, if `\svnFullAuthor` is available, or `\svnauthor`, if it is not. If `chronos` still hasn't found an author, `Author` is used.

`<tag>/copyleft` = `true|false` *copyleft, copyright*  
*boolean key*

Whether a `copyleft` or `copyright` notice should specify `copyleft` or `copyright`.

Default: `false` (`\chronoscopyright`)

Default: `true` (`\chronoscopyleft`)

`\chronoscopyright` respects the global default, so if you set `<tag>/copyleft true` with `\chronosset`, both macros will make `copyleft` notices unless overridden in the `<key-value list>` of options they absorb when executed. `\chronoscopyleft` always creates a `copyleft` notice, regardless of any global settings, unless `copyleft` is explicitly set `false` when invoked.

`<tag>/notice` = `{<macro definition>}` *copyleft, copyright*  
*key*

Template for a `copyleft` or `copyright` notice. It is used as the definition of the macro used for the content of the notice and should absorb two arguments: year and author.

Default: `{Copyleft \textcopyleft{ } #1 #2}` (if `<tag>/copyleft` is `true`)

Default: `{Copyright \textcopyright{ } #1 #2}` (if `<tag>/copyleft` is `false`)

For example,

```
\begin{chronos}
[
  copyright/notice={Created by #2 in the year #1 of the Great Debacle at the behest of
  His Gracious Grasp Full Acre Fanfare the Nineteenth.},
]
```

`<tag>/rotate` = `<angle>` *copyleft, copyright*

*key*

The angle to rotate the node containing a copyleft or copyright notice.

Default: 90

`<tag>/year` = `<text>` *copyleft, copyright*

*key*

The year of publication for a copyleft or copyright notice.

Default: `\svnyear` (if available)

Default: `\today` (otherwise)

#### 9.4.1 Specialist Fonts for Text Tags

`<tag>/date font` = `{<font commands>}` *life, event, period*

*key*

Set font macros to be applied to the date content of text tags.

Default:

```
\chronosset{%
...
event/date font=\itshape\bfseries\small,
life/date font=\sffamily\large,
period/date font=\upshape\normalsize\mdseries,
}
```

Note that if you want to alter the font for the entire contents of the text tag, it is better to just use `<tag>/text tag+=font={<>}`. Use `date font` to modify those settings specifically for date(s). Note that if era label are included, they will not be affected.

`<tag>/text font` = `{<font commands>}` *life, event, period*

*key*

Set font macros to be applied to the text content of text tags.

Default:

```
\chronosset{%
...
event/text font=\uishape\large,
life/text font=\sffamily\Large,
period/text font=\small\bfseries,
}
```

Note that if you want to alter the font for the entire contents of the text tag, it is better to just use `<tag>/text tag+=font={<>}`. Use `text font` to modify those settings specifically for names.

## 9.5 Additional Elements: Global Configuration

*Except where otherwise noted, the keys in this section should not be used locally.* The following keys are intended for use in the `<chronos preamble>` or in `\chronosset`. They are not intended for use when creating particular elements. For example, `default colour` should *not* be used for particular elements, unless you wish to *use* the existing default, as opposed to setting it. Instead, use `colour` to override default settings.

See section 8.8 for further information about colour keys and colour list keys.

`life` =  $\{ \langle \text{key-value list} \rangle \}$  *life, event, period, theory*  
`event`  
`period` Equivalent to prefixing each item in  $\langle \text{key-value list} \rangle$  with  $\langle \text{tag} \rangle$ .  
`theory`  
`key`

```
\begin{chronos}
[
  life={%
    full dates,
    without eras,
    text tag+={font=\sffamily},
    text font=\bfseries,
    date font=\small,
    colours above={red,orange,blue},
    colours below={darkgray,gray,black,magenta},
  },
  period={%
    only years,
    text tag+={opacity=.75},
  },
  event={%
    text tag+={double=blue},
  },
]
\end{chronos}
```

$\langle \text{tag} \rangle / \text{default colour}$  =  $\langle \text{colour name} \rangle$  *life, event, period, theory, info*  
 $\langle \text{tag} \rangle / \text{default color}$   
`colour key` The default colour to use for all elements of type  $\langle \text{tag} \rangle$ , as explained in section 8.8. *This key does something quite different if used when creating a specific element. See section 9.3 for details.* For example,

```
\begin{chronos}[
  life/default colour=blue,
  event/default colour=green,
  period/default colour=red,
]
\end{chronos}
```

See section 8.8 for details and defaults.

`colours above` =  $\{ \langle \text{colour list} \rangle \}$  *life, event, period, theory*  
`colors above`  
 $\langle \text{tag} \rangle / \text{colours above}$   
 $\langle \text{tag} \rangle / \text{colors above}$   
`colour list key` The default and tag-specific colour lists for all susceptible elements above the timeline. *These keys should never be used when creating specific elements.*

```
\begin{chronos}[
  colours above={gray,blue,green},
  life/colours above={magenta,pink,purple},
]
\end{chronos}
```

See section 8.8 for details and defaults.

`colours below` =  $\{ \langle \text{colour list} \rangle \}$  *life, event, period, theory*  
`colors below`  
 $\langle \text{tag} \rangle / \text{colours below}$   
 $\langle \text{tag} \rangle / \text{colors below}$   
`colour list key` The default and tag-specific colour lists for all susceptible elements below the timeline. *These keys should never be used when creating specific elements.*

```
\begin{chronos}[
  colours below={red,orange,magenta},
  theory/colours below={black,gray},
]
\end{chronos}
```

```
\end{chronos}
```

See section 8.8 for details and defaults.

`colour rotation` = `true|false` *life, event, period, theory*  
`color rotation` Whether colour rotation is enabled by default.  
`<tag>/colour rotation`  
`<tag>/color rotation` Default: `true`  
*boolean key*

```
\begin{chronos}[
  colour rotation=false,
]
\end{chronos}
```

See section 8.8 for details and defaults.

`copyleft` = `{(key-value list)}` *copyleft, copyright*  
`copyleft'` Style to apply to the copyleft or copyright, an element of tag type copyleft / copyright.  
`copyleft+`  
`copyright` Default: empty  
`copyright'`  
`copyright+` `copyleft`, `copyleft'`, `copyright` and `copyright'` replace the current list; `copyleft+` and `copyright+` replace it.  
*key*

`event dates split` = `true|false` *event*  
*boolean key*

Create two text tags for each event, one above and one below the timeline. The formatted `date` or `dates` content goes into one and the formatted `name` or `name` content goes into the other. *This key has no effect on text tags belonging to other tags, such as life or period.*

Default: `true`

Initially: `false`

`event date split` Additional style applied to text tags of type event if `event dates split` is `true`. *event*  
*style*

This style is provided primarily for use *outside* the `chronos` environment, in case you want some timelines with split events and some without. It is *not* intended to support both split and unsplit events on the same timeline.

Default: empty

The next twelve sets of keys fall into two groups, corresponding to the five sets of corresponding keys explained in section 9.4. ***None of these keys should be used when creating specific elements.***

The first set of six consists of plural forms, as opposed to the singular forms used for tag-specific configuration. These are available in the `<chronos preamble>` and `\chronosset`.

`text tags` = `{(key-value list)}` *life, event, period, theory, info*  
`text tags+`  
`text tags'` Set or modify the global default `<key-value list>` to be applied to text tags in the absence of a tag-specific setting (section 9.4). `text tags` and `text tags'` replace the current value; `text tags+` replaces it.  
*key*

Default: `outer sep=0pt,text=#1!75!black`

The key are passed a single argument specifying the current element's assigned colour, which may be used in the usual way i.e. by writing `#1` everywhere you would like the colour to be used.

Note that, when checking if a more fine-grained value is set, *the lists of <key-value> pairs are regarded as a whole. They are not treated on a <key>-by-<key> basis.* So if you write

```
\begin{chronos}
[
  event/text tag={},
  text tags+={fill=green},
]
\end{chronos}
```

you will *not* get green text tags for events. Nor will you get the package option default. Instead, no style whatsoever will be applied when creating event text tags.

`connections` =  $\{(key\text{-}value\ list)\}$  *life, event, period, theory*  
`connections+`  
`connections'` Set or modify the global default  $\langle key\text{-}value\ list \rangle$  to be applied to connections in the absence of a tag-specific setting (section 9.4). `connections` and `connections'` replace the current value; `connections+` replaces it.  
*key*

Default: `draw=#1`

These keys are related to the tag-specific  $\langle tag \rangle / \text{connection}$ ,  $\langle tag \rangle / \text{connection+}$  and  $\langle tag \rangle / \text{connection}'$  in just the same way as `text tags`, `text tags+` and `text tags'` are related to  $\langle tag \rangle / \text{text tag}$ ,  $\langle tag \rangle / \text{text tag+}$  and  $\langle tag \rangle / \text{text tag}'$ . Please see above for details.

`lines` =  $\{(key\text{-}value\ list)\}$  *life, event, period*  
`lines+`  
`lines'` Set or modify the global default  $\langle key\text{-}value\ list \rangle$  to be applied to lines in the absence of a tag-specific setting (section 9.4). `lines` and `lines'` replace the current value; `lines+` replaces it.  
*key*

Default: none (see section 9.4 for tag-specific defaults.)

These keys are related to the tag-specific  $\langle tag \rangle / \text{line}$ ,  $\langle tag \rangle / \text{line+}$  and  $\langle tag \rangle / \text{line}'$  in just the same way as `text tags`, `text tags+` and `text tags'` are related to  $\langle tag \rangle / \text{text tag}$ ,  $\langle tag \rangle / \text{text tag+}$  and  $\langle tag \rangle / \text{text tag}'$ . Please see above for details.

`chronos connectors` =  $\{(key\text{-}value\ list)\}$  *life, event, period, theory*  
`chronos connectors+`  
`chronos connectors'` Set or modify the global default  $\langle key\text{-}value\ list \rangle$  to be applied to chronos connectors in the absence of a tag-specific setting (section 9.4). `chronos connectors'` replaces the current value; `chronos connectors` and `chronos connectors+` replace it.  
*key*

Default: `anchor=center,inner sep=0pt,outer sep=0pt`

These keys are related to the tag-specific  $\langle tag \rangle / \text{chronos connector}$ ,  $\langle tag \rangle / \text{chronos connector+}$  and  $\langle tag \rangle / \text{chronos connector}'$  in just the same way as `text tags`, `text tags+` and `text tags'` are related to  $\langle tag \rangle / \text{text tag}$ ,  $\langle tag \rangle / \text{text tag+}$  and  $\langle tag \rangle / \text{text tag}'$ . Please see above for details.

`text tag connectors` =  $\{(key\text{-}value\ list)\}$  *life, event, period, theory*  
`text tag connectors+`  
`text tag connectors'` Set or modify the global default  $\langle key\text{-}value\ list \rangle$  to be applied to text tag connectors in the absence of a tag-specific setting (section 9.4). `text tag connectors'` replaces the current value; `text tag connectors` and `text tag connectors+` replace it.  
*key*

Default: `anchor=center,inner sep=0pt,outer sep=0pt`

These keys are related to the tag-specific  $\langle tag \rangle / \text{text tag connector}$ ,  $\langle tag \rangle / \text{text tag connector+}$  and  $\langle tag \rangle / \text{text tag connector}'$  in just the same way as `text tags`, `text tags+` and `text tags'` are related to  $\langle tag \rangle / \text{text tag}$ ,  $\langle tag \rangle / \text{text tag+}$  and  $\langle tag \rangle / \text{text tag}'$ . Please see above for details.

`main text tag connectors` =  $\{(key\text{-}value\ list)\}$  *life, event, period, theory*  
`main text tag connectors+`  
`main text tag connectors'` Set or modify the global default  $\langle key\text{-}value\ list \rangle$  to be applied to main text tag connectors in the absence of a tag-specific setting (section 9.4). `main text tag connectors'` replaces the current value; `main text tag connectors` and `main text tag connectors+` add to it.  
*key*

Default: empty

These keys are related to the tag-specific `<tag>/main text tag connector`, `<tag>/main text tag connector+` and `<tag>/main text tag connector'` in just the same way as `text tags`, `text tags+` and `text tags'` are related to `<tag>/text tag`, `<tag>/text tag+` and `<tag>/text tag'`. Please see above for details.

The next six sets of keys are convenience keys which set or modify the global defaults and the corresponding keys for all tags at once.

`every text tags` = `{(key-value list)}` *life, event, period, theory, info*

`every text tags+`  
`every text tags'`  
*key* A convenience key equivalent to setting the same `<key-value list>` for all of `text tags`, `life/text tag`, `event/text tag`, `period/text tag`, `theory/text tag` and `info/text tag` or the `+` or `'` variants. *This key should never be used when creating a specific element.* See section 9.4 and above for details and defaults.

`every connections` = `{(key-value list)}` *life, event, period, theory*

`every connections+`  
`every connections'`  
*key* A convenience key equivalent to setting the same `<key-value list>` for all of `connections`, `life/connection`, `event/connection`, `period/connection` and `theory/connection` or the `+` or `'` variants. *This key should never be used when creating a specific element.* See section 9.4 and above for details and defaults.

`every lines` = `{(key-value list)}` *life, event, period*

`every lines+`  
`every lines'`  
*key* A convenience key equivalent to setting the same `<key-value list>` for all of `lines`, `life/line`, `event/line` and `period/line` or the `+` or `'` variants. *This key should never be used when creating a specific element.* See section 9.4 and above for details and defaults.

`every chronos connectors` = `{(key-value list)}` *life, event, period, theory*

`every chronos connectors+`  
`every chronos connectors'`  
*key* A convenience key equivalent to setting `<key-value list>` for all of `chronos connectors`, `life/chronos connector`, `event/chronos connector`, `period/chronos connector` and `theory/chronos connector` or the `+` or `'` variants. *This key should never be used when creating a specific element.* See section 9.4 and above for details and defaults.

`every text tag connectors` = `{(key-value list)}` *life, event, period, theory*

`every text tag connectors+`  
`every text tag connectors'`  
*key* A convenience key equivalent to setting the same `<key-value list>` for all of `text tag connectors`, `life/text tag connector`, `event/text tag connector`, `period/text tag connector` and `theory/text tag connector` or the `+` or `'` variants. *This key should never be used when creating a specific element.* See section 9.4 and above for details and defaults.

`every main text tag connectors` = `{(key-value list)}` *life, event, period, theory*

`every main text tag connectors+`  
`every main text tag connectors'`  
*key* A convenience key equivalent to setting the same `<key-value list>` for all of `main text tag connectors`, `life/main text tag connector`, `event/main text tag connector`, `period/main text tag connector` and `theory/main text tag connector` or the `+` or `'` variants. *This key should never be used when creating a specific element.* See section 9.4 and above for details and defaults.

`every theory circle circle` = `{(key-value list)}` *theory circle*

`every theory circle circle'`  
`every theory circle circle+`  
*key* Configuration of the base ring for elements of tag type `theory circle`. The ring consists of two circles with the smaller forming a hole in the centre by default. Changing or deleting the filling rule will eliminate the hole.

Default: `fill=<chronos main colour>`, `draw=<chronos main colour>`, `even odd rule`

`every theory circle circle` and `every theory circle circle+` add to the current `<key-value list>`; `every theory circle circle'` replaces it.

`every theory circle text` = `{(key-value list)}` *theory circle*

`every theory circle text'`  
`every theory circle text+`  
*key*



Style applied to the texts used in constructing elements of tag type theory circle. By default the texts are placed along the semicircular paths corresponding to the upper and lower halves of the ring formed by the theory circle circles. This means the colour used here should differ from that used to fill the circles, given the default styles.

Default: `decoration={text effects along path, text={##1}, text effects/.cd, fit text to path, text=chronos@prifliw@cefndir, characters={text along path, font=\scriptsize\s`  
`decorate`

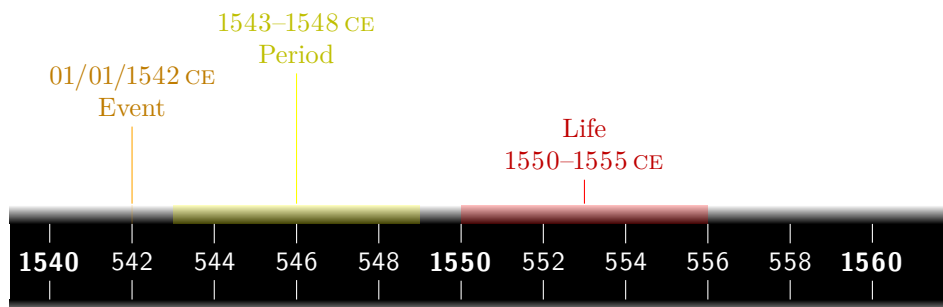
`every theory circle text` and `every theory circle text+` add to the current *<key-value list>*; `every theory circle text'` replaces it.

`text tag yshift` = *<dimension>*  
*dimension key*

*life, event, period, theory*

The `yshift` to apply when placing the `text tag` if `yshift` is otherwise `0pt` and `at` is unset. You should probably never use this key in the context of a particular element, because `yshift` works just as well and will probably be more reliable and certainly faster. Moreover, unlike `yshift`, which can be used to adjust a position set with `at`, `text tag yshift` cannot. If `at` is used, `text tag yshift` is ignored. It makes sense to set this globally if you want all elements or all elements belonging to a particular tag to be shifted by some specified distance from the timeline. For example,

```
\begin{chronos}[
  life/text tag yshift=10pt,
  event/text tag yshift=30pt,
  period/text tag yshift=50pt,
  theory/text tag yshift=70pt,
]
\end{chronos}
```



### Theory

The following keys take the form `{every} <tag>`, optionally followed by prime or plus. *They should not be used to configure elements for which other global keys exist, such as colours, connections, connectors, date formats, lines or text tags.* Generally, these keys should be unnecessary and are best avoided, although they may occasionally be convenient.

`every life` = *<(key-value list)>*

*life*

`every life'`

`every life+` Additional configuration for all elements of tag type life. These do much the same as `life/tag`, `life/tag+` and `life/tag'`, but should *never* be used when creating a specific element. `every life` and `every life+` add to the current *<key-value list>*; `every life'` replaces it.

`every event` = *<(key-value list)>*

*event*

`every event'`

`every event+` Additional configuration for all elements of tag type event. These do much the same as `event/tag`, `event/tag+` and `event/tag'`, but should *never* be used when creating a specific element. `every`

event and every event+ add to the current  $\langle key\text{-value list}\rangle$ ; every event' replaces it.

`every period` =  $\{\langle key\text{-value list}\rangle\}$  *period*

`every period'`  
`every period+`  
*key* Additional configuration for all elements of tag type period. These do much the same as period/tag, period/tag+ and period/tag', but should *never* be used when creating a specific element. every period and every period+ add to the current  $\langle key\text{-value list}\rangle$ ; every period' replaces it.

`every theory` =  $\{\langle key\text{-value list}\rangle\}$  *theory*

`every theory'`  
`every theory+`  
*key* Additional configuration for all elements of tag type theory. These do much the same as theory/tag, theory/tag+ and theory/tag', but should *never* be used when creating a specific element. every theory and every theory+ add to the current  $\langle key\text{-value list}\rangle$ ; every theory' replaces it.

`every info` =  $\{\langle key\text{-value list}\rangle\}$  *info*

`every info'`  
`every info+`  
*key* Additional configuration for all elements of tag type info. These do much the same as info/tag, info/tag+ and info/tag', but should *never* be used when creating a specific element. every info and every info+ add to the current  $\langle key\text{-value list}\rangle$ ; every info' replaces it.

## 9.6 Adding Connections, Using Colours and Accessing Styles

To access the colour list used for the timeline etc., see sections 8.3 and 8.4.5. For details of the way colour list are assigned to elements, see section 8.8.

Life, event, period and theory elements are designed to be connected not only, in the case of those which are connectable, to the timeline, but also to each other. To ensure consistent styling, this requires the use of `chronos` styles in TikZ commands.

In addition, densely-packed timelines sometimes require non-standard paths be used to connect a minority of elements to the timeline in an efficient way. Again, this requires access to `chronos` styles.

`chronos connect` =  $\{\langle tag\rangle\}:\{\langle element\ name\rangle\}$  *life, event, period, theory*  
*style*

This sets the style used for connections belonging to elements of type  $\langle tag\rangle$  with the colour assigned to  $\langle element\ name\rangle$  (section 8.8). For example,

```
\draw [chronos connect=life:johannes gutenber] (connector johannes gutenber) -- (
connector printing press) (connector johannes gutenber2) -|- (connector movable type) (
connector johannes gutenber3) -- ++(5pt,0pt) |-| (connector gutenber bible);
```

This will draw a line using the style for connections of tag type `life` and the colour assigned to the element named `johannes gutenber`. Note the use of connectors on both the element's own text tag and on other elements' text tags. In this case, tag `johannes gutenber` is being connected to tag `printing press`, tag `movable type` and tag `johannes gutenber bible`.

The following four keys provide analogous access to the styles and colour list used for `chronos` connectors, text tag connectors, lines and text tags and are used in the same way.

`chronos create chronos` =  $\{\langle tag\rangle\}:\{\langle element\ name\rangle\}$  *life, event, period*  
`connector`  
*style*

This sets the style used for `chronos` connectors belonging to elements of type  $\langle tag\rangle$  with the colour assigned to  $\langle element\ name\rangle$ .

`chronos create text tag` =  $\{\langle tag\rangle\}:\{\langle element\ name\rangle\}$  *life, event, period, theory*  
`connector`  
*style*

This sets the style used for text tag connectors belonging to elements of type  $\langle tag\rangle$  with the colour assigned to  $\langle element\ name\rangle$ .

`chronos mark line` =  $\{\langle tag\rangle\}:\{\langle element\ name\rangle\}$  *life, event, period*  
*style*

This sets the style used for lines (on or near the timeline) belonging to elements of type  $\langle tag \rangle$  with the colour assigned to  $\langle element name \rangle$ .

`chronos text tag = { $\langle tag \rangle$ }: { $\langle element name \rangle$ }` *life, event, period, theory, info*  
*style*

This sets the style used for text tags belonging to elements of type  $\langle tag \rangle$  with the colour assigned to  $\langle element name \rangle$ .

We can also use the colour assigned to `johannes gutenberg` directly. Perhaps, for example, we'd like to put a book symbol near this element in the appropriate colour.

Example: `\node [colour johannes gutenberg, above left=5pt and 10pt of tag johannes gutenberg.north west, anchor=south east, inner sep=0pt] { $\langle book-symbol \rangle$ };`

## 10 Drawing on Chronos Layers

See section 6.4.

`on chronos background layer` Apply to a scope to draw everything inside on layer `chronos background`.  
*style*

```
\begin{scope}[on chronos background layer]
  \node {Something};% in between the regular background and chronos middle ground
\end{scope}
```

`on chronos middle ground layer` Apply to a scope to draw everything inside on layer `chronos middle ground`.  
*style*

```
\begin{scope}[on chronos middle ground layer]
  \node {Something};% behind the main layer and chronos background
\end{scope}
```

`on chronos foreground layer` Apply to a scope to draw everything inside on layer `chronos foreground`.  
*style*

```
\begin{scope}[on chronos foreground layer]
  \node {Something};% above the main layer but behind chronos overlay.
\end{scope}
```

`on chronos overlay layer` Apply to a scope to draw everything inside on layer `chronos overlay`.  
*style*

By default, `chronos` puts only debugging information on `chronos overlay`, which means drawing on this layer should always draw on top of anything constructed by the package code.

```
\begin{scope}[on chronos overlay layer]
  \node {Something over everything else.};
\end{scope}
```

In addition, `chronos` never puts anything on the non-`chronos` PGF/TikZ `background` layer and it would be difficult to persuade it to do so without rewriting internal code. Drawing on *this* layer, therefore, is almost guaranteed to end up behind everything constructed by the package code<sup>34</sup>.

```
\begin{scope}[on background layer]% fill area below the timeline
  \fill [blue!25!white] (chronos pre |- chronos bottom) rectangle (chronos post-foot);
\end{scope}
```

<sup>34</sup>Unless nefarious TeXnicians have interfered with your installation. It is even quite unlikely a bug would cause this kind of problem, though bugs will doubtless cause many others.

## 11 Externalising Chronos Timelines with Memoize

As explained in section 15, `chronos` timelines cannot be externalised with PGF/TikZ's `external`. Since PGF/TikZ, in general, and `chronos`, in particular, can be rather slow to compile, this is serious issue. If you only have a two or three small timelines, the compilation time will be negligible. But if you have a large, densely packed timeline or many timelines, compilation time will quickly become excessive.

Fortunately, `chronos` environments *can* be externalised. Moreover, they can be externalised more conveniently, more robustly and more securely, without the need for a separate compilation for each `chronos`. This means compilation is only a little slower when the timelines are being compiled (whereas compilation would be far slower with the external `pgf/ti\emphkz` library, even if it worked) and subsequent compilations are fast.

Sašo Živanović's `memoize` has no trouble compiling this documentation and externalising its timelines. `Memoize` is a little more trouble to set up initially than the external `pgf/ti\emphkz` library, but requires far less fine-tuning once configured.

*To externalise* `chronos` timelines, *you must first setup memoization as explained in* `memoize's documentation`<sup>35</sup>.

`Chronos` supports automemoization out-of-the-box<sup>36</sup>: to enable automatic memoization of `chronos` environments, simply load `memoize` early in your preamble. `Chronos` will then enable 'automemoization' for all timelines<sup>37</sup>.

All `chronos` styles (except `default`) and all colour schemes (except `default`) are defined so that modification will automatically trigger the recompilation of all `chronos` timelines which use them.

## 12 Deferring Code

*If you don't know why you might want to use the keys in this section, you don't need to use them.*

```

timeline config = {(code)}
timeline config'
timeline config+
  key

```

Execute additional `(code)` after `chronos` has processed the keys at the start of the `chronos` environment, but before further processing the resulting configuration and constructing the timeline. These keys are provided primarily for use in `chronos` style definitions, but may occasionally be useful elsewhere. `timeline config` and `timeline config+` add to the current code; `timeline config'` replaces it. Note that `timeline config'` is destructive: it obliterates any existing code `chronos` has installed, which may be entirely unrelated to the code now being stored. `Chronos` style authors should never use this form. Even if the code is for purely private use in a locked room with no internet access, you should stick to the additive forms unless your memory is infallible *and* you always remember to use it.

### 12.1 Additional TikZ

Generally, you can mix arbitrary TikZ code freely into the body of the `chronos` environment. For example, this is how to add connections between text tags or to decorate your timeline with symbols or ornaments.

However, sometimes you might want to add something *after* `chronos` has finished. You might, for example, want to do something after the frame is drawn or place something relative to headings

<sup>35</sup>By default, `memoize` uses `perl` and requires the installation of a couple of libraries. If you use Linux or have `python` already installed, I'd recommend using this method as it requires only a single extra library, is faster and more robust. If you do not wish to use either `perl` or `python`, you can use `TEX`, but I have not personally tested this method as it is slower and less secure.

<sup>36</sup>This fantastic feat was accomplished by copying a line of code from `memoize's` manual and substituting `chronos` for the appropriate word. Even I managed to achieve this without major incident.

<sup>37</sup>Of course, memoization can be disabled permanently or temporarily for some or all timelines. See `memoize's` documentation for details or look at the code for this document, which disables memoization for fig. 1 to prevent destruction of hyperlinks.

or subheadings. Two sets of keys are provided for this purpose. One set enable you to execute arbitrary TikZ code within the picture's bounding box; the other enables you to do so outside. Generally, it is the first set you will want to use; the second are useful in a narrower range of cases and for debugging purposes.

```
chronos tikz' = {\TikZ commands}
```

```
  chronos tikz
```

```
  chronos tikz+
```

```
    key
```

Commands to execute after the *<timeline additions specification>* and any frame, headings and subheadings are drawn, but before debugging information is added (see section 14). `chronos tikz` and `chronos tikz+` add to current material; `chronos tikz'` replaces it. Material added with these keys is included in the final picture's bounding box. If you draw outside the frame and outer border, for example, the final bounding box expands to accommodate it. *If you aren't sure which set of keys to use, choose these.*

```
chronos tikz outside bb' = {\TikZ commands}
```

```
  chronos tikz outside bb
```

```
  chronos tikz outside bb+
```

```
    key
```

Commands to execute after the *<timeline additions specification>* and any frame, headings and subheadings are drawn, but before debugging information is added (see section 14). `chronos tikz outside bb` and `chronos tikz outside bb+` add to current material; `chronos tikz outside bb'` replaces it. Material added with these keys is excluded when the final picture's bounding box is determined. If you draw outside the frame and outer border, for example, TeX will treat it as if it didn't exist and you will need to ensure adequate space is available to accommodate it manually. *If you aren't sure which set of keys to use, avoid these.*

Finally, you might want to add material at some specific point in the construction of the picture (e.g. after headings but before the frame). The following sets of keys facilitate such additions.

```
before headings' = {\TikZ commands}
```

```
  before headings
```

```
  before headings+
```

```
    key
```

Commands to execute after the *<timeline additions specification>*, but before constructing any headings. `before headings` and `before headings+` add to current material; `before headings'` replaces it.

```
before drawing frame' = {\TikZ commands}
```

```
  before drawing frame
```

```
  before drawing frame+
```

```
    key
```

Commands to execute after the *<timeline additions specification>* and any headings and subheadings are drawn, but before constructing any frame. `before drawing frame` and `before drawing frame+` add to current material; `before drawing frame'` replaces it.

## 13 Custom Schemes and Styles

The macros and keys explained in this section enable you to define custom colour schemes and chronos styles. These may then be used in the same way as those provided by `chronos` (section 7).

*Customisation is a two-stage process. Chronos styles should not define colours definable by colour schemes.*

Colour schemes are straightforward to define; chronos styles are a bit trickier.

### 13.1 Defining Chronos Colour Schemes

As explained in section 7.2, in addition to the default colours, `chronos` currently provides `blues`, `contninety`, `cronoleg`, `lavender`, `modern`, `offlinebasic`, `offlinealt`, `sobriety` and `xcolseries`<sup>38</sup> (table 2). `xcolseries` demonstrates the use of `xcolor` colour series in `chronos` colour lists. `contninety`, `modern`, `offlinebasic` and `offlinealt` illustrate the use of colour schemes to support `chronos` styles which require minimal modifications of other colour schemes.

<sup>38</sup>Note that `xcolseries` uses the `hsb` colour model, which is not supported by PGF/TikZ. If loading this set of colours directly, add `/utils/exec=` to `chronos`'s optional argument. This is not necessary if loading a `chronos` style which utilises `xcolseries`. In either case, all colours in the current `chronos` environment will be converted to `rgb`.

New colour schemes should follow the examples in `chronos-lib-colschemes.sty`<sup>39</sup>. For instance, here’s the code to set up blues:

```
\chronosnewcolourscheme{blues}{% chronos-lib-colschemes.sty
  timeline foreground=DodgerBlue4,
  timeline background=DodgerBlue2,
  default below={Cerulean!50!DodgerBlue4,Cerulean!50!DodgerBlue3,Cerulean!50!DodgerBlue2,
Cerulean!50!DodgerBlue1,Cerulean},
  default above={Cerulean!50!DodgerBlue4,Cerulean!50!DodgerBlue3,Cerulean!50!DodgerBlue2,
Cerulean!50!DodgerBlue1,Cerulean},
  foreground=DodgerBlue4,
  background=white,
}
```

This is intended for ‘off line’ timelines so it doesn’t include colours for a timeline border, though `chronos` will derive such colours anyway, as explained below.

There are two pitfalls in defining a colour scheme. First, definitions cannot utilise other `chronos` colours at this stage. You cannot, therefore, define the middle border colour, for example, in terms of the outer and inner colours.

Second, scheme names must consist of letters only as they are used to create new macros.

```
\chronosnewcolourscheme [(existing scheme)] {<name>}{<key-value list>}
macro
\chronosnewcolourscheme [(existing scheme)] {<name>}{<key-value list>}
macro
```

If *<existing scheme>* is specified, it should be the name of an existing colour scheme; otherwise, a default set of colours is loaded. *<name>* is the name of the new colour scheme and must be a unique string of alphabetic characters suitable for use in a macro name. *<key-value list>* is a list of key-value pairs from the list in table 13.

Schemes need not use all keys<sup>40</sup>. It is sufficient to specify the required deviations from *<existing scheme>*. For example, here’s the code to set up `offlinealt`,

```
\chronosnewcolourscheme[cronoleg]{offlinealt}{%
  timeline foreground=blue!40,
}
```

### 13.1.1 How Colour Schemes are Processed

When a colour scheme is loaded, `chronos` processes the settings in six stages.

1. The specified *<existing scheme>* or defaults are loaded.
2. Keys for the ‘core’ colours `foreground` and `background` are set and flipped to provide default settings for the ‘core derivative’ colours `timeline foreground` and `timeline background`.
3. Keys for the ‘core derivative’ colours `timeline foreground` and `timeline background` are set and the resulting four colours used to derive default settings for the ‘core border’ colours `timeline border inner`, `timeline border middle` and `timeline border outer`. In particular, `timeline border inner` is set to match `timeline background`, `timeline border outer` is set to `background` and `timeline border middle` is set to a 50-50 mix of the two.
4. Keys for the ‘core border’ colours `timeline border inner`, `timeline border middle` and `timeline border outer` are set. The main `foreground` colour is assigned to the ‘elemental’

<sup>39</sup>For historical reasons, `cronoleg` is non-standardly defined as it was the default scheme during most `chronos` development. The current implementation of this scheme is officially internal. The implementation — as opposed to the scheme — is highly likely to change in backwards-incompatible ways without notice. This warning does not apply to *usage* of the colour scheme, but you should not take it as a model for a new scheme, except to pass it as an option to `\chronosnewcolourscheme`.

<sup>40</sup>In fact, they need not use any, though a colour scheme which uses none would serve no purpose.

Table 13: Keys for `\chronosnewcolourscheme`. Note that neither ‘colour’ nor ‘color’ appears in any key.

Key	Expected Argument Type	Example
foreground	<i>&lt;colour name&gt;</i>	chronosblack
background	<i>&lt;colour name&gt;</i>	chronoswhite
timeline foreground	<i>&lt;colour name&gt;</i>	chronosCerulean
timeline background	<i>&lt;colour name&gt;</i>	chronosDodgerBlue4!50!chronosblack
timeline border outer	<i>&lt;colour name&gt;</i>	chronoswhite
timeline border inner	<i>&lt;colour name&gt;</i>	chronosCerulean
timeline border middle	<i>&lt;colour name&gt;</i>	chronosDodgerBlue4!50!chronosblack
life/default	<i>&lt;colour name&gt;</i>	chronosDodgerBlue4
event/default	<i>&lt;colour name&gt;</i>	chronosDodgerBlue4
period/default	<i>&lt;colour name&gt;</i>	chronosDodgerBlue4
theory/default	<i>&lt;colour name&gt;</i>	chronosDodgerBlue4
info/default	<i>&lt;colour name&gt;</i>	chronosDodgerBlue4
default above	<i>&lt;list of colour names&gt;</i>	chronosRed, chronosOrange, chronosYellow, chronosGreen, chronosBlue, chronosMidnightBlue, chronosViolet
default below	<i>&lt;list of colour names&gt;</i>	chronosCerulean!50!chronosDodgerBlue4, chronosCerulean!50!chronosDodgerBlue3, chronosCerulean!50!chronosDodgerBlue2, chronosCerulean!50!chronosDodgerBlue1, chronosCerulean
life/above	<i>&lt;list of colour names&gt;</i>	chronosDeepPink2, chronosDarkOrange1, chronosFirebrick1, chronosPurple0, chronosWildStrawberry, chronosOrangeRed1, chronosDarkGoldenrod1, chronosDarkOrchid3
life/below	<i>&lt;list of colour names&gt;</i>	chronosDodgerBlue3, chronosGreen3, chronosBlue3, chronosSpringGreen4, chronosDeepSkyBlue2, chronosForestGreen, chronosPeriwinkle, chronosSeaGreen3
event/above	<i>&lt;list of colour names&gt;</i>	chronosThistle4, chronosThistle4!.5!chronosThistle3, chronosThistle3, chronosThistle3!.5!chronosThistle2, chronosThistle2
event/below	<i>&lt;list of colour names&gt;</i>	chronosSeashell4, chronosSeashell4!.5!chronosSeashell3, chronosSeashell3, chronosSeashell3!.5!chronosSeashell2, chronosSeashell2
period/above	<i>&lt;list of colour names&gt;</i>	chronosMistyRose4, chronosMistyRose4!.5!chronosMistyRose3, chronosMistyRose3, chronosMistyRose3!.5!chronosMistyRose2, chronosMistyRose2
period/below	<i>&lt;list of colour names&gt;</i>	chronosIvory4, chronosIvory4!.5!chronosIvory3, chronosIvory3, chronosIvory3!.5!chronosIvory2, chronosIvory2
theory/above	<i>&lt;list of colour names&gt;</i>	xcolor s2!![0],xcolor s2!![1],xcolor s2!![2],xcolor s2!![3],xcolor s2!![4],xcolor s2!![5],xcolor s2!![6],xcolor s2!![7],xcolor s2!![8],xcolor s2!![9],xcolor s2!![10],xcolor s2!![11], xcolor s2!![12],xcolor s2!![13],xcolor s2!![14],xcolor s2!![15]
theory/below	<i>&lt;list of colour names&gt;</i>	xcolor g2!![0],xcolor g2!![1],xcolor g2!![2],xcolor g2!![3],xcolor g2!![4],xcolor g2!![5],xcolor g2!![6],xcolor g2!![7],xcolor g2!![8],xcolor g2!![9],xcolor g2!![10],xcolor g2!![11],xcolor g2!![12],xcolor g2!![13],xcolor g2!![14],xcolor g2!![15]

default colours `life/default`, `event/default`, `period/default`, `theory/default` and `info/default`.

5. Keys for the ‘elemental’ default colours `life/default`, `event/default`, `period/default` and `theory/default` are set.
6. *Much later*, after the user configuration for the `chronos` environment has been read, `chronos` potentially flips the ‘core derivative’ colours `timeline foreground` and `timeline background`. See section 13.2.

Only after this sixth stage are the ‘public’ names listed in table 14 assigned to the final set of colour scheme-definable colours.

## 13.2 Defining Chronos Styles

The current method for creating `chronos` styles is straightforward in theory, but potentially hazardous in practice. Here’s an example from `chronos-lib-styles.sty`.

```
\pgfqkeys{/chronos}{%
  blues below/.style={%
    /chronos/.cd,
    blues below/.meaning to context,
    colour scheme=blues,
    rotate all colours,
    timeline={%
      timeline years=above,
      timeline marks,
      timeline minor marks,
      step minor year=50,
      step divisions=10,
      step major year=100,
      dates=1550:2050,
      timeline height'=3pt,
      timeline line={chronos timeline foreground colour,double=chronos timeline
background colour,line width=\timelineht/3,double distance=\timelineht/3},
      timeline arrow,
      conditional timeline arrow={%
        timeline/timeline line+={Bar-Latex,shorten <=-\timelineht/3,shorten >=-3pt-2.1\
timelineht},
        timeline/timeline width--={3pt+2.43\timelineht},
        before headings+={\path (chronos post) -- ++(3pt+2.1\timelineht,0pt) (chronos
pre) -- ++(-\timelineht/3,0pt);},
      }{,
      timeline mark={chronos timeline foreground colour,line width=.6pt,shorten >=-4pt},
      timeline minor mark={chronos timeline foreground colour,line width=.5pt,shorten
>=-3.5pt},
      timeline bare mark={chronos timeline foreground colour,line width=.3pt,shorten
>=-2.5pt},
      timeline year={fill=none,text=chronos timeline foreground colour,rotate around
={45:(chronos year \chronosyeari |- chronos top)}},
      major step font=\sffamily\footnotesize\tlstyle,
      timeline years anchor=south west,
      minor step font=\sffamily\scriptsize\tlstyle,
      timeline margin'=17.5pt,
    },
    minor year format={!Y},
    every event below,
    every life below,
    every period below,
    levels=0:3,
    headings style+={text=chronos main colour!75!chronos main background colour,font=\
small\itshape\bfseries},
```



```

subheadings style+={text=chronos main colour!75!chronos main background colour,font
=\footnotesize\itshape},
main/title+={font=\LARGE,text=chronos timeline foreground colour,draw=chronos
timeline background colour,semithick},
main/frame+={thick,draw,chronos timeline foreground colour,double=chronos timeline
background colour},
copyright={font=\footnotesize\sffamily, inner sep=0pt, outer sep=0pt, text=chronos
timeline foreground colour!50!chronos main background colour},
copyright/rotate=90,
copyright/tag anchor=north west,
},
}

```

This definition is chosen because it is one of the most technically complex examples. This complexity is a function of several factors: it uses *off-line* years; the year labels are rotated; the line involves two arrow tips; and the line is drawn with `double`.

Note the following:

1. colours listed in table 13 are used but not defined;
2. instead, a custom colour configuration is set by loading an appropriate colour scheme;
3. there is a weird looking `\chronosyeari` in the definition of `timeline year`;
4. `timeline/timeline arrow` and `timeline/conditional timeline arrow` enables use of arrow tips to be toggled off;
5. `dates` are defined, even though they are almost certainly wrong in most cases;
6. `.meaning to context` is used, even though the user might not have loaded `memoize`, which defines it.
7. some fonts use a non-standard command `\tlstyle`.

Item 7 need not concern us here. If certain packages are loaded, it ensures tabular, lining figures; if not, `chronos` provides a command with this name at the end of the preamble by simply `\letting` it to `\upshape`.

Regarding item 5, the standard `chronos` styles all define `dates`, but whether they should do so is another question. On the one hand, if they are not defined (as they are not if no `chronos` style is loaded), `chronos` will generate an error, alerting the user to the deficiency. Since it is highly unlikely any default choice will suit any user, let alone most of them, an error might be considered appropriate. On the other hand, some `chronos` styles are far more suitable for some temporal ranges than others. For example, consider this excerpt from the definition of `contemporary 90`:

```

timeline={%
  timeline marks,
  timeline minor marks,
  timeline mark={ultra thick},
  timeline minor mark={thick},
  step divisions=4,
  step major years=2,
},

```

This is fine for a `timeline` of a decade or two, but quite unsuitable for one representing either the period 3,000 BCE–2025 CE or the first half of 1857. While a user can always modify these settings, along with the `dates`, a default range provides a sense of the temporal duration the `chronos` style is suitable for ‘out-of-the-box’.

The author of this package has found a comfortable spot on a convenient fence and intends to stay there, whatever the provided `chronos` styles might suggest. The reader is warned to make the most of the fences available here, as there are none whatsoever in the next section.

Table 14: Keys and names for `chronos` colours. Note that neither ‘colour’ nor ‘color’ appears in any key in the first column, but in every key in the second. In the second column, ‘color’ may be substituted for ‘colour’ in any name.

		Colour Schemes Key	Later Accessible As			
MUST NOT define!	C O R E	core {	foreground	chronos main colour	C O R E	
			background	chronos main background colour		
		core derivative {	timeline foreground	chronos timeline foreground colour		
	timeline background		chronos timeline background colour			
	core border {	timeline border outer	chronos timeline border outer colour			
		timeline border inner	chronos timeline border inner colour			
		timeline border middle	chronos timeline border middle colour			
	Should NOT touch!	E L E M E N T A L	default colours {	life/default		-
				event/default		-
period/default				-		
theory/default				-		
info/default				-		
colour lists {		default above	-			
		default below	-			
		life/above	-			
		life/below	-			
		event/above	-			
		event/below	-			
		period/above	-			
		period/below	-			
		theory/above	-			
		theory/below	-			

### 13.2.1 How (Not) to Customise Colours

Items 1 and 2 are the most important. *Chronos styles MUST NOT set core, core derivative or core border colours, where ‘core, core derivative and core border colours’ refer to those listed in tables 13 and 14.* In many cases, violating this rule may appear to work, but in others doing so will produce weird results or errors.

Moreover, *chronos styles should not set any other colour key or colour list directly.* In many cases, violating this rule may appear to work, but in others doing so will cause things not to work as expected.

To summarise, *if it can be done by a colour scheme, it should be done by a colour scheme*<sup>41</sup>.

The reason for this restriction is that the colours are not finalised and the public colour names are not defined when the colour scheme and/or chronos style are read. Initially, `chronos` assigns colours only to internal names. When the user configuration in the `<chronos preamble>` has been read, `chronos` starts the `tikzpicture` environment and further processes the configuration before drawing the timeline. As part of this processing, `chronos` makes changes to colours in specified circumstances.

In particular, the colours assigned to the `timeline foreground` and `background` are switched if three conditions are satisfied.

1. The internal colour names for `chronos timeline foreground colour` and `chronos timeline background colour` evaluate to the same colour specification.
2. One of the specifications is identical to the colour specification for `white`.

<sup>41</sup>That is, ‘can implies ought’.

### 3. `timeline years` is not on line.

Condition 3 cannot be determined until the complete configuration has been read. In particular, it is not known when colour schemes and chronos styles are read. While it is recommended users select a chronos style congruent with their preferred setting for `timeline years`, this is intended to make configuration easier and is not a requirement.

Only *after* colours are potentially switched are the public names listed in table 14 assigned, long after colour schemes and chronos styles have been read.

It is nonetheless possible, indeed recommended, to *use* the public names in chronos styles, though they cannot be used in colour schemes. It is only *defining* them at this stage which is problematic.

Here is an example from the definition of `modern` in `chronos-lib-styles`:

```
✓ timeline line={chronos timeline background colour, opacity=1},
  period/line={fill=chronos timeline foreground colour, blend mode=overlay},
  life/line={fill=chronos timeline foreground colour, blend mode=overlay},
  event/line={draw=chronos timeline foreground colour, thick, blend mode=overlay},
  every text tags={fill=chronos main background colour, text=####1, fill opacity=.75,
text opacity=1, draw=none, rounded corners, align=center, font=\sffamily\footnotesize},
```

This is perfectly proper<sup>42</sup>. However, if you were to include something such as

```
✗ timeline border middle colour=chronos timeline border inner colour!50!chronos timeline
border outer colour,
```

you would get an error complaining about the use of undefined colours. The definition of `timeline border middle colour` is the prerogative of the colour scheme and shouldn't feature in a chronos style at all, but this particular definition is illegitimate in any case because neither `chronos timeline border inner colour` nor `chronos timeline border outer colour` yet exists.

But why shouldn't chronos styles include colour definitions of the kind permitted in colour schemes? Because `chronos` processes the definitions in colour schemes as they are read (section 13.1.1). If you put

```
✗ foreground=SlateBlue4,
background=Snow1,
```

in a chronos style, *only* these colours will be set. In particular, neither the `timeline` nor any default colours will be affected at all. But if you put this into a colour scheme, `chronos` will derive colours for the `timeline` and set default colours for elements belonging to the various tags. If no other changes are made, the result will be a white-on-blue `timeline` with blue-to-white `timeline` borders and blue as the fallback colour for `tag` elements. (This is probably wrong for `off line` and `chronos` won't correct you because `Snow1` isn't exactly `white`, but that's why colour schemes should do either a bit more or a bit less than this.)

If you wish, your chronos style can load a colour scheme of its own. This is what many of the standard chronos styles do. For instance, here is the sum total of `modern`'s `modern` colour scheme,

```
✓ \chronosnewcolourscheme{modern}{%
  timeline foreground=chronosSilver,
}
```

### 13.2.2 How to Rotate Years

Item 3 is a function of this style's rotation of the year labels created for the `timeline`. The easiest way to do this is to **rotate around** one of the anchors belonging to the node containing the

<sup>42</sup>At least, it is fine as far as `chronos` goes. Whether it is proper `TikZ` code is not for me to judge.

relevant year. Obviously, we can't do this for each node. We don't know how many there are or what they are named. Instead, we need a hook into the `\foreach` loop `chronos` uses when creating the year labels.

`\chronosyeari`  
*macro* refers to the current year *inside the \foreach loop used to mark years on the timeline*. (`chronos year \chronosyeari`) isn't actually the node, but the point representing the date on the timeline, but the node starts there, so we can use it provided `timeline years anchor` is set appropriately.

```
timeline year={rotate around={45:(chronos year \chronosyeari |- chronos top)}},
timeline years anchor=south west,
```

### 13.2.3 Hashes

You may have noticed the following line in the excerpt from `modern`'s definition above.

```
every text tags={fill=chronos main background colour, text=####1, fill opacity=.75,
text opacity=1, draw=none, rounded corners, align=center, font=\sffamily\footnotesize},
```

Anywhere you'd normally use a single hash (e.g. `#1`) in defining a TikZ style, you need two (`##1`) because you're nesting that definition within the definition of another style. So it is not surprising to find lines such as

```
connections={draw=##1, {Triangle[width=0pt 3,reversed,length=0pt 1.5]}-{Triangle[width
=0pt 5,reversed,length=0pt 2.5]}},
```

in `modern`'s definition, but why *four*?

Certain keys require one or more additional doublings of hashes. Anytime you use an `every` key, you need to double. Double double makes four, so we get `text=####1`<sup>43</sup>.

Elsewhere, a single doubling is generally sufficient, as shown in these lines from the definition of `plain arrow`

```
period/line+={line width=2pt,draw=##1},
life/line+={line width=2pt,draw=##1},
```

Incidentally, PGF doesn't complain if you quadruple the hashes here, though it does so if you make the same mistake elsewhere. So silence does not always indicate correctness. This is important if you're debugging: don't assume because a pattern generates no error in one case, it cannot be the source of an error in another.

Note also that if you say

```
x text tags={draw=####1,sharp corners,text opacity=1,fill opacity=1,draw opacity=1,
drop shadow},
```

T<sub>E</sub>X will give you an error suggesting you haven't used *enough* hashes,

```
! Illegal parameter number in definition of \tikz@temp.
<to be read again>
```

1

```
1.113 ]
```

```
? h
```

```
You meant to type ## instead of #, right?
```

```
Or maybe a } was forgotten somewhere earlier, and things
are all screwed up? I'm going to assume that you meant ##.
```

```
?
```

<sup>43</sup>For real fun with hashes, may I recommend `chronos` or `forest`?

If you double the hashes *again* (#####1), you'll get the same error. The actual problem is that you've used too many.

✓ `text tags={draw##1,sharp corners,text opacity=1,fill opacity=1,draw opacity=1,drop shadow},`

is correct in a chronos style definition i.e. twice the number required in the `<chronos preamble>`. If you reduce the hashes to one (`#1`), you'll get no error but the wrong output as the element's colour won't be used.

***Despite this, chronos styles should always use chronos keys and hashes for colours.***

Hashes are essential for two reasons.

1. Hard-coding colours breaks colour rotation. In order for colours to be not just assigned in rotation, but used for the elements they are assigned to, chronos style definitions must use the colour names passed to them. So hashes are essential when defining the properties of tag elements subject to colour rotation.
2. Chronos ***cannot track colours it doesn't know about and it doesn't know about colours passed directly to PGF/TikZ keys.*** Hard-coding colours breaks the system of colour names chronos provides. Chronos will assign colour names to colours regardless, but the names will not refer to the colours actually used. They will merely refer to the colours assigned. Chronos styles are responsible for ensuring assigned colours are used so chronos colour names work correctly. Suppose a chronos style includes `event/text tag+={text=red},event/connection+={draw=red}`. Chronos will keep assigning colours to elements of tag type event, but it will not assign 'red' except by happy chance.

Example: `\draw [chronos connect=period:red letter day] ...`

will still work, but may well use black or navy blue rather than the pillar box red expected. Since this referencing system works for some elements not subject to colour rotation at all, such as those belonging to tag info and applies even when colour rotation is disabled completely, it constitutes a more general reason to avoid hard-coding colours, even if the effects may be less immediately noticeable in some timelines.

#### 13.2.4 Timeline Arrow

Chronos styles must decide whether to support timelines with and/or without one or more arrow tips and/or line caps. In deciding this, note the following points.

- Only `off line` styles can support these features.
- Adding, removing or modifying a tip or cap requires adjusting the `timeline width`. This is because the length available for representing time is reduced when some proportion of the timeline line is used for a tip or cap. Chronos adjusts automatically for `timeline margins` and `timeline era margins`, but styles are responsible for other adjustments.
- Supporting both arrowed and non-arrowed variants therefore requires conditionalised code.
- Each arrow tip and line cap requires a bespoke adjustment, even if used in default form.
- Users may legitimately use `timeline/timeline arrow` and `timeline/no timeline arrow` after loading a chronos style.
- Chronos styles may legitimately ignore these keys.
- Chronos styles must delay finalising the content of `timeline` until the end of the `<chronos preamble>` if they wish to support variants with and without tips and/or caps.

See `timeline/timeline arrow` and `timeline/no timeline arrow`.

```
timeline/conditional = {(<key-value list if arrow/cap>)}key-value list otherwise
  timeline arrow
    key
```

This key expects two arguments: *<key-value list if arrow/cap>* should be a list of key-values to be executed if `timeline/timeline arrow` is true; *<key value list otherwise>* should be a list of key-values to be executed if it is false. Chronos will switch the key path to `/chronos/` prior to using the list, but the `timeline` prefix must be specified if required. The effect is to add code to the style `timeline/do timeline arrow` which executes *<key-value list if arrow/cap>* if `timeline arrow` is true and *<key-value list otherwise>* otherwise. More specifically, the code used to implement this mechanism is equivalent to

```
conditional timeline arrow/.code 2 args={%
  \pgfqkeys{/chronos}{%
    llinell amser/.cd,
    timeline@arrow/.style={/chronos/.cd,#1},
    no@timeline@arrow/.style={/chronos/.cd,#2},
    do timeline arrow/.add code={%
      \ifchronostimelinearrow
        \tikzset{/chronos/llinell amser/timeline@arrow}%
      \else
        \tikzset{/chronos/llinell amser/no@timeline@arrow}%
      \fi
    },
  }%
},
```

If the timeline uses off line yearss, `\pgfqkeys{/chronos/timeline}{<do timeline arrow>}` is executed after `timeline/timeline height` is finalised.

Example: See below.

`timeline/do timeline arrow`  
*key*

Chronos styles are expected to set this *via* `timeline/conditional timeline arrow`, which causes it to be executed in `timeline config`, but they could also execute it explicitly if required.

Default: dependent on other options

For example, `lines on line` supports arrowed and non-arrowed variants using

```
lines on line/.style={% https://tex.stackexchange.com/a/324453/
  /chronos/.cd,
  ...
  timeline={%
    timeline width'=120mm,
    ...
    timeline arrow,
    conditional timeline arrow={%
      timeline/timeline width'--=20mm,
      timeline/timeline line+={shorten >=-20mm, --{Triangle Cap[length=20mm]}},
      before headings+={%
        \path (chronos post) -- +(20mm,0pt);
      },
    }{ },
  },
  ...
},
```

`timeline arrow` requests an arrow by default, but does nothing else. `conditional timeline arrow` sets up the style keys to execute if `timeline arrow` is still enabled when `do timeline arrow` is executed. At this stage, then, no actual changes are applied to the style to be applied to the timeline.

The actual effects on the timeline's style are determined only at the end of *<chronos preamble>* when `timeline/do timeline arrow` is executed. Hence, the user may override the style's use

of `timeline arrow` by writing `timeline/timeline arrow=false` or `timeline/no timeline arrow` after loading lines on line.

Styles which support timeline arrows must do the following to ensure correct results<sup>44</sup>.

1. Set `timeline/timeline arrow` if an arrow, non-default line-cap or similar is to be default.
2. Use `timeline/conditional timeline arrow` if a non-arrow is to be supported and configure the arrow/cap/spacer(s) *only* using this conditional.
3. Decrease `timeline/timeline width` by the total length of arrows, caps and spacers. At the beginning of the `chronos` environment, this dimension must equal the actual length available for the `timeline era margins`, `timeline margins` and the representation of time, else marks and years may be placed onto arrows or caps.

The recommended way to do this at present is to

- (a) calculate the total length of arrows, caps and spacers by hand and use `timeline/timeline width' = {\total length}` to subtract it from the user-specified `width`<sup>45</sup>;
  - (b) add `shorten >=` and/or `shorten <=`, as appropriate, to increase the length of the line just while it is being drawn.
4. Ensure the bounding box includes any arrows, caps and spacers.

One way to achieve this is to

- (a) use `before headings+` to place coordinates at the tip and very tail of the arrow/-cap/spacer(s).
5. Calculations must account for `\pgflinewidth` and, if applicable, any use of `double`, in order to avoid overfull boxes.

### 13.2.5 Styles and Automemoization

It is recommended that `chronos` styles are configured so that externalised `chronos` timelines which use them are automatically recompiled if the styles' definitions change. This can be achieved by adding `<name of style>/.meaning` to `context` to each `chronos` style's definition. For example, the packaged styles all use the following template to begin their definitions.

```
\pgfqkeys{/chronos}{%
  <name of style>/.style={%
    /chronos/.cd,
    <name of style>/.meaning to context,
    ...
  },
}
```

This is safe, even if `memoize` isn't used, because `chronos` provides a fallback key handler, `.meaning` to `context` which does nothing.

## 13.3 Defining Styles for Additional Elements

Due to the way `chronos` manages tag contexts, creating custom styles to apply to the additional elements explained in section 9 is not necessarily straightforward.

<sup>44</sup>This is necessary because

`chronos` discards the bounding box which includes the arrows immediately after drawing them and it is not possible (as far as I can tell) to extract the required information, even though PGF has just performed all these calculations itself.

<sup>45</sup>Accurate calculation requires knowledge of `\pgflinewidth`, any use of `double`, custom options passed to the arrow and details of the formula PGF uses to calculate the length for the specific types of arrow tips and/or line caps configured. In some cases, this information is included in the `TikZ` manual but, in most cases, you must consult the source of the `arrows.meta` `pgf/ti\emphkz` library.

If you only want to use non-chronos keys in your style, however, it *is* straightforward. Simply create whatever PGF/TikZ styles you wish and add them to particular elements as you deem appropriate.

The trouble starts if you want to define style which include chronos keys. More particularly, difficulties arise if you want to use keys which are specific to tag contexts such as `at` or `tag anchor`. For example, the timeline in fig. 1 uses three custom styles, `tag left`, `tag post` and `tag right` to place text tags. Consider the definition of `tag right`,

```
at/.expand once=level -##1.south -| ##2,
tag anchor=north west,
anchor=south west,
xshift=5pt,
connectors=east,
```

It uses `at` and `tag anchor`, which are tag-specific chronos keys, as well as the `anchor` and `xshift` PGF/TikZ keys. A naïve approach would suggest

```
× tag right/.style 2 args={%
at/.expand once=level -##1.south -| ##2,
tag anchor=north west,
anchor=south west,
xshift=5pt,
connectors=east,
},
```

but this will fail. Less naïvely, you might fiddle with path prefixes, but this won't work reliably either because chronos effectively activates some tag-specific settings by installing them temporarily under `/chronos`. Meanwhile, it redefines a subset of both the global and tag-specific keys to ensure local element-specific settings don't 'leak'<sup>46</sup>.

The result of all this is that you cannot generally use standard PGF/TikZ techniques to define styles involving chronos keys for use in creating chronos elements belonging to tags. Given the aims of chronos, this is a significant limitation only partially mitigated by the following workaround.

Chronos provides a PGF/TikZ key handler to facilitate the creation of straightforward styles, but the current version has significant limitations I've not been able to solve.

```
.chronos key maker = {(key name)}{(pgf key handler)}{(value)}
key handler
```

`<key name>` should be a name suitable for a PGF/TikZ key. `<pgf key handler>` should be a PGF key handler, without the leading dot, such as `style 2 args` or `ecode`. `<value>` should be the value or definition for `<key name>`. *Only handlers which expect a single argument may be used.* This limits the maximum number of arguments `<key name>` can absorb to two, since the only PGF key handlers capable of absorbing three or more arguments themselves require two or more.

The key handler is available in the `<chronos preamble>` and in `\chronosset`. It requires a single doubling of hashes.

Example:

Here are the definitions of `tag left`, `tag post` and `tag right` mentioned above.

```
tag right/.chronos key maker={tag right}{style 2 args}{%
at/.expand once=level -##1.south -| ##2,
tag anchor=north west,
anchor=south west,
xshift=5pt,
connectors=east,
},
tag left/.chronos key maker={tag left}{style 2 args}{%
```

<sup>46</sup>PGF/TikZ has this type of containment down to a fine art. Chronos's approach is altogether cruder.



```

at/.expand once=level -##1.south -| ##2,
tag anchor=north east,
anchor=south east,
xshift=-5pt,
text tag+={align=right},
},
tag post/.chronos key maker={tag post}{style}{%
at=level -##1.south -| chronos end,
tag anchor=north west,
anchor=south east,
connect=false,
connectors=east,
},

```

Note `tag post`'s use of the standard coordinate `chronos end` (fig. 3).

## 14 Debugging

*Note that many keys in this section draw on `chronos` overlay layer. They will typically draw **over** content you've created. This should not be a concern as they are not intended for use in the final document.*

`placeholders` = on|off  
*choice key*

If enabled, any helper nodes created with `levels` will be visible rather than invisible<sup>47</sup> and vertical lines corresponding to headings will be drawn. This option is intended to assist in the creation of complex timelines.

Default: on

Initially: off

`placeholder lines` = {(key-value list)}  
*style*

The style used to draw any lines created when `placeholders` is enabled. The style may be modified or replaced using the usual TikZ techniques, but the settings for nodes should not be altered in a way which changes their size e.g. by setting `line width` or similar.

```

\begin{chronos}
[
  placeholders,
  placeholder lines/.append style={thick},% for the default nodes and similar lines,
  but thicker
  placeholder lines/.style={thin,draw=magenta,<->},% for magenta double-arrowed
  lines with no changes to nodes
]
\end{chronos}

```

Default: `help lines, every node/.append style=rotate=-90,anchor=south,pos=.25,inner sep=0pt`

The following were created for use in developing the package, but some may be more generally useful. Those which seem most likely to be helpful are listed first.

*Note that all of the keys which follow ignore the picture's bounding box. This means they will disappear (or partially disappear) with no warning if there is insufficient space. This may be a concern, but having half the timeline disappear from view is worse.*

`show coords` = true|false  
*boolean key*

<sup>47</sup>I am grateful to Qrrbrlrlbel for providing the code implementing this at [TeX StackExchange: 694967](https://tex.stackexchange.com/questions/694967).

Labels a selection of `chronos` coordinates, which may be useful for placement or trouble-shooting purposes.

Default: `true`

Initially: `false`

`show bounding box = true|false`

*boolean key*

Draws the bounding box of the `tikzpicture` containing the timeline.

Default: `true`

Initially: `false`

`show nodes = true|false`

*boolean key*

If, and only if, `timeline mark eras` is explicitly enabled (as opposed to being enabled just because a timeline spans BCE and CE), draws and labels the nodes containing the era labels on the timeline.

Default: `true`

Initially: `false`

`debug` A convenience key which switches on all four of the options above.

*key*

```
\begin{chronos}
  debug,
\end{chronos}
```

The following keys are available to customise the output of the options in this section.

`show coordinate colour = <colour name>`

`show coordinate color`

*colour key*

Default: `red`

`show bb colour = <colour name>`

`show bb color`

*colour key*

Default: `green`

`show node colour = <colour name>`

`show node color`

*colour key*

Default: `blue`

`show coordinate` A style used to show coordinates. It is used both directly and indirectly by both `show coord` and `show node coord`. If you want to redefine it, it should take 5 arguments: a colour name, an angle, the name of the coordinate, a dimension and a (possibly empty) key-value list.

Default: `fill=#1, circle, anchor=center, inner sep=1pt, text=#1, pin=[[#1, inner sep=0pt, pin edge={draw=#1}, pin distance=#4, #5]#2:#3}`

`show coord` A style used to show coordinates. If you want to redefine it, it should take 2 arguments: the name of the coordinate and an angle.

*style*

Default: `/chronos/show coordinate={<chronos show coordinate colour>}{#1}{#2}{30pt}{}`

`show node coord` A style used to show particular points on nodes. If you want to redefine it, it should take 2 arguments: the name of the coordinate and an angle.

*style*

Default: `/chronos/show coordinate={<chronos show node colour>}{#1}{#2}{30pt}{}`

`\chronosshowcolour` [`\macroname`]{<colour name>}

*macro*

`\chronosshowcolour*` [`\macroname`]{<colour name>}

*macro*

`\chronosshowcolor` [`\macroname`]{<colour name>}

*macro*

`\chronosshowcolor*` [`\macroname`]{`<colour name>`}

*macro*

Extract the colour specification of `<colour name>` to the macro `\macroname`. The starred forms show `\macroname`; the remainder merely (re)define it. In case it is not obvious, don't use a `\macroname` you care about as it will be overwritten without warning. By default, an internal macro is used and reused, so, if you don't specify `\macroname`, you can only inspect one colour specification at a time.

Example: `\chronosshowcolour*{white}`

will show the colour specification of `white` on the terminal.

The remainder are unlikely to be helpful except in debugging `chronos` and no attempt has been made to render their output intelligible.

`\chronosshowpreset` Show non-default globalised options. This shows the properties<sup>48</sup> currently recorded as set by the user. This includes selected options set by `chronos` styles and options set with `\chronosset`, but not defaults set by `chronos` when loading. This list is used in deciding whether to change the current setting of an option during timeline configuration. For example, if a user specifically requests `off line years` with a `timeline height` of 50mm in white-on-blue, `chronos` won't override those settings. But if a user asks for `off line years` without specifying `timeline height` or changing the default colours, `chronos` will try to select something reasonable for `timeline height` and assume the user wants black-on-white rather than white-on-white.

*macro*

The output of `\chronosshowpreset` is unlikely to prove especially enlightening unless debugging `chronos`. Here, for example, is the output when used at the start of a sample `chronos` environment,

```
The sequence \l__chronos_gosod_seq is empty
> .
```

and right after the optional argument has been processed,

```
The sequence \l__chronos_gosod_seq contains the items (without outer braces):
> {angor@blynyddoedd}
> {timeline@years}
> {@digwyddiad@llawn}
> {@byw@llawn}
> {@parhad@llawn}
> {markeras}
> {llinell}
> {cysylltiad}
> {llinell amser}
> {border}.
```

So this user didn't specify any non-default settings in the document preamble or with `\chronosset`, but has either set or specified a `chronos` style which set various options for this particular `chronos` environment, which `chronos` should respect. Note that the output tells us nothing about what has been chosen, but only *that* an explicit choice has been made. For example, `markeras` means the user has decided eras should or should not be marked on the timeline, but does not tell us which.

`\chronosshowfeatures` [`<tag>`]

*macro*

*life, event, period, theory, info*

Shows properties<sup>49</sup> assigned to either the current or `<tag>` context. Note that the output uses the original names for tags, which differ from those documented in this manual. `life`, `event`, `period`, `theory` and `info` correspond to `byw`, `digwyddiad`, `parhad`, `theori` and `gwybodaeth`.

Without an argument, the default list of properties is shown if the command is executed outside a `tag` context; otherwise, the list for the current context is shown. With an argument, the list of properties for `<tag>` is shown regardless of execution context.

There is no list of properties associated with tag `main`.

<sup>48</sup>Specifically, the contents of the `expl3` sequence used to record the names of `chronos` properties.

<sup>49</sup>Specifically, `expl3` property lists.

Here's the output from `\chronosshowfeatures` inside a `chronos` environment, but outside any tag context,

The property list `\l__chronos_prop` contains the pairs (without outer braces):

```
> {@tag} => {{,/chronos/troi lliwiau=false,/chronos/blynyddoedd yn
unig,/chronos/heb gyfnodau,/chronos/troi lliwiau=true}}
> {@cysylltwr@chronos} => {{coordinate}}
> {@cysylltwr@testun} => {{anchor=center,inner sep=0pt,outer
sep=0pt,circle, anchor=center, draw=none, fill=none, minimum
size=\pgflinewidth }}
> {@llinell} => {{}}
> {@testun} => {{fill=chronos main background colour, text=###1, fill
opacity=.75, text opacity=1, draw=none, rounded corners, align=center,
font=\sffamily \footnotesize ,draw=###1,sharp corners,text opacity=1,fill
opacity=1,draw opacity=1,drop shadow}}
> {@cysylltiad} => {{draw=##1, {Triangle[width=0pt 3,reversed,length=0pt
1.5]}-{Triangle[width=0pt 5,reversed,length=0pt 2.5]}}}
```

and from `\chronosshowfeatures[event]`,

The property list `\l__chronos_digwyddiad_prop` contains the pairs (without outer braces):

```
> {@cysylltwr@chronos} => {{coordinate}}
> {@cysylltwr@testun} => {{circle, anchor=center, draw=none, fill=none,
minimum size=\pgflinewidth }}
> {@testun} => {{fill=chronos main background colour, text=##1, fill
opacity=.75, text opacity=1, draw=none, rounded corners, align=center,
font=\sffamily \footnotesize ,draw=##1,sharp corners,text opacity=1,fill
opacity=1,draw opacity=1,drop shadow}}
> {@tag} => {{,/chronos/blynyddoedd yn unig,/chronos/heb
gyfnodau,/chronos/troi lliwiau=true}}
> {@llinell} => {{draw=chronos timeline foreground colour, thick, blend
mode=overlay}}}
```

Table 15: Public names for `chronos` internal macros defined locally within the *<timeline specification>*.

Public name	Chronos internal name
<code>\ceyearlabel</code>	<code>\chronos@yearce</code>
<code>\bceyearlabel</code>	<code>\chronos@yearbce</code>
<code>\celabel</code>	<code>\chronos@ce</code>
<code>\bcelabel</code>	<code>\chronos@bce</code>
<code>\timelineht</code>	<code>\chronos@height</code>
<code>\timelineborderht</code>	<code>\chronos@borderheight</code>
<code>\timelinewd</code>	<code>\chronos@width</code>
<code>\lineyshift</code>	<code>\chronos@llinell@yshift</code>

Table 16: Public names for `chronos` internal macros defined if undefined at the end of the preamble.

Public name	Chronos internal name
<code>\ceyearlabel</code>	<code>\chronos@yearce</code>
<code>\bceyearlabel</code>	<code>\chronos@yearbce</code>
<code>\celabel</code>	<code>\chronos@ce</code>
<code>\bcelabel</code>	<code>\chronos@bce</code>

## 15 Compatibility

`Chronos` timelines cannot be externalised using `TikZ`'s external `pgf/ti\emphkz` library<sup>50</sup>.

`TikZ`'s `spy pgf/ti\emphkz` library also appears to be incompatible.

Arrow tips and line caps from `TikZ`'s `arrows pgf/ti\emphkz` library are not supported in `timeline`. Please use `arrows.meta` instead.

`Chronos` defines some commands without either marking them as internal or using a package-specific prefix. These commands are of the following kinds.

- They use Welsh rather than English (`\byw`, `\digwyddiad`, `\parhad`, `\gwybodaeth`, `\theori`, `\cylchtheori` and `\prifdeitl`). These all use `\NewDocumentCommand`. Should they already be defined,  $\text{\LaTeX} 2_{\epsilon}$  will produce an error and existing definitions will not be overwritten.
- They are defined only locally within the *<timeline specification>*. These provide local access to `chronos` internals and do not use a package-specific prefix for reasons of convenience. These macros are listed in table 15. *Note that some of these macros are also defined conditionally at the end of the preamble. The local definitions described here are unconditional.*
- They are ‘throwaway’, extremely temporary macros such as `\tempa`. These are used only very, very locally. Any macro which needs to retain its definition for more than a few lines uses a `chronos@` prefix unless it is a variable in a `PGF \foreach` loop.
- They are defined only if undefined at the end of the preamble, so existing definitions are maintained without warning or error. This applies to cases where either `chronos` uses a command if it is available (e.g. `\uishape`), but needs a fallback otherwise, or a public macro is made available as a convenience, if the user is not using the name already (e.g. `\celabel`). These macros are listed in tables 16 and 17.
- They are differently-named replacements for a subset of `etoolbox` macros and tests<sup>51</sup>, which are defined only if they do not exist. If they already exist, `chronos` produces a warning and continues, hoping for the best. This set of macros is compatible with `etoolbox`, which `chronos` depends on for patching purposes.

<sup>50</sup>However, `chronos` pictures *can* be ‘memoized’. Moreover, if `memoize` is loaded, `chronos` will set up ‘automemoization’ by default. See section 11.

<sup>51</sup>They are a response to advice not to mix `expl3` and `etoolbox`. Since I’d originally thought it was better to use `etoolbox` functions than create a slew of wrappers for `expl3` functions, these are the products of the resulting rewrite. Despite my best efforts, the dependency on `etoolbox` remains, but usage is confined to cases where `expl3` does not offer equivalent functionality.

Table 17: Fallback definitions for macros undefined at the end of the preamble.

Functionality used if defined	Chronos fallback definition
<code>\tlstyle</code>	<code>\let\tlstyle\upshape</code>
<code>\plstyle</code>	<code>\let\plstyle\upshape</code>
<code>\uishape</code>	<code>\let\uishape\itshape</code>
<code>\textui</code>	<code>\DeclareTextFontCommand{\textui}{\uishape}</code>
<code>\sishape</code>	<code>\DeclareRobustCommand\sishape{\itshape\scshape}</code>
<code>\textsi</code>	<code>\DeclareTextFontCommand{\textsi}{\sishape}</code>

Table 18: Approximate replacements for etoolbox macros.

etoolbox	chronos expl3 wrapper
<code>\ifundef</code>	<code>\IfFreeTF, \IfFreeT and \IfFreeF</code>
<code>\ifdef</code>	<code>\IfExistTF, \IfExistT and \IfExistF</code>
<code>\ifcsundef</code>	<code>\IfCSFreeTF, \IfCSFreeT and \IfCSFreeF</code>
<code>\ifcsdef</code>	<code>\IfCSExistTF, \IfCSExistT and \IfCSExistF</code>
<code>\undef</code>	<code>\Undefine</code>
<code>\csletcs</code>	<code>\CSletCS</code>
<code>\cslet</code>	<code>\CSlet</code>
<code>\ifboolexpr</code>	<code>\IfBooleanExprTF, \IfBooleanExprT and \IfBooleanExprF</code>
<code>bool</code>	<code>\LegacyBoolean</code>
<code>test</code>	<code>\CSFreeBoolean</code>
<code>\ifnumcomp</code>	<code>\IntCompareBoolean, \IfIntCompareTF, \IfIntCompareT and \IfIntCompareF</code>

However, they may be incompatible with packages I'm unaware of or which are not yet published, in which case the warnings may prove informative. These macros are listed in table 18.

## 15.1 Compatibility with Code from T<sub>E</sub>X SE Answers

The CTAN release of `chronos` is not backwards compatible with versions published on [T<sub>E</sub>X StackExchange](#). However, there are several methods you can use to update most timelines produced using code from answers there. Which approach is best depends on the specific case.

I suggest four possible approaches below. Of these, methods 1 and 2 are strongly recommended. The remaining methods 3(a) and 3(b) are for those keen for adventures in the typesetting hinterlands, desperate souls suffering in imminent-deadline hells and the perilously inquisitive with too much time on their hands. They are included because most of us, at one time or another, find ourselves in situations of the second type, even if we are too home-loving and incurious to dare the others.

**Method 1:** If you intend to develop work utilising code from T<sub>E</sub>X SE answers further, I strongly recommend taking the time to switch to the new key-value interface and `chronos` environment. This method is the most work, but also the most reliable and flexible. There is no guarantee that either of the alternative methods methods 3(a) and 3(b) will work or continue to work with future `chronos` releases. Method 2 is an option, but if you are actively developing a timeline, the flexibility of `chronos` should make things easier and provide options otherwise unavailable. If you put more work in and then find the code you have insufficient to your needs, you will only have delayed and expanded the task of updating.

**Method 2:** If you don't intend to develop existing timelines further, I strongly recommend not loading `chronos`, renaming any existing file to avoid conflicts and doing an ultra-simple update so existing documents load the renamed file. This is the simplest, most straightforward option. Why fix what ain't broke? If the code you have works and you're satisfied with the results, you need this package like a head needs an ache. The only thing you should do — and you really *should* do this — is rename any conflicting package you created locally. That is, if you've stuck code from an SE answer in a file named `chronos.sty`, I strongly recommend renaming it to, for example, `chronos-se.sty` to avoid conflicts. Then you can use `chronos` in new documents and just change the `\usepackage` invocation to `chronos-se` in old ones.

**Method 3:** If methods 1 and 2 aren't options — if, say, you want to use this package for a new timeline in a document with existing timelines and you don't have time to update those, then one of the following pairs of definitions *may* produce more-or-less the same output from existing or slightly modified code. Note that there is no guarantee this will work in any particular case or, if it does, that it will continue to work with future releases of `chronos`. It may, however, provide a quick-and-dirty fix if you are stuck.

(a) This requires minimal changes to existing code. You will need to modify existing timelines to use the `chronos` environment if they are currently in `tikzpicture` environments. Then place the following code *into the preamble* of your document:

```
\usepackage{chronos}
\makeatletter
% The following definitions **MUST** be in the preamble.
% They will **NOT** work if placed after \begin{document}
% or before \usepackage{chronos}.
% BEGIN \chronosevent
\NewDocumentCommand \chronosevent { 0 {} m 0 {} +m D () { \chronos@testun@yshift } }
{% #1 [<connection options>]
% #2 [<date>]
% #3 [<text tag options>]
% #4 [<text>]
% #5 (<yshift>)
  \digwyddiad{%
    date=#2,
    name=#4,
    yshift=#5,
    text tag+={#3},
    connection+={#1},
  }%
}
% END \chronosevent
% BEGIN \chronosperiod
\NewDocumentCommand \chronosperiod { 0 {} m 0 {} m 0 {} +m D () { \chronos@testun@yshift } }
{% #1 [<line options>]
% #2 [<start date>]
% #3 [<connection options>]
% #4 [<end date>]
% #5 [<text tag options>]
% #6 [<text>]
% #7 (<yshift>)
  \parhad{%
    start=#2,
    end=#4,
    name=#6,
    yshift=#7,
    connection+={#3},
    text tag+={#5},
    line+={#1},
  }%
}
% END \chronosperiod
\makeatother
```

If you use this method, you *cannot* use the key-value versions of `\chronosevent` and `\chronosperiod`. Instead, you will need to use `\digwyddiad` for events and `\parhad` for periods when you wish to make use of the new features.

(b) Alternatively, update all existing environments to use `chronos` as explained in method 3(a), if re-

quired. Then replace every occurrence of `\chronosevent` and `\chronosperiod` with `\chronoslegacyevent` and `\chronoslegacyperiod` and place the following in your document preamble<sup>52</sup>:

```
\usepackage{chronos}
\makeatletter
% BEGIN \chronoslegacyevent
\NewDocumentCommand \chronoslegacyevent { 0 {} m 0 {} +m D () { \chronos@testun@yshift } }
{% #1 [<connection options>]
% #2 {<date>}
% #3 [<text tag options>]
% #4 {<text>}
% #5 (<yshift>)
\chronosevent{%
  date=#2,
  name=#4,
  yshift=#5,
  text tag+={#3},
  connection+={#1},
}%
}
% END \chronoslegacyevent
% BEGIN \chronoslegacyperiod
\NewDocumentCommand \chronoslegacyperiod { 0 {} m 0 {} m 0 {} +m D () { \chronos@testun@yshift } }
{% #1 [<line options>]
% #2 {<start date>}
% #3 [<connection options>]
% #4 {<end date>}
% #5 [<text tag options>]
% #6 {<text>}
% #7 (<yshift>)
\chronosperiod{%
  start=#2,
  end=#4,
  name=#6,
  yshift=#7,
  connection+={#3},
  text tag+={#5},
  line+={#1},
}%
}
% END \chronoslegacyperiod
\makeatother
```

This allows you to use `\chronosevent` and `\chronosperiod` with the key-value interface in new timelines.

You do not need to read the remainder of this document in order to install or use the package.

---

<sup>52</sup>The location isn't crucial in this case, provided the definitions are read before you use them and after `chronos` is loaded, but it is bad practice to define new commands in the body of documents.



# chronos code\*

Clea F. Rees†

v0.9.2 (SVN 10946)

## Abstract

chronos implementation.

Note that part of this code was originally developed with no intention it should be published. Much of this code is not written in English and much of the original user interface is similarly non-English. Where this is the case, the code now supports English aliases of the original macros and keys. However, although I have tried to provide translations of all useful comments, no doubt I have missed some. I have also tried to provide some English indication regarding the purpose of commands and keys whose use is ‘obvious’ only if the name is understood. These additions are currently very sparsely scattered, however, and you should probably complain by filing a bug if you are actually interested in what it is supposed to do<sup>1</sup>.

---

\*This is file `chronos-code.dtx`.

†Bug tracker: [codeberg.org/cfr/chronos/issues](https://codeberg.org/cfr/chronos/issues) | Code: [codeberg.org/cfr/chronos](https://codeberg.org/cfr/chronos) | Mirror: [github.com/cfr42/chronos](https://github.com/cfr42/chronos)

<sup>1</sup>I’ve been told the main reason to document my code is for future-me. I do not expect future me to require English translations ... If you are not me, it would therefore be useful to let me know.

## 16 *chronos*

L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> package.

```

1 \RequirePackage{svn-prov}
2 \ProvidesPackageSVN[chronos.sty]{$Id: chronos-code.dtx 10946 2025-03-15 07:57:17Z cfrees
  $}[v0.9.2 \revinfo]
3 \DefineFileInfoSVN[chronos]

4 \NeedsTeXFormat{LaTeX2e}[2021-11-15]
5 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

copied verbatim, excepting format from Joseph Wright's `siunitx.sty` under LPPL

```

6 \@ifundefined{ExplLoaderFileDate}{%
7   \RequirePackage{expl3}%
8 }{}
```

almost verbatim from `siunitx.sty`

```

9 \@ifl@t@r\ExplLoaderFileDate{2022-02-24}{%
10 }{%
11   \PackageError{chronos}{Support package expl3 too old}
12   {%
13     You need to update your installation of the bundles 'l3kernel' and
14     'l3packages'.\MessageBreak
15     Loading~chronos~will~abort!%
16   }%
17   \endinput
18 }%
19 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
20 \ExplSyntaxOn
21 \newif\ifchronos@enwaulliwswml
```

`simple colour names` Only a single option really.

```

simple colour names
simple color names
no simple colour names
no simple color names
22 \keys_define:nn { chronos } %^A <<<
23 {
24   enwau~lliw~swml .legacy_if_set:n = chronos@enwaulliwswml,
25   enwau~lliw~swml .default:n = true,
26   enwau~lliw~swml .initial:n = true,
27   enwau~lliw~swml .usage:n = general,
28   simple~colour~names .legacy_if_set:n = chronos@enwaulliwswml,
29   simple~colour~names .default:n = true,
30   simple~colour~names .usage:n = general,
31   simple~color~names .legacy_if_set:n = chronos@enwaulliwswml,
32   simple~color~names .default:n = true,
33   simple~color~names .usage:n = general,
34   dim~enwau~lliw~swml .legacy_if_set_inverse:n = chronos@enwaulliwswml,
35   dim~enwau~lliw~swml .default:n = true,
36   dim~enwau~lliw~swml .usage:n = general,
37   no~simple~colour~names .legacy_if_set_inverse:n = chronos@enwaulliwswml,
38   no~simple~colour~names .default:n = true,
39   no~simple~colour~names .usage:n = general,
40   no~simple~color~names .legacy_if_set_inverse:n = chronos@enwaulliwswml,
41   no~simple~color~names .default:n = true,
42   no~simple~color~names .usage:n = general,
43 } %^A >>>
```

`\IfFormatAtLeastTF` Joseph Wright: from `siunitx.sty`; <https://chat.stackexchange.com/transcript/message/64327823#64327823>

```
44 \providecommand \IfFormatAtLeastTF { \@ifl@t@r \fmtversion }
```

```

45 \IfFormatAtLeastTF { 2022-06-01 }
46 {
47   \ProcessKeyOptions [ chronos ]
48 }{
49   \RequirePackage { l3keys2e }
50   \ProcessKeysOptions { chronos }
51 }

52 \IfFormatAtLeastTF { 2020-10-01 }{
53 }{
54   \RequirePackage { xparse }
55   \providecommand \ExpandArgs [1]
56   { \cs_if_exist_use:c { exp_args:N #1 } }
57 }
58 \ExplSyntaxOff
59 \RequirePackage{xcolor}

```

A mae fixedpointarithmetic eisiau fp - fixedpointarithmetic needs fp

```

60 \RequirePackage{tikz,etoolbox,pgfcalendar,calc,fp}% rwyf ti *eisiau* calc!
61 \usetikzlibrary{arrows.meta,calc,positioning,fixedpointarithmetic,decorations.%
62   text,fit,shadows}
63 \IfFileExists{tikzlibrarycfrforeground.code.tex}{%
64   \usetikzlibrary{cfrforeground}%
65 }{%
66   \usetikzlibrary{backgrounds}%
67 }

68 \ExplSyntaxOn

69 \bool_new:N \l__chronos_byw_troi_bool
70 \bool_new:N \l__chronos_digwyddiad_troi_bool
71 \bool_new:N \l__chronos_parhad_troi_bool
72 \bool_new:N \l__chronos_theori_troi_bool
73 \bool_new:N \l__chronos_gwybodaeth_troi_bool
74 \bool_new:N \l__chronos_troi_bool

75 \clist_new:N \g__chronos_lliwiau_uchod_clist
76 \clist_new:N \g__chronos_lliwiau_isod_clist
77 \clist_new:N \g__chronos_lliwiau_byw_uchod_clist
78 \clist_new:N \g__chronos_lliwiau_byw_isod_clist
79 \clist_new:N \g__chronos_lliwiau_parhad_uchod_clist
80 \clist_new:N \g__chronos_lliwiau_parhad_isod_clist
81 \clist_new:N \g__chronos_lliwiau_digwyddiad_uchod_clist
82 \clist_new:N \g__chronos_lliwiau_digwyddiad_isod_clist
83 \clist_new:N \g__chronos_lliwiau_theori_uchod_clist
84 \clist_new:N \g__chronos_lliwiau_theori_isod_clist
85 \clist_new:N \g__chronos_lliwiau_uchod_rhag_clist
86 \clist_new:N \g__chronos_lliwiau_isod_rhag_clist
87 \clist_new:N \g__chronos_lliwiau_byw_uchod_rhag_clist
88 \clist_new:N \g__chronos_lliwiau_byw_isod_rhag_clist
89 \clist_new:N \g__chronos_lliwiau_parhad_uchod_rhag_clist
90 \clist_new:N \g__chronos_lliwiau_parhad_isod_rhag_clist
91 \clist_new:N \g__chronos_lliwiau_digwyddiad_uchod_rhag_clist
92 \clist_new:N \g__chronos_lliwiau_digwyddiad_isod_rhag_clist
93 \clist_new:N \g__chronos_lliwiau_theori_uchod_rhag_clist
94 \clist_new:N \g__chronos_lliwiau_theori_isod_rhag_clist
95 \clist_new:N \l__chronos_llythrennau_bach_clist
96 \clist_set:Nn \l__chronos_llythrennau_bach_clist
97 {
98   a, an, and, as, but, for, if, in, is, of, on, the
99 }
100 \clist_new:N \l__chronos_dyddiadau_coords_clist

```

```

101 \clist_new:N \l__chronos_subheadings_clist
102 \clist_new:N \g__chronos_century_subheadings_clist
103 \clist_new:N \l__chronos_headings_clist
104 \clist_new:N \l__chronos_tmpa_clist
105 \clist_new:N \g__chronos_tmpa_clist
106 \clist_new:N \l__chronos_tmpb_clist
107 \clist_new:N \l__chronos_tmpc_clist

108 \int_gzero_new:N \g__chronos_int
109 \int_new:N \l__chronos_tmpa_int
110 \int_new:N \l__chronos_tmpb_int

111 \prop_new:N \l__chronos_byw_prop
112 \prop_new:N \l__chronos_digwyddiad_prop
113 \prop_new:N \l__chronos_gwybodaeth_prop
114 \prop_new:N \l__chronos_parhad_prop
115 \prop_new:N \l__chronos_theori_prop

116 \prop_new:N \l__chronos_rhagosedig_prop
117 \prop_new:N \l__chronos_prop
118 \prop_new:N \l__chronos_tmpa_prop

119 \regex_const:Nn \c__chronos_enw_regex { [^A-Za-z0-9\s\-\] }
120 \regex_const:Nn \c__chronos_enw_priflythren_cyntaf_regex { (^[^A-Za-z]*)([a-z]) }
121 \regex_const:Nn \c__chronos_enw_diogelu_regex
122 {
123   ([\s\-\c{\}\}][[:punct:]]*) ([^\s\-\c{\}\})* (\b|\c{\}\})
124 } % \s unrhyw space character \b word boundary

125 \regex_const:Nn \c__chronos_curly_bracket { [ \{ \} ] }
126 \regex_const:Nn \c__chronos_initial_minus { ^\-\ }

127 \seq_new:N \l__chronos_gosod_seq
128 \seq_new:N \l__chronos_tmpa_seq

129 \tl_new:N \l__chronos_lliw_tl
130 \tl_new:N \l__chronos_date_tl
131 \tl_new:N \l__chronos_dateformat_tl
132 \tl_new:N \l__chronos_year_tl
133 \tl_new:N \l__chronos_yearformat_tl
134 \tl_new:N \l__chronos_minoryearformat_tl
135 \tl_new:N \l__chronos_tikzname_tl
136 \tl_set:Nn \l__chronos_dateformat_tl { !d!/m!/Y }
137 \tl_set:Nn \l__chronos_yearformat_tl { !Y }
138 \tl_set:Nn \l__chronos_minoryearformat_tl { !c }
139 \tl_new:N \l__chronos_tmpa_tl
140 \tl_new:N \l__chronos_tmpb_tl
141 \tl_new:N \l__chronos_tmpc_tl
142 \tl_new:N \l__chronos_tmpd_tl

```

**foreground** Colour keys handled by l3keys.

```

background
timeline foreground 143 \keys_define:nn { chronos / lliwiau }%^A <<<
144 {
timeline background 145 foreground .code:n = {\__chronos_color_set_from_existing:nn
146   {chronos@prifliw}{#1}},
timeline border outer 147 foreground .groups:n = {core},
timeline border inner 148 background .code:n = {\__chronos_color_set_from_existing:nn
timeline border middle 149   {chronos@prifliw@cefnidir}{#1}},
life 150 background .groups:n = {core},
period 151 timeline ~ foreground .code:n = {\__chronos_color_set_from_existing:nn
event 152   {chronos@lliw@llinell}{#1}
theory 153 },
info 154 timeline ~ foreground .groups:n = {core ~ derivative},

```

```

155 timeline ~ background .code:n = {\_chronos_color_set_from_existing:nn
156   {chronos@lliw@cefndir@llinell}{#1}},
157 timeline ~ background .groups:n = {core ~ derivative},
158 timeline ~ border ~ outer .code:n = {\_chronos_color_set_from_existing:nn
159   {chronos@borderouter}{#1}},
160 timeline ~ border ~ outer .groups:n = {core ~ border},
161 timeline ~ border ~ inner .code:n = {\_chronos_color_set_from_existing:nn
162   {chronos@borderinner}{#1}},
163 timeline ~ border ~ inner .groups:n = {core ~ border},
164 timeline ~ border ~ middle .code:n = {\_chronos_color_set_from_existing:nn
165   {chronos@bordermiddle}{#1}},
166 timeline ~ border ~ middle .groups:n = {core ~ border},
167 life / default .code:n = {\_chronos_color_set_from_existing:nn
168   {chronos@byw@lliw@rhagosodedig}{#1}},
169 event / default .code:n = {\_chronos_color_set_from_existing:nn
170   {chronos@digwyddiad@lliw@rhagosodedig}{#1}},
171 period / default .code:n = {\_chronos_color_set_from_existing:nn
172   {chronos@parhad@lliw@rhagosodedig}{#1}},
173 theory / default .code:n = {\_chronos_color_set_from_existing:nn
174   {chronos@theori@lliw@rhagosodedig}{#1}},
175 info / default .code:n = {\_chronos_color_set_from_existing:nn
176   {chronos@gwybodaeth@lliw@rhagosodedig}{#1}},

```

default above Colour list keys handled by l3keys.

```

default below
  life above 177 default ~ above .clist_gset:N = \g__chronos_lliwiau_uchod_clist,
  life below 178 default ~ below .clist_gset:N = \g__chronos_lliwiau_isod_clist,
  event above 179 life / above .clist_gset:N = \g__chronos_lliwiau_byw_uchod_clist,
  event below 180 life / below .clist_gset:N = \g__chronos_lliwiau_byw_isod_clist,
  period above 181 event / above .clist_gset:N = \g__chronos_lliwiau_digwyddiad_uchod_clist,
  period below 182 event / below .clist_gset:N = \g__chronos_lliwiau_digwyddiad_isod_clist,
  theory above 183 period / above .clist_gset:N = \g__chronos_lliwiau_parhad_uchod_clist,
  theory below 184 period / below .clist_gset:N = \g__chronos_lliwiau_parhad_isod_clist,
185 theory / above .clist_gset:N = \g__chronos_lliwiau_theori_uchod_clist,
186 theory / below .clist_gset:N = \g__chronos_lliwiau_theori_isod_clist,
187 }%^^A >>>

```

YY yn lle YYYY

```

188 \cs_new_protected_nopar:Npn \_chronos_year_shorten:n #1
189 {
190   \int_set:Nn \l__chronos_tmpa_int { \tl_count:n { #1 } }
191   \int_compare:nTF
192   {
193     \l__chronos_tmpa_int < 3
194   }
195   {
196     #1
197   }
198   {
199     \int_compare:nTF
200     {
201       \l__chronos_tmpa_int < 4
202     }
203     {
204       \_chronos_year_shorten_aux:w 0 #1 \q_stop
205     }
206     {
207       \_chronos_year_shorten_aux:w #1 \q_stop % expl3 manuaal, 46
208     }
209   }
210 }

```

```

211 \cs_new_protected_nopar:Npn \__chronos_year_shorten_aux:w #1 #2 #3 #4 \q_stop
212 {
213   #3 #4
214 }
215 \cs_generate_variant:Nn \__chronos_year_shorten:n { V , v , x }
216 \cs_new_protected_nopar:Npn \__chronos_year_semi_shorten:n #1
217 {

218   \int_set:Nn \l__chronos_tmpa_int { \tl_count:n { #1 } }
219   \int_compare:nTF
220   {
221     \l__chronos_tmpa_int < 4
222   }
223   {
224     #1
225   }
226   {

```

expl3 manual, 46 (w/q\_stop?) ; §5.7 Unbraced

```

227   \__chronos_year_semi_shorten_aux:w #1 \q_stop
228 }
229 }
230 \cs_new_protected_nopar:Npn \__chronos_year_semi_shorten_aux:w #1 #2 #3 #4 \q_stop
231 {
232   #2 #3 #4
233 }
234 \cs_generate_variant:Nn \__chronos_year_semi_shorten:n { V , v , x }
235 \cs_generate_variant:Nn \int_abs:n { v }
236 \cs_generate_variant:Nn \tl_replace_all:Nnn { Nnx }

```

dangos dyddiadau | show dates

ateb Joseph Wright: <http://tex.stackexchange.com/a/327642/> ; PD/CCO at <https://tex.stackexchange.com/users/73/joseph-wright>

```

237 \cs_new_protected_nopar:Npn \__chronos_show_date:n #1
238 {%
239   \tl_set_eq:NN \l__chronos_date_tl \l__chronos_dateformat_tl
240   \tl_replace_all:Nnx \l__chronos_date_tl { !a }
241     { \pgfcalendarweekdayshortname{\thechronos@weekday} } }
242   \tl_replace_all:Nnx \l__chronos_date_tl { !A }
243     { \pgfcalendarweekdayname{\thechronos@weekday} } }
244   \tl_replace_all:Nnx \l__chronos_date_tl { !b }
245     { \pgfcalendarmonthshortname{\csname chronos@#1month\endcsname} } }
246   \tl_replace_all:Nnx \l__chronos_date_tl { !B }
247     { \pgfcalendarmonthname{\csname chronos@#1month\endcsname} } }
248   \tl_replace_all:Nnx \l__chronos_date_tl { !c }
249     { \__chronos_year_semi_shorten:x { \int_abs:v { chronos@#1year } } } }
250   \tl_replace_all:Nnx \l__chronos_date_tl { !d }
251     { \csname chronos@#1day\endcsname } }
252   \tl_replace_all:Nnx \l__chronos_date_tl { !E }
253     { \__chronos_dateformat_era:v { chronos@#1year } } }
254   \tl_replace_all:Nnx \l__chronos_date_tl { !m }
255     { \csname chronos@#1month\endcsname } }
256   \tl_replace_all:Nnx \l__chronos_date_tl { !q }
257     { \__chronos_dateformat_sign:v { chronos@#1year } } }
258   \tl_replace_all:Nnx \l__chronos_date_tl { !Q }
259     { \__chronos_dateformat_signs:v { chronos@#1year } } }
260   \tl_replace_all:Nnx \l__chronos_date_tl { !y }
261     { \__chronos_year_shorten:x { \int_abs:v { chronos@#1year } } } }
262   \tl_replace_all:Nnx \l__chronos_date_tl { !Y }

```

```

263   { \int_abs:v { chronos@#1year } }
264   \l__chronos_date_tl
265 }
266 \cs_new_protected_nopar:Npn \__chronos_show_year:n #1
267 {% ateb Joseph Wright: \url{http://tex.stackexchange.com/a/327642/} ; PD/CCO at \url{https://
268   \tl_set_eq:NN \l__chronos_year_tl \l__chronos_yearformat_tl
269   \tl_replace_all:Nnx \l__chronos_year_tl { !c }
270   { \__chronos_year_semi_shorten:x { \int_abs:n { #1 } } }
271   \tl_replace_all:Nnx \l__chronos_year_tl { !E }
272   { \__chronos_dateformat_era:n { #1 } }
273   \tl_replace_all:Nnx \l__chronos_year_tl { !q }
274   { \__chronos_dateformat_sign:n { #1 } }
275   \tl_replace_all:Nnx \l__chronos_year_tl { !Q }
276   { \__chronos_dateformat_signs:n { #1 } }
277   \tl_replace_all:Nnx \l__chronos_year_tl { !y }
278   { \__chronos_year_shorten:x { \int_abs:n { #1 } } }
279   \tl_replace_all:Nnx \l__chronos_year_tl { !Y }
280   { \int_abs:n { #1 } }
281   \l__chronos_year_tl
282 }
283 \cs_new_protected_nopar:Npn \__chronos_dateformat_sign:n #1
284 {
285   \int_compare:nT { #1 < 0 } { - }
286 }
287 \cs_generate_variant:Nn \__chronos_dateformat_sign:n { v }
288 \cs_new_protected_nopar:Npn \__chronos_dateformat_signs:n #1
289 {
290   \int_compare:nTF
291   { #1 < 0 } { - }
292   {
293     \int_compare:nT { #1 > 0 }
294     {
295       +
296     }
297   }
298 }
299 \cs_generate_variant:Nn \__chronos_dateformat_signs:n { v }
300 \cs_new_protected_nopar:Npn \__chronos_dateformat_era:n #1
301 {
302   \int_compare:nTF
303   { #1 < 0 } { \chronos@yearbce }
304   {
305     \int_compare:nT { #1 > 0 }
306     {
307       \chronos@yearce
308     }
309   }
310 }
311 \cs_generate_variant:Nn \__chronos_dateformat_era:n { v }
312 \cs_new_protected_nopar:Npn \__chronos_set_dateformat:n #1
313 {
314   \tl_set:Nn \l__chronos_dateformat_tl { #1 }
315   \tl_replace_all:Nnn \l__chronos_dateformat_tl { ~ } { \c_space_token }
316 }
317 \cs_generate_variant:Nn \__chronos_set_dateformat:n { v }
318 \cs_new_protected_nopar:Npn \__chronos_set_yearformat:n #1
319 {
320   \tl_set:Nn \l__chronos_yearformat_tl { #1 }
321   \tl_replace_all:Nnn \l__chronos_yearformat_tl { ~ } { \c_space_token }
322 }
323 \cs_generate_variant:Nn \__chronos_set_yearformat:n { V }

```

```

324 \cs_new_protected_nopar:Npn \__chronos_set_minoryearformat:n #1
325 {
326   \tl_set:Nn \l__chronos_minoryearformat_tl { #1 }
327   \tl_replace_all:Nnn \l__chronos_minoryearformat_tl { ~ } { \c_space_token }
328 }
329 \cs_generate_variant:Nn \__chronos_set_minoryearformat:n { V }
330 \cs_generate_variant:Nn \regex_match:NnTF { NVTF }
331 \cs_new_protected_nopar:Nn \__chronos_set_date_aux:n
332 {
333   \tl_set:Nx \l__chronos_tmpc_tl { #1 }
334   \regex_replace_all:NnN \c__chronos_curly_bracket {} \l__chronos_tmpc_tl
335   \regex_match:NVTF \c__chronos_initial_minus \l__chronos_tmpc_tl
336   {
337     \exp_last_unbraced:NV \__chronos_set_date_aux_bce:w \l__chronos_tmpc_tl \q_stop
338   }{
339     \exp_last_unbraced:NV \__chronos_set_date_aux_ce:w \l__chronos_tmpc_tl \q_stop
340   }
341 }
342 \cs_new_protected_nopar:Nn \__chronos_set_date:nmmm
343 {
344   \pgfcalendardatetojulian{#{1}-#2-#3}{\c@chronos@date}%
345   \setcounter{chronos@#4date}{\thechronos@date}%
346   \legacy_if:nF { chronos@yearzero }
347   {
348     \int_compare:nNnT { 0 } < { #1 }
349     {
350       \addtocounter{chronos@#4date}{-366}%
351     }
352   }
353   \expandafter\def\csname chronos@#4year\endcsname{#1}%
354   \expandafter\def\csname chronos@#4month\endcsname{#2}%
355   \expandafter\def\csname chronos@#4day\endcsname{#3}%
356 }
357 \cs_new_protected_nopar:Npn \__chronos_set_date_aux_bce:w -#1 - #2 - #3 - #4 @#5 \q_stop
358 {
359   \__chronos_set_date:nmmm {-#1} {#2} {#3} {#5}
360 }
361 \cs_new_protected_nopar:Npn \__chronos_set_date_aux_ce:w #1 - #2 - #3 - #4 @#5 \q_stop
362 {
363   \__chronos_set_date:nmmm {#1} {#2} {#3} {#5}
364 }

365 \cs_new_protected_nopar:Nn \__chronos_troilliwiau:nn
366 {
367   \clist_if_empty:cTF { g__chronos_lliwiau_#1_#2_clist }
368   {
369     \clist_gpop:cN { g__chronos_lliwiau_#2_clist } \l__chronos_lliw_tl
370     \clist_gput_right:cV { g__chronos_lliwiau_#2_clist } \l__chronos_lliw_tl
371   }{
372     \clist_gpop:cN { g__chronos_lliwiau_#1_#2_clist } \l__chronos_lliw_tl
373     \clist_gput_right:cV { g__chronos_lliwiau_#1_#2_clist } \l__chronos_lliw_tl
374   }
375 }
376 \cs_new_nopar:Nn \__chronos_color_set_from_existing:nn { \colorlet {#1} {#2} }

377 \cs_new_protected_nopar:Nn \__chronos_creu_tikzname:n
378 {
379   \int_compare:nTF { \tl_count:n { #1 } < 2 }

```

expand unwaith os llai na 2 token yn #1 (gallu defnyddio pgffor loops i greu digwyddiadau etc.)

expand once if fewer than 2 tokens in #1 (can use pgffor loops to create events etc.)



```

380 {
381   \tl_set:No \l__chronos_tikzname_tl { #1 }

fel arall, peidio i ddiogelu macros fformatio (e.e. \emph etc.)
otherwise, don't protect formatting macros (e.g. \emph etc.)
(what did I mean by this?)

382 }{
383   \tl_set:Nn \l__chronos_tikzname_tl { #1 }
384 }
385 \regex_replace_all:NnN \c__chronos_enw_regex { } \l__chronos_tikzname_tl
386 }
387 \cs_new_protected_nopar:Nn \__chronos_enw_priflythrennu_eraill:n
388 {
389   \clist_if_in:NnTF \l__chronos_llythrennau_bach_clist { #1 } { #1 }
390   {
391     \str_uppercase:n #1
392   }
393 }
394 \cs_new_protected_nopar:Nn \__chronos_enw_priflythrennu:n
395 {
396   \tl_set:Nn \l__chronos_tmpc_tl { #1 }
397   \legacy_if:nF {chronos@felymae}
398   {
399     \regex_replace_all:NnN \c__chronos_enw_diogelu_regex
400     {
401       \1 \c{__chronos_enw_priflythrennu_eraill:n} \cB{ \2 \cE} \3
402     } \l__chronos_tmpc_tl
403     \regex_replace_all:NnN \c__chronos_enw_priflythren_cyntaf_regex
404     {
405       \1 \c{str_uppercase:n}\2
406     } \l__chronos_tmpc_tl
407   }
408   \l__chronos_tmpc_tl
409 }
410 \cs_generate_variant:Nn \__chronos_enw_priflythrennu:n { V,o }

```

functions: containment

```

411 \cs_new_protected_nopar:Nn \__chronos_at_begin: %^^A <<< functions: containment
412 {
413   \cs_set_eq:NN \chronosset \@@chronosset
414   \pgfsetlayers{\chronos@layers}% cadw newidiadau tu mewn i'r grpw
415   \chronos@baselineskip=\baselineskip
416   \cs_if_free:NT \chronosbaselineskip
417   {
418     \cs_new_eq:NN \chronosbaselineskip \chronos@baselineskip
419   }
420   \int_gincr:N \g__chronos_int
421 } %^^A >>> functions: containment

```

pgfkeys

```

422 \cs_new_protected_nopar:Nn \__chronos_cadw_nodweddion:nnn
423 {% #1: tag #2 key #3 key-value list
424   \prop_put:cnn { l__chronos_#1_prop } { #2 } { {#3} }
425 }
426 \cs_new_protected_nopar:Nn \__chronos_cadw_nodweddion_rhag:nn
427 {% #1: tag #2 key #3 key-value list
428   \prop_put:Nnn \l__chronos_prop { #1 } { {#2} }
429 }
430 \cs_generate_variant:Nn \prop_put_from_keyval:Nn { cV }

```

```

431 \cs_new_protected_nopar:Nn \__chronos_cadw_nodweddion_rhestr:nnn
432 {
433   \clist_map_inline:nn { #1 }
434   {
435     \prop_put:cnn { l__chronos_##1_prop } { #2 } { {#3} }
436   }
437 }
438 \cs_new_protected_nopar:Nn \__chronos_ychwanegu_nodweddion:nnn
439 { % roedd y problem yn #3 yn eisoes!
440   \prop_get:cnNTF { l__chronos_#1_prop } { #2 } \l__chronos_tmpc_tl
441   {
442     \tl_set:Nn \l__chronos_tmpd_tl { #3 }
443     \regex_replace_all:nnN { \\ } { \\\ } \l__chronos_tmpd_tl
444     \regex_replace_once:nnN { \}\z } { , \u{l__chronos_tmpd_tl} \} } \l__chronos_tmpc_tl
445     \prop_put:cnV { l__chronos_#1_prop } { #2 } \l__chronos_tmpc_tl
446   }{
447     \prop_put:cnn { l__chronos_#1_prop } { #2 } { {#3} }
448   }
449 }
450 \cs_new_protected_nopar:Nn \__chronos_ychwanegu_nodweddion_rhestr:nnn
451 { % ## #1 rhestr o prop lists; #2 property; #3 value
452   \clist_map_inline:nn { #1 }
453   {
454     \prop_get:cnNTF { l__chronos_##1_prop } { #2 } \l__chronos_tmpc_tl
455     {
456       \tl_set:Nn \l__chronos_tmpd_tl { #3 }
457       \regex_replace_all:nnN { \\ } { \\\ } \l__chronos_tmpd_tl
458       \regex_replace_once:nnN { \}\z } { , \u{l__chronos_tmpd_tl} \} } \l__chronos_tmpc_tl
459       \prop_put:cnV { l__chronos_##1_prop } { #2 } \l__chronos_tmpc_tl
460     }{
461       \prop_put:cnn { l__chronos_##1_prop } { #2 } { {#3} }
462     }
463   }
464 }
465 \cs_new_protected_nopar:Nn \__chronos_ychwanegu_nodweddion_rhestr_pre:nnn
466 { % ## #1 rhestr o prop lists; #2 property; #3 value
467   \clist_map_inline:nn { #1 }
468   {
469     \prop_get:cnNTF { l__chronos_##1_prop } { #2 } \l__chronos_tmpc_tl
470     {
471       \tl_set:Nn \l__chronos_tmpd_tl { #3 }
472       \regex_replace_all:nnN { \\ } { \\\ } \l__chronos_tmpd_tl
473       \regex_replace_once:nnN { ^\{ } { \{ \u{l__chronos_tmpd_tl} , } \} } \l__chronos_tmpc_tl
474       \prop_put:cnV { l__chronos_##1_prop } { #2 } \l__chronos_tmpc_tl
475     }{
476       \prop_put:cnn { l__chronos_##1_prop } { #2 } { {#3} }
477     }
478   }
479 }
480 \cs_new_protected_nopar:Nn \__chronos_ychwanegu_nodweddion_rhag:nn
481 {
482   \prop_get:cnNTF { l__chronos_prop } { #1 } \l__chronos_tmpc_tl
483   {
484     \tl_set:Nn \l__chronos_tmpd_tl { #2 }
485     \regex_replace_all:nnN { \\ } { \\\ } \l__chronos_tmpd_tl
486     \regex_replace_once:nnN { \}\z } { , \u{l__chronos_tmpd_tl} \} } \l__chronos_tmpc_tl
487     \prop_put:NnV \l__chronos_prop { #1 } \l__chronos_tmpc_tl
488   }{
489     \prop_put:Nnn \l__chronos_prop { #1 } { {#2} }
490   }

```

```

491 }
492 \cs_new_protected_nopar:Nn \__chronos_ychwanegu_nodweddion_rhag_pre:nn
493 {
494   \prop_get:cnNTF { l__chronos_prop } { #1 } \l__chronos_tmpc_tl
495   {
496     \tl_set:Nn \l__chronos_tmpd_tl { #2 }
497     \regex_replace_all:nnN { \\ } { \\\\ } \l__chronos_tmpd_tl
498     \regex_replace_once:nnN { ~\{ } { \{ \u{l__chronos_tmpd_tl} , } \l__chronos_tmpc_tl
499     \prop_put:NnV \l__chronos_prop { #1 } \l__chronos_tmpc_tl
500   }{
501     \prop_put:Nnn \l__chronos_prop { #1 } { {#2} }
502   }
503 }
504 \cs_generate_variant:Nn \prop_concat:NNN { NNc }
505 \cs_new_protected_nopar:Nn \__chronos_gosod_nodweddion:n
506 {
cadw status | save status
507   \prop_set_eq:NN \l__chronos_rhagosedig_prop \l__chronos_prop
508   \prop_concat:NNc \l__chronos_tmpa_prop \l__chronos_prop { l__chronos_#1_prop }
509   \prop_set_eq:NN \l__chronos_prop \l__chronos_tmpa_prop
510   \prop_map_function:NN \l__chronos_prop \__chronos_tikzset:nn
511 }
512 \cs_generate_variant:Nn \__chronos_gosod_nodweddion:n { V }
513 \cs_new_protected_nopar:Nn \__chronos_ailosod_nodweddion:
514 {
515   \prop_set_eq:NN \l__chronos_prop \l__chronos_rhagosedig_prop
516   \prop_map_function:NN \l__chronos_prop \__chronos_tikzset:nn
517 }
518 \cs_new_protected_nopar:Nn \__chronos_dangos_nodweddion:n
519 {
520   \str_case:nnF { #1 }
521   {
522     { life } { \prop_show:N \l__chronos_byw_prop }
523     { event } { \prop_show:N \l__chronos_digwyddiad_prop }
524     { period } { \prop_show:N \l__chronos_parhad_prop }
525     { theory } { \prop_show:N \l__chronos_theori_prop }
526     { info } { \prop_show:N \l__chronos_gwybodaeth_prop }
527   }{
528     \prop_show:c { l__chronos_#1_prop }
529   }
530 }
531 \cs_new_protected_nopar:Nn \__chronos_dangos_nodweddion_rhag:
532 {
533   \prop_show:N \l__chronos_prop
534 }
535 \cs_new_protected_nopar:Nn \__chronos_tikzset:nn
536 {% \pgfqkeys{#1}{#2} = \pgfkeys{#1/.cd}{#2} ond yn gyflymach (Skillman a t 977)
537   \pgfqkeys {/chronos} { #1/.style = #2 }
538 }
539 \cs_new_protected_nopar:Nn \__chronos_lliwiau_cadw_rhag:
540 {
541   \clist_map_inline:nn { byw, digwyddiad, parhad, theori }
542   {
543     \clist_map_inline:nn { isod, uchod }
544     {
545       \clist_gset_eq:cc { g__chronos_lliwiau_##1_####1_rhag_clist }
546       {
547         g__chronos_lliwiau_##1_####1_clist
548       }

```

```

549 }
550 }
551 \clist_gset_eq:NN \g__chronos_lliwiau_isod_rhag_clist \g__chronos_lliwiau_isod_clist
552 \clist_gset_eq:NN \g__chronos_lliwiau_uchod_rhag_clist \g__chronos_lliwiau_uchod_clist
553 }
554 \cs_new_protected_nopar:Nn \__chronos_lliwiau_clirio:
555 {
556 \clist_map_inline:nn { byw, digwyddiad, parhad, theori }
557 {
558 \clist_map_inline:nn { isod, uchod }
559 {
560 \clist_gset_eq:cc { g__chronos_lliwiau_##1_####1_clist }
561 {
562 g__chronos_lliwiau_##1_####1_rhag_clist
563 }
564 }
565 }
566 \clist_gset_eq:NN \g__chronos_lliwiau_isod_clist \g__chronos_lliwiau_isod_rhag_clist
567 \clist_gset_eq:NN \g__chronos_lliwiau_uchod_clist \g__chronos_lliwiau_uchod_rhag_clist
568 }

569 \cs_new_protected_nopar:Nn \__chronos_at_end:
570 {
571 \clist_if_empty:NF \l__chronos_headings_clist
572 {
573 \clist_remove_duplicates:N \l__chronos_headings_clist
574 \clist_map_inline:Nn \l__chronos_headings_clist
575 {
576 \foreach \i/\j/\k in {##1} {%
577 \testunteitl[/chronos/@amseraumawr]{\i}{\j}{\k}(chronos ~ main ~ headings)}%^^A
    paid â defnyddio ’;’ neu dim byd yma
578 \legacy_if:nT { chronos@placeholders}
579 {
580 \scoped[on ~ chronos ~ foreground ~ layer]
581 {
582 \foreach \i/\j/\k in {##1} {\draw [/chronos/placeholder ~ lines] %
583 (chronos ~ main ~ headings -| \j) edge ~ node {\j} %
584 (chronos ~ bottom -| \j) (chronos ~ main ~ headings -| \k) %
585 edge ~ node {\k} (chronos ~ bottom -| \k);}
586 }
587 }
588 }
589 }
590 \clist_if_empty:NF \l__chronos_subheadings_clist
591 {
592 \clist_remove_duplicates:N \l__chronos_subheadings_clist
593 \clist_map_inline:Nn \l__chronos_subheadings_clist
594 {
595 \foreach \i/\j/\k/\m in {##1} {\testunteitl[/chronos/@amserau]{\i}{\j}{\k}{\m)}%^^A
    paid â defnyddio ’;’ neu dim byd yn y fan hon
596 }
597 }
598 \clist_if_empty:NF \g__chronos_century_subheadings_clist
599 {
600 \clist_remove_duplicates:N \g__chronos_century_subheadings_clist
601 \clist_map_inline:Nn \g__chronos_century_subheadings_clist
602 {
603 \seq_set_split:Nnn \l__chronos_tmpa_seq { / } { ##1 }
604 \seq_get_left:NN \l__chronos_tmpa_seq \l__chronos_tmpc_tl
605 \seq_get_right:NN \l__chronos_tmpa_seq \l__chronos_tmpd_tl
606 \int_set:Nn \l__chronos_tmpb_int { 100 * \l__chronos_tmpc_tl }

```

```

607     \int_set:Nn \l__chronos_tmpa_int { \l__chronos_tmpb_int - 100 }
608     \testunteitl[/chronos/@amserau]{\l__chronos_tmpe_tl\l__chronos_tmpe_tl}%
609     [\l__chronos_tmpe_tl\textsuperscript{\l__chronos_tmpe_tl}c.]%
610     {chronos ~ year ~ \int_to_arabic:n {\l__chronos_tmpa_int}}%
611     {chronos ~ year ~ \int_to_arabic:n {\l__chronos_tmpe_int}}%
612     (chronos ~ lower ~ subheadings)% paid â defnyddio ‘;’ neu dim byd yn y fan hon
613   }
614 }
615 }

```

`\__chronos_kex`⟨*whatever*⟩ functions just produce groups of pgf keys for the plain/prime/plus triple, standard/every, cy/en and combinations thereof

tldr: reduce clutter/typing and facilitate changes/fixes (hopefully)

```

616 \cs_new_protected_nopar:Nn \__chronos_kexpander:nnnn
617 { % #1 enw (brif enw) | name (primary name) ;
618   % #2 llwybr/prop tag | path/prop tag ;
619   % #3 rhag | default (‘ or +) ;
620   % #4 tags
621   \pgfqkeys{/chronos} {
622     #1’/.code={
623       \pgfqkeys{/chronos}{#2/.style={##1}}
624       \__chronos_cadw_nodweddion_rhag:nn { #2 } { ##1 }
625     },
626     #1+/.code={
627       \pgfqkeys{/chronos}{#2/.append ~ style={##1}}
628       \__chronos_ychwanegu_nodweddion_rhag:nn { #2 } { ##1 }
629     },
630     #1/.forward ~ to=/chronos/#1#3,
631     every ~ #1’/.code={
632       \pgfqkeys{/chronos}{#2/.style/.expand ~ once={##1}}
633       \__chronos_cadw_nodweddion_rhestr:nnn { #4 } { #2 } { ##1 }
634       \__chronos_cadw_nodweddion_rhag:nn { #2 } { ##1 }
635     },
636     every ~ #1+/.code={
637       \pgfqkeys{/chronos}{#2/.append ~ style/.expand ~ once={##1}}
638       \__chronos_ychwanegu_nodweddion_rhestr:nnn { #4 } { #2 } { ##1 }
639       \__chronos_ychwanegu_nodweddion_rhag:nn { #2 } { ##1 }
640     },
641     every ~ #1/.forward ~ to=/chronos/every ~ #1#3,
642   }
643 }
644 \cs_new_protected_nopar:Nn \__chronos_kexpander:nnnnn
645 { % #1 enw | name ;
646   % #2 enw saesneg | english name ;
647   % #3 llwybr/prop tag | path/property tag ;
648   % #4 rhag | default (‘ or +) ;
649   % #5 tags
650   \__chronos_kexpander:nnnn { #1 } { #3 } { #4 } { #5 }
651   \pgfqkeys{/chronos} {
652     #2’/.forward ~ to=/chronos/#1’,
653     #2+/.forward ~ to=/chronos/#1+,
654     #2/.forward ~ to=/chronos/#1,
655     every ~ #2’/.forward ~ to=/chronos/every ~ #1’,
656     every ~ #2+/.forward ~ to=/chronos/every ~ #1+,
657     every ~ #2/.forward ~ to=/chronos/every ~ #1,
658   }
659 }
660 \cs_new_protected_nopar:Nn \__chronos_kexpandtotags:nnn
661 { % #1 enw | name ;
662   % #2 enw saesneg | english name ;

```

```

663 % #3 rhag | default ( ' or +)
664 \pgfqkeys{/chronos} {
665   every ~ #1'/.code={
666     \__chronos_cadw_nodweddion:nnn {#1}{@tag}{##1}
667   },
668   every ~ #1+/.code={
669     \__chronos_ychwanegu_nodweddion:nnn {#1}{@tag}{##1}
670   },
671   every ~ #1/.forward ~ to=/chronos/every ~ #1#3,
672   every ~ #2'/.forward ~ to=/chronos/every ~ #1',
673   every ~ #2+/.forward ~ to=/chronos/every ~ #1+,
674   every ~ #2/.forward ~ to=/chronos/every ~ #1,
675 }
676 }
677 \cs_new_protected_nopar:Nn \__chronos_kextripler:nnnn
678 { % #1 enw | name ;
679   % #2 llwybr/prop tag | path/prop tag ;
680   % #3 rhag | default ;
681   % #4 math e.e. style neu code | type e.g. style or code
682   \pgfqkeys{/chronos} {
683     #2/.#4={},
684     #1+/.code={
685       \pgfqkeys{/chronos}{#2/.append ~ #4={##1}}
686     },
687     #1'/.code={%
688       \pgfqkeys{/chronos}{#2/.#4={##1}}
689     },
690     #1/.forward ~ to=/chronos/#1#3,
691   }
692 }
693 \cs_new_protected_nopar:Nn \__chronos_kexforwardtriple:nn
694 {%
695   \pgfqkeys{/chronos} {
696     #2'/.forward ~ to=/chronos/#1',
697     #2+/.forward ~ to=/chronos/#1+,
698     #2/.forward ~ to=/chronos/#1,
699   }
700 }
701 \cs_new_protected_nopar:Nn \__chronos_kextripler:nnnnn
702 { % #1 enw | name ;
703   % #2 enw saesneg | english name ;
704   % #3 llwybr/prop tag | path/property tag ;
705   % #4 rhag | default ;
706   % #5 math e.e. style neu code | type e.g. style or code
707   \__chronos_kextripler:nnnn { #1 } { #3 } { #4 } { #5 }
708   \__chronos_kexforwardtriple:nn { #1 } { #2 }
709 }
710 \cs_new_protected_nopar:Nn \__chronos_kexforwarder:nn
711 { % #1 llwybr/enw | path/name ;
712   % #2 rhestr allweddau newydd | list of new keys
713   \clist_map_inline:nn { #2 }
714   {
715     \pgfqkeys{/chronos} { ##1/.forward ~ to=/chronos/#1 }
716   }
717 }
718 \cs_new_protected_nopar:Nn \__chronos_kexforwarder:nnn
719 { % #1 llwybr | path ;
720   % #2 enw | name ;
721   % #3 rhestr allweddau newydd ar yr un llwybr | list of new keys on the same path
722   \clist_map_inline:nn { #3 }
723   {

```

```

724 \pgfqkeys{/chronos/#1} { ##1/.forward ~ to=/chronos/#1/#2 }
725 }
726 }
727 \cs_new_protected_nopar:Nn \__chronos_kexkeymaker:nnn
728 {
729 \clist_map_inline:nn { byw, digwyddiad, parhad, theori, gwybodaeth, prif }
730 {
731 \pgfqkeys{/chronos/##1} { #1/.#2={#3} }
732 }
733 }

734 \cs_generate_variant:Nn \legacy_if:nTF { oTF }

```

Joseph Wright: <https://chat.stackexchange.com/transcript/message/65523217#65523217>

```

735 \cs_new_eq:NN \__chronos_keys_set_exclude_groups:nnn \keys_set_exclude_groups:nnn
736 \cs_if_exist:NF \__chronos_keys_set_exclude_groups:nnn
737 {
738 \cs_new_eq:NN \__chronos_keys_set_exclude_groups:nnn \keys_set_filter:nnn
739 }

```

**\*\*mewnol hefyd!\*\*** | **\*\*internal also!\*\*** Ddylwn i ddefnyddio `\NewDocumentCommand` (ond **\*mewnol\***), `\newcommand/\newcommand*`, `\def/\gdef/\edef/\xdef`, `cs_new_eq:NN`, `\let neu rhywbeth arall?!!`

```

740 \newcommand* \chronos@tikzprefix { \int_to_arabic:n { \g__chronos_int } }
741 \cs_new_eq:NN \chronos@env@begin \__chronos_at_begin:
742 \cs_new_eq:NN \chronos@setdateformat \__chronos_set_dateformat:n
743 \cs_new_eq:NN \chronos@setyearformat \__chronos_set_yearformat:n
744 \cs_new_eq:NN \chronos@setminoryearformat \__chronos_set_minoryearformat:n

```

for pgf/tikz convenience

```

745 \NewDocumentCommand \chronos@showdate { o m }
746 {
747 \group_begin:
748 \IfValueT { #1 }
749 {
750 \__chronos_set_dateformat:n { #1 }
751 }
752 \pgfcalendarjuliantoweekday{\csname thechronos@#2date\endcsname}{\c@chronos@weekday}%
753 \__chronos_show_date:n { #2 }
754 \group_end:
755 }
756 \NewDocumentCommand \chronos@showdate@cs { o m }
757 {
758 \group_begin:
759 \IfValueT { #1 }
760 {
761 \__chronos_set_dateformat:v { #1 }
762 }
763 \pgfcalendarjuliantoweekday{\csname thechronos@#2date\endcsname}{\c@chronos@weekday}%
764 \__chronos_show_date:n { #2 }
765 \group_end:
766 }
767 \NewDocumentCommand \chronos@showyear { o m }
768 {
769 \group_begin:
770 \IfValueT { #1 }
771 {
772 \tl_set:No \l__chronos_tmpc_tl { #1 }
773 \tl_if_empty:NF \l__chronos_tmpc_tl
774 {

```

```

775     \__chronos_set_yearformat:V \l__chronos_tmpc_tl
776   }
777 }
778 \__chronos_show_year:n { #2 }
779 \group_end:
780 }

781 \newcommand* \chronos@minoryearformat { \l__chronos_minoryearformat_tl }
782 \newcommand* \chronos@troilliwiiau@uchod [1] [byw] {% 0 {byw}
783   \__chronos_troilliwiiau:nn { #1 } { uchod }
784   \expandafter\def\csname chronos@#1@lliw\endcsname{\l__chronos_lliw_tl}
785 }
786 \newcommand* \chronos@troilliwiiau@isod [1] [byw] {% 0 {byw}
787   \__chronos_troilliwiiau:nn { #1 } { isod }
788   \expandafter\def\csname chronos@#1@lliw\endcsname{\l__chronos_lliw_tl}
789 }
790 \NewDocumentCommand \chronos@lliwiau@uchod { o m }
791 {
792   \IfValueTF { #1 }
793     { \tl_set:Nn \l__chronos_tmpc_tl { _#1 } }
794     { \tl_clear:N \l__chronos_tmpc_tl }
795   \clist_gset:cn { g__chronos_lliwiau \l__chronos_tmpc_tl _uchod_clist } { #2 }
796 }
797 \NewDocumentCommand \chronos@lliwiau@isod { o m }
798 {
799   \IfValueTF { #1 }
800     { \tl_set:Nn \l__chronos_tmpc_tl { _#1 } }
801     { \tl_clear:N \l__chronos_tmpc_tl }
802   \clist_gset:cn { g__chronos_lliwiau \l__chronos_tmpc_tl _isod_clist } { #2 }
803 }
804 \cs_new_eq:NN \chronos@lliwiau@clear \__chronos_lliwiau_clririo:
805 \cs_new_eq:NN \chronos@lliwiau@cadw@rhag \__chronos_lliwiau_cadw_rhag:

806 \newcommand* \chronos@creu@tikzname [2] {% m m
807   \__chronos_creu_tikzname:n { #2 }
808   \expandafter\let\csname chronos@#1@tikzname\endcsname \l__chronos_tikzname_tl
809 }
810 \cs_new_eq:NN \chronos@enw@priflythrennu \__chronos_enw_priflythrennu:V
811 \cs_new_eq:NN \chronos@testunteitl@priflythrennu \__chronos_enw_priflythrennu:n

812 \cs_new_eq:NN \chronos@cadw@nodweddion@rhag \__chronos_cadw_nodweddion_rhag:nn
813 \cs_new_eq:NN \chronos@cadw@nodweddion \__chronos_cadw_nodweddion:nnn
814 \cs_new_eq:NN \chronos@ychwanegu@nodweddion \__chronos_ychwanegu_nodweddion:nnn
815 \NewDocumentCommand \chronos@ychwanegu@nodweddion@rhestr { s t {^} m m m }
816 {
817   \IfBooleanTF { #2 }
818   {
819     \__chronos_ychwanegu_nodweddion_rhestr_pre:nnn { #3 }{ #4 }{ #5 }
820     \IfBooleanT { #1 } { \__chronos_ychwanegu_nodweddion_rhag_pre:nn { #4 }{ #5 } }
821   }{
822     \__chronos_ychwanegu_nodweddion_rhestr:nnn { #3 }{ #4 }{ #5 }
823     \IfBooleanT { #1 } { \__chronos_ychwanegu_nodweddion_rhag:nn { #4 }{ #5 } }
824   }
825 }
826 \NewDocumentCommand \chronos@cadw@nodweddion@rhestr { s m m m }
827 {
828   \__chronos_cadw_nodweddion_rhestr:nnn { #2 }{ #3 }{ #4 }
829   \IfBooleanT { #1 } { \__chronos_cadw_nodweddion_rhag:nn { #3 }{ #4 } }
830 }
831 \cs_new_eq:NN \chronos@ychwanegu@nodweddion@rhag \__chronos_ychwanegu_nodweddion_rhag:nn
832 \cs_new_eq:NN \chronos@gosod@nodweddion \__chronos_gosod_nodweddion:n
833 \cs_new_eq:NN \chronos@gosod@nodweddion@var \__chronos_gosod_nodweddion:V

```



```

834 \cs_new_eq:NN \chronos@ailosod@nodweddion \__chronos_ailosod_nodweddion:
835 \cs_new_eq:NN \chronos@dangos@nodweddion \__chronos_dangos_nodweddion:n
836 \cs_new_eq:NN \chronos@dangos@nodweddion@rhag \__chronos_dangos_nodweddion_rhag:
837 \newcommand* \chronos@ychwanegu@gosod [1]
838 {
839   \legacy_if:nF { chronos@preset } {
840     \clist_map_inline:nn { #1 }
841     {
842       \seq_put_right:Nn \l__chronos_gosod_seq {##1}
843     }
844   }
845 }%
846 \newcommand* \chronos@dangos@gosod
847 {
848   \seq_show:N \l__chronos_gosod_seq
849 }
850 \newcommand* \chronos@if@gosodTF [3]
851 {
852   \seq_if_in:NnTF \l__chronos_gosod_seq { #1 } { #2 } { #3 }
853 }

854 \newcommand* \chronos@if@gosodF [2]
855 {
856   \chronos@presettrue
857   \seq_if_in:NnF \l__chronos_gosod_seq { #1 } { #2 }
858   \chronos@presetfalse
859 }
860 \NewDocumentCommand \chronos@dangos@lliwiau {
861   s 0 { byw, digwyddiad, parhad, theori } D () { isod, uchod }
862 } {
863   \clist_set:Nn \l__chronos_tmpb_clist { #2 }
864   \clist_set:Nn \l__chronos_tmpc_clist { #3 }
865   \clist_map_inline:Nn \l__chronos_tmpb_clist
866   {
867     \clist_map_inline:Nn \l__chronos_tmpc_clist
868     {
869       \clist_show:c { g__chronos_lliwiau_##1_####1_clist }
870     }
871   }
872   \IfBooleanT { #1 }
873   {
874     \clist_map_inline:Nn \l__chronos_tmpc_clist
875     {
876       \clist_show:c {g__chronos_lliwiau_##1_clist}
877     }
878   }
879 }
880 \NewDocumentCommand \chronos@dangos@lliwiau@rhag
881 {
882   s 0 { byw, digwyddiad, parhad, theori } D () { isod, uchod }
883 } {
884   \clist_set:Nn \l__chronos_tmpb_clist { #2 }
885   \clist_set:Nn \l__chronos_tmpc_clist { #3 }
886   \clist_map_inline:Nn \l__chronos_tmpb_clist
887   {
888     \clist_map_inline:Nn \l__chronos_tmpc_clist
889     {
890       \clist_show:c { g__chronos_lliwiau_##1_####1_rhag_clist }
891     }
892   }
893   \IfBooleanT { #1 }

```

```

894 {
895   \clist_map_inline:Nn \l__chronos_tmpc_clist
896   {
897     \clist_show:c {g__chronos_lliwiau_##1_rhag_clist}
898   }
899 }
900 }
901 \cs_new_eq:NN \chronosdangoslliwiau \chronos@dangos@lliwiau
902 \cs_new_eq:NN \chronosdangoslliwiaurhag \chronos@dangos@lliwiau@rhag
903 \newcommand* \chronos@dangos@fformatiau dyddiadau{%
904   \clist_map_inline:nn
905   { \l__chronos_dateformat_tl, \l__chronos_yearformat_tl, \l__chronos_minoryearformat_tl}
906   { \tl_show:N ##1 }
907 }
908 \cs_new_eq:NN \chronosdangosfformatiau dyddiadau \chronos@dangos@fformatiau dyddiadau
909 \NewDocumentCommand \chronos@to@clist { t {+} m m }
910 {
911   \IfBooleanTF { #1 }
912   {
913     \clist_put_right:co { l__chronos_#2_clist } { #3 }
914   }{
915     \clist_set:co { l__chronos_#2_clist } { #3 }
916   }
917 }
918 \NewDocumentCommand \chronos@global@to@clist { s t {+} m m }
919 {
920   \IfBooleanTF { #2 }
921   {
922     \IfBooleanTF { #1 }
923     {
924       \clist_gput_right:cx { g__chronos_#3_clist } { #4 }
925     }{
926       \clist_gput_right:co { g__chronos_#3_clist } { #4 }
927     }
928   }{
929     \IfBooleanTF { #1 }
930     {
931       \clist_gset:cx { g__chronos_#3_clist } { #4 }
932     }{
933       \clist_gset:co { g__chronos_#3_clist } { #4 }
934     }
935   }
936 }
937 \newcommand* \chronos@global@clear@to@clist [1] {% m
938   \clist_gclear:c { g__chronos_#1_clist }
939 }
940 \newcommand* \chronos@from@clist [2] {% m m
941   \clist_remove_duplicates:c { l__chronos_#1_clist }
942   \clist_if_empty:cTF { l__chronos_#1_clist }
943   {
944     \expandafter\let#2\@empty
945   }{
946     \expandafter\let\expandafter#2\csname l__chronos_#1_clist\endcsname
947   }
948 }
949 \newcommand* \chronos@global@from@clist [1] {
950   \clist_use:cn { g__chronos_#1_clist } { , }
951 }
952 \newcommand* \chronos@global@eq@clist [2] {
953   \clist_gset_eq:cc { g__chronos_#1_clist } { g__chronos_#2_clist }
954 }

```

```

955 \newcommand* \chronos@dangos@clicl [1] { \clicl_show:c { #1_clicl } }
956 \cs_new_eq:NN \chronos@at@end \__chronos_at_end:
957 \cs_new_eq:NN \chronos@set@date@aux \__chronos_set_date_aux:n
958 \cs_new_eq:NN \chronos@set@date \__chronos_set_date:nnnn % blwyddyn; mis; dydd; tag for
    macro

959 \cs_new_eq:NN \chronos@legacy@if \legacy_if:oTF

960 \newcommand* \chronos@legacy@if@set [2] {\cs:w #1#2\cs_end:}
961 \def\chronos@datetojulian@extractyear #1-#2-#3 {#1}
962 \NewDocumentCommand \chronos@dangoslliw
963 { s 0 {\chronos@temp@lliw} m }
964 {\extractcolorspec{#3}{#2}\IfBooleanT{#1}{\show#2}}
965 \cs_new_eq:NN \chronos@keymaker \__chronos_kexkeymaker:nnn

```

`\IfFreeTF` yn lle `\ifundef` o `etoolbox` - instead of `\ifundef` from `etoolbox`

```

\IfFreeT
\IfFreeF
966 \cs_if_exist:NTF \IfFreeTF {\PackageWarning{chronos}{
967   Refusing ~ to ~ overwrite ~ existing ~ \protect\IfFreeTF.
968   ~ This ~ may ~ not ~ work}
969 } { \cs_new_eq:NN \IfFreeTF \cs_if_free:NTF }
970 \cs_if_exist:NTF \IfFreeT {\PackageWarning{chronos}{
971   Refusing ~ to ~ overwrite ~ existing ~ \protect\IfFreeT.
972   ~ This ~ may ~ not ~ work}
973 } { \cs_new_eq:NN \IfFreeT \cs_if_free:NT }
974 \cs_if_exist:NTF \IfFreeF {\PackageWarning{chronos}{
975   Refusing ~ to ~ overwrite ~ existing ~ \protect\IfFreeF.
976   ~ This ~ may ~ not ~ work}
977 } { \cs_new_eq:NN \IfFreeF \cs_if_free:NF }

```

`\IfExistTF` yn lle `\ifdef` o `etoolbox` - in place of `\ifdef` from `etoolbox`

```

\IfExistT
\IfExistF
978 \cs_if_exist:NTF \IfExistTF {\PackageWarning{chronos}{
979   Refusing ~ to ~ overwrite ~ existing ~ \protect\IfExistTF.
980   ~ This ~ may ~ not ~ work}
981 } { \cs_new_eq:NN \IfExistTF \cs_if_exist:NTF }
982 \cs_if_exist:NTF \IfExistT {\PackageWarning{chronos}{
983   Refusing ~ to ~ overwrite ~ existing ~ \protect\IfExistT.
984   ~ This ~ may ~ not ~ work}
985 } { \cs_new_eq:NN \IfExistT \cs_if_exist:NT }
986 \cs_if_exist:NTF \IfExistF {\PackageWarning{chronos}{
987   Refusing ~ to ~ overwrite ~ existing ~ \protect\IfExistF.
988   ~ This ~ may ~ not ~ work}
989 } { \cs_new_eq:NN \IfExistF \cs_if_exist:NF }

```

`\IfCSFreeTF` yn lle `\ifcsundef` o `etoolbox` - instead of `\ifcsundef`

```

\IfCSFreeT
\IfCSFreeF
990 \cs_if_exist:NTF \IfCSFreeTF {\PackageWarning{chronos}{
991   Refusing ~ to ~ overwrite ~ existing ~ \protect\IfCSFreeTF.
992   ~ This ~ may ~ not ~ work}
993 } { \cs_new_eq:NN \IfCSFreeTF \cs_if_free:cTF }
994 \cs_if_exist:NTF \IfCSFreeT {\PackageWarning{chronos}{
995   Refusing ~ to ~ overwrite ~ existing ~ \protect\IfCSFreeT.
996   ~ This ~ may ~ not ~ work}
997 } { \cs_new_eq:NN \IfCSFreeT \cs_if_free:cT }
998 \cs_if_exist:NTF \IfCSFreeF {\PackageWarning{chronos}{
999   Refusing ~ to ~ overwrite ~ existing ~ \protect\IfCSFreeF.
1000   ~ This ~ may ~ not ~ work}
1001 } { \cs_new_eq:NN \IfCSFreeF \cs_if_free:cF }

```

`\IfCSExistTF` yn lle `\ifcsdef` o `etoolbox` - instead of `\ifcsdef`

```

\IfCSExistT
\IfCSExistF

```

```

1002 \cs_if_exist:NTF \IfCSEexistTF {\PackageWarning{chronos}{
1003   Refusing ~ to ~ overwrite ~ existing ~ \protect\IfCSEexistTF.
1004   ~ This ~ may ~ not ~ work}
1005 } { \cs_new_eq:NN \IfCSEexistTF \cs_if_exist:cTF }
1006 \cs_if_exist:NTF \IfCSEexistT {\PackageWarning{chronos}{
1007   Refusing ~ to ~ overwrite ~ existing ~ \protect\IfCSEexistT.
1008   ~ This ~ may ~ not ~ work}
1009 } { \cs_new_eq:NN \IfCSEexistT \cs_if_exist:cT }
1010 \cs_if_exist:NTF \IfCSEexistF {\PackageWarning{chronos}{
1011   Refusing ~ to ~ overwrite ~ existing ~ \protect\IfCSEexistF.
1012   ~ This ~ may ~ not ~ work}
1013 } { \cs_new_eq:NN \IfCSEexistF \cs_if_exist:cF }

```

`\Undefine` yn lle `\undef` o `etoolbox` - instead of `\undef`

```

1014 \cs_if_exist:NTF \Undefine {\PackageWarning{chronos}{
1015   Refusing ~ to ~ overwrite ~ existing ~ \protect\Undefine.
1016   ~ This ~ may ~ not ~ work}
1017 } { \cs_new_eq:NN \Undefine \cs_undefine:N }

```

`\CSletCS` yn lle `\csletcs` o `etoolbox` - instead of `\csletcs`

```

1018 \cs_if_exist:NTF \CSletCS {\PackageWarning{chronos}{
1019   Refusing ~ to ~ overwrite ~ existing ~ \protect\CSletCS.
1020   ~ This ~ may ~ not ~ work}
1021 } { \cs_new_eq:NN \CSletCS \cs_set_eq:cc }

```

`\CSlet` yn lle `\cslet` o `etoolbox` - instead of `\cslet`

```

1022 \cs_if_exist:NTF \CSlet {\PackageWarning{chronos}{
1023   Refusing ~ to ~ overwrite ~ existing ~ \protect\CSlet.
1024   ~ This ~ may ~ not ~ work}
1025 } { \cs_new_eq:NN \CSlet \cs_set_eq:cN }

```

`\IfBooleanExprTF` yn lle `\ifboolexpr` o `etoolbox` (ish) - instead of `\ifboolexpr`

```

\IfBooleanExprT
\IfBooleanExprF
1026 \cs_if_exist:NTF \IfBooleanExprTF {\PackageWarning{chronos}{
1027   Refusing ~ to ~ overwrite ~ existing ~ \protect\IfBooleanExprTF.
1028   ~ This ~ may ~ not ~ work}
1029 } { \cs_new_eq:NN \IfBooleanExprTF \bool_if:nTF }
1030 \cs_if_exist:NTF \IfBooleanExprT {\PackageWarning{chronos}{
1031   Refusing ~ to ~ overwrite ~ existing ~ \protect\IfBooleanExprT.
1032   ~ This ~ may ~ not ~ work}
1033 } { \cs_new_eq:NN \IfBooleanExprT \bool_if:nT }
1034 \cs_if_exist:NTF \IfBooleanExprF {\PackageWarning{chronos}{
1035   Refusing ~ to ~ overwrite ~ existing ~ \protect\IfBooleanExprF.
1036   ~ This ~ may ~ not ~ work}
1037 } { \cs_new_eq:NN \IfBooleanExprF \bool_if:nF }

```

`\LegacyBoolean` yn lle `bool` o `etoolbox` (ish) - instead of `bool` from `etoolbox`

```

1038 \cs_if_exist:NTF \LegacyBoolean {\PackageWarning{chronos}{
1039   Refusing ~ to ~ overwrite ~ existing ~ \protect\LegacyBoolean.
1040   ~ This ~ may ~ not ~ work}
1041 } { \cs_new_eq:NN \LegacyBoolean \legacy_if_p:n }

```

`\CSFreeBoolean` yn lle `test` o `etoolbox` (ish) - instead of `test` from `etoolbox`

```

1042 \cs_if_exist:NTF \CSFreeBoolean {\PackageWarning{chronos}{
1043   Refusing ~ to ~ overwrite ~ existing ~ \protect\CSFreeBoolean.
1044   ~ This ~ may ~ not ~ work}
1045 } { \cs_new_eq:NN \CSFreeBoolean \cs_if_free_p:N }

```

```

\IntCompareBoolean yn lle \ifnumcomp o etoolbox (ish) - instead of \ifnumcomp from etoolbox
\IfIntCompareTF
\IfIntCompareT
\IfIntCompareF
1046 \cs_if_exist:NTF \IntCompareBoolean {\PackageWarning{chronos}{
1047 Refusing ~ to ~ overwrite ~ existing ~ \protect\IntCompareBoolean.
1048 ~ This ~ may ~ not ~ work}
1049 } { \cs_new_eq:NN \IntCompareBoolean \int_compare_p:nNn }
1050 \cs_if_exist:NTF \IfIntCompareTF {\PackageWarning{chronos}{
1051 Refusing ~ to ~ overwrite ~ existing ~ \protect\IfIntCompareTF.
1052 ~ This ~ may ~ not ~ work}
1053 } { \cs_new_eq:NN \IfIntCompareTF \int_compare:nTF }
1054 \cs_if_exist:NTF \IfIntCompareT {\PackageWarning{chronos}{
1055 Refusing ~ to ~ overwrite ~ existing ~ \protect\IfIntCompareT.
1056 ~ This ~ may ~ not ~ work}
1057 } { \cs_new_eq:NN \IfIntCompareT \int_compare:nT }
1058 \cs_if_exist:NTF \IfIntCompareF {\PackageWarning{chronos}{
1059 Refusing ~ to ~ overwrite ~ existing ~ \protect\IfIntCompareF.
1060 ~ This ~ may ~ not ~ work}
1061 } { \cs_new_eq:NN \IfIntCompareF \int_compare:nF }

\chronosnewcolourscheme
\chronosnewcolorscheme
1062 \NewDocumentCommand \chronosnewcolourscheme { 0 {rhagosedig} m m }
1063 {
1064   \group_begin:
1065     \cs_new_nopar:cn { __chronos_lliwiau_#2 : }
1066     {
1067       \cs:w chronos@lliwiau@#1 \cs_end:
1068       \keys_set_groups:nnn { chronos / lliwiau } { core } { #3 }
1069       \__chronos_color_set_from_existing:nn { chronos@lliw@cefndir@llinell }
1070       { chronos@prifliw }
1071       \__chronos_color_set_from_existing:nn { chronos@lliw@llinell }
1072       { chronos@prifliw@cefndir }
1073       \keys_set_groups:nnn { chronos / lliwiau } { core ~ derivative } { #3 }
1074       \__chronos_color_set_from_existing:nn { chronos@borderinner }
1075       { chronos@lliw@cefndir@llinell }
1076       \__chronos_color_set_from_existing:nn { chronos@borderouter }
1077       { chronos@prifliw@cefndir }
1078       \__chronos_color_set_from_existing:nn { chronos@bordermiddle }
1079       { chronos@borderinner!50!chronos@borderouter }
1080       \keys_set_groups:nnn { chronos / lliwiau } { core ~ border } { #3 }
1081       \__chronos_color_set_from_existing:nn { chronos@byw@lliw@rhagosodedig }
1082       { chronos@prifliw }
1083       \__chronos_color_set_from_existing:nn { chronos@digwyddiad@lliw@rhagosodedig }
1084       { chronos@prifliw }
1085       \__chronos_color_set_from_existing:nn { chronos@parhad@lliw@rhagosodedig }
1086       { chronos@prifliw }
1087       \__chronos_color_set_from_existing:nn { chronos@theori@lliw@rhagosodedig }
1088       { chronos@prifliw }
1089       \__chronos_color_set_from_existing:nn { chronos@gwybodaeth@lliw@rhagosodedig }
1090       { chronos@prifliw }

1091       \__chronos_keys_set_exclude_groups:nnn { chronos / lliwiau }
1092       { core, core ~ derivative, core ~ border } { #3 }
1093       \@ifpackageloaded{memoize}
1094       {
1095         \mmzset { csname ~ meaning ~ to ~ context={ __chronos_lliwiau_#2 : } }
1096       }{}
1097     }
1098     \cs_new_eq:cc { chronos@lliwiau@#2 } { __chronos_lliwiau_#2 : }
1099   \group_end:
1100 }
1101 \cs_new_eq:NN \chronosnewcolorscheme \chronosnewcolourscheme

```

1102 \ExplSyntaxOff

1103 \newlength{\chronos@diwedd@diwedd}  
1104 \newlength{\chronos@dechrau@dechrau}  
1105 \newlength{\chronos@byw@border}  
1106 \newlength{\chronos@parhad@border}  
1107 \newlength{\chronos@digwyddiad@border}  
1108 \newlength{\chronos@byw@border@inv}  
1109 \newlength{\chronos@parhad@border@inv}  
1110 \newlength{\chronos@digwyddiad@border@inv}

1111 \newlength{\chronos@templgtha}  
1112 \newlength{\chronos@templgthb}  
1113 \newlength{\chronos@templgthc}

1114 \newdimen\chronos@borderheight  
1115 \newdimen\chronos@height  
1116 \newdimen\chronos@width  
1117 \chronos@width=\textwidth  
1118 \newdimen\chronos@eramargin  
1119 \newdimen\chronos@timelinemargin  
1120 \newdimen\chronos@inner@halfheight  
1121 \newdimen\chronos@outer@halfheight

1122 \newdimen\chronos@pgflinewidth@saved  
1123 \newdimen\chronos@border@de  
1124 \newdimen\chronos@border@chwith  
1125 \newdimen\chronos@border@penawdau  
1126 \newdimen\chronos@border@pen  
1127 \newdimen\chronos@border@gwaelod  
1128 \newdimen\chronos@border@allanol  
1129 \newdimen\chronos@subheading@drop@uchod  
1130 \newdimen\chronos@subheading@drop@isod  
1131 \newdimen\chronos@heading@drop  
1132 \newdimen\chronos@llinell@yshift  
1133 \newdimen\chronos@testun@yshift  
1134 \newdimen\chronos@baselineskip  
1135 \newdimen\chronos@cylchtheori@mawr  
1136 \newdimen\chronos@cylchtheori@bach  
1137 \newdimen\chronos@tmpdimena  
1138 \newdimen\chronos@tmpdimenb  
1139 \chronos@testun@yshift=5pt  
1140 \chronos@height=\pi pt  
1141 \chronos@borderheight=\pi pt  
1142 \chronos@llinell@yshift=\pi pt  
1143 \chronos@timelinemargin=15pt  
1144 \chronos@eramargin=15pt  
1145 \chronos@border@allanol=5pt  
1146 \chronos@border@penawdau=\pi pt  
1147 \chronos@border@pen=0pt  
1148 \chronos@border@de=0pt  
1149 \chronos@border@gwaelod=0pt  
1150 \chronos@border@chwith=0pt  
1151 \chronos@cylchtheori@mawr=15pt  
1152 \chronos@cylchtheori@bach=9pt

1153 \newcounter{chronos@date}  
1154 \newcounter{chronos@startdate}  
1155 \newcounter{chronos@enddate}  
1156 \newcounter{chronos@startyear}  
1157 \newcounter{chronos@startmarkyear}  
1158 \newcounter{chronos@endyear}  
1159 \newcounter{chronos@yeardate}

1160 \newcounter{chronos@thingdate}  
1161 \newcounter{chronos@otherthingdate}  
1162 \newcounter{chronos@genidate}  
1163 \newcounter{chronos@marwdate}  
1164 \newcounter{chronos@digdate}  
1165 \newcounter{chronos@weekday}  
1166 \newcounter{chronos@theori@countanchors}  
1167 \newcounter{chronos@tempcnta}  
1168 \newcounter{chronos@tempcntb}  
1169 \newcounter{chronos@tempcntc}  
1170 \newcounter{chronos@tempadate}  
1171 \newcounter{chronos@tempbdate}  
1172 \newcounter{chronos@bagpuss}  
  
1173 \newif\ifchronos@marks  
1174 \chronos@markstrue  
1175 \newif\ifchronos@marks@minor  
1176 \chronos@marks@minortrue  
1177 \newif\ifchronos@marks@bare  
1178 \chronos@marks@barefalse  
1179 \newif\ifchronos@timeline@showyears  
1180 \chronos@timeline@showyearstrue  
1181 \newif\ifchronos@eventyearsonline  
1182 \chronos@eventyearsonlinefalse  
1183 \newif\ifchronos@yearzero  
1184 \chronos@yearzerofalse  
1185 \newif\ifchronos@markateraswitch  
1186 \chronos@markateraswitchfalse  
1187 \newif\ifchronos@onlytext  
1188 \chronos@onlytextfalse  
1189 \newif\ifchronos@markeras  
1190 \chronos@markerasfalse  
1191 \newif\ifchronos@yearsonline  
1192 \chronos@yearsonlinefalse  
1193 \newif\ifchronos@eventdatessplit  
1194 \chronos@eventdatessplitfalse  
1195 \newif\ifchronos@minoryears  
1196 \chronos@minoryearstrue  
1197 \newif\ifchronos@byw@isod  
1198 \chronos@byw@isodfalse  
1199 \newif\ifchronos@byw@isod@rhag  
1200 \chronos@byw@isod@rhagfalse  
1201 \newif\ifchronos@every@byw@isod  
1202 \chronos@every@byw@isodfalse  
1203 \newif\ifchronos@every@byw@uchod  
1204 \chronos@every@byw@uchodfalse  
1205 \newif\ifchronos@byw@cysylltiad  
1206 \chronos@byw@cysylltiadtrue  
1207 \newif\ifchronos@byw@cysylltiadtheori  
1208 \chronos@byw@cysylltiadtheorifalse  
1209 \newif\ifchronos@digwyddiad@isod  
1210 \chronos@digwyddiad@isodfalse  
1211 \newif\ifchronos@digwyddiad@isod@rhag  
1212 \chronos@digwyddiad@isod@rhagfalse  
1213 \newif\ifchronos@every@digwyddiad@isod  
1214 \chronos@every@digwyddiad@isodfalse  
1215 \newif\ifchronos@every@digwyddiad@uchod  
1216 \chronos@every@digwyddiad@uchodfalse  
1217 \newif\ifchronos@digwyddiad@cysylltiad  
1218 \chronos@digwyddiad@cysylltiadtrue  
1219 \newif\ifchronos@digwyddiad@cysylltiadtheori

1220 \chronos@digwyddiad@cysylltiadtheorifalse  
1221 \newif\ifchronos@parhad@isod  
1222 \chronos@parhad@isodfalse  
1223 \newif\ifchronos@parhad@isod@rhag  
1224 \chronos@parhad@isod@rhagfalse  
1225 \newif\ifchronos@every@parhad@isod  
1226 \chronos@every@parhad@isodfalse  
1227 \newif\ifchronos@every@parhad@uchod  
1228 \chronos@every@parhad@uchodfalse  
1229 \newif\ifchronos@parhad@cysylltiad  
1230 \chronos@parhad@cysylltiadtrue  
1231 \newif\ifchronos@parhad@cysylltiadtheori  
1232 \chronos@parhad@cysylltiadtheorifalse  
1233 \newif\ifchronos@theori@isod  
1234 \chronos@theori@isodfalse  
1235 \newif\ifchronos@theori@cysylltiadtheori  
1236 \chronos@theori@cysylltiadtheorifalse  
1237 \newif\ifchronos@cam@mod  
1238 \newif\ifchronos@middleanchorborder  
1239 \newif\ifchronos@troilliwiau  
1240 \chronos@troilliwiautrue  
1241 \newif\ifchronos@dangoscyfnodau  
1242 \chronos@dangoscyfnodautrue  
1243 \newif\ifchronos@felymae  
1244 \chronos@felymaefalse  
1245 \newif\ifchronos@temp  
1246 \chronos@temptrue  
1247 \newif\ifchronos@headings  
1248 \chronos@headingsfalse  
1249 \newif\ifchronos@frame  
1250 \chronos@framefalse  
1251 \newif\ifchronos@framedefnyddiobb  
1252 \chronos@framedefnyddiobbtrue  
1253 \newif\ifchronos@placeholders  
1254 \chronos@placeholdersfalse  
1255 \newif\ifchronos@showcoords  
1256 \chronos@showcoordsfalse  
1257 \newif\ifchronos@showbb  
1258 \chronos@showbbfalse  
1259 \newif\ifchronos@shownodes  
1260 \chronos@shownodesfalse  
1261 \newif\ifchronos@bufarw  
1262 \chronos@bufarwtrue  
1263 \newif\ifchronos@gorffenedig  
1264 \chronos@gorffenedigtrue  
1265 \newif\ifchronos@preset  
1266 \chronos@presettrue  
1267 \newif\ifchronos@blynyddoedduchod  
1268 \chronos@blynyddoedduchodfalse  
1269 \newif\ifchronos@blynyddoeddisod  
1270 \chronos@blynyddoeddisodfalse  
1271 \newif\ifchronos@dimondblynyddoedd  
1272 \chronos@dimondblynyddoeddfalse  
1273 \newif\ifchronos@tag@cysylltu  
1274 \chronos@tag@cysylltuttrue  
1275 \newif\ifchronos@copyleft  
1276 \chronos@copyleftfalse  
1277 \newif\ifchronos@phantom  
1278 \chronos@phantomfalse  
1279 \newif\ifchronostimelinarrow  
1280 \chronostimelinarrowfalse



```

1281 \let\chronos@coords@\empty
1282 \def\chronos@ce{CE}
1283 \def\chronos@bce{BCE}
1284 \def\chronos@yearce{\textsc{ce}}
1285 \def\chronos@yearbce{\textsc{bce}}
1286 \def\chronos@yshift{0pt}
1287 \def\chronos@ffont@camaumawr{\sffamily\bfseries}
1288 \def\chronos@ffont@camaubach{\sffamily}
1289 \def\chronos@ffont@cyfnodau{\sffamily\bfseries}

1290 \def\chronos@uchod{0}
1291 \def\chronos@isod{0}

```

addaswyd o ateb Martin Scharrer: <https://tex.stackexchange.com/a/56405/>

i ddefnyddio `\setto<dim>` macros y tu mewn i lluniau tikz

to use `\setto<dim>` macros inside tikz pictures

LPL permission: <https://tex.stackexchange.com/users/2975/martin-scharrer>

```

1292 \let\orig@settodim\@settodim
1293 \let\chronos@settodim\@settodim
1294 \patchcmd{\chronos@settodim}{\setbox\@tempboxa\hbox}{\chronos@tikz@setbox}{}{}
1295 \def\chronos@tikz@setbox#1{%
1296   \setbox\@tempboxa\hbox{\pgfinterruptpicture #1\endpgfinterruptpicture}%
1297 }
1298 \appto\tikz@installcommands{%
1299   \let\@settodim\chronos@settodim
1300 }
1301 \appto\tikz@uninstallcommands{%
1302   \let\@settodim\orig@settodim
1303 }

```

Blue Copied from `xcolor.sty`, `x11names.def`, `svgnames.def`

```

Blue3 1304 \definecolorset{rgb}{chronos}{}{% xcolor.sty, x11names.def, svgnames.def
DarkGoldenrod1 1305   Blue,0,0,1;%
  DarkGray 1306   Blue3,0,0,.804;%
  DarkOrange1 1307   DarkGoldenrod1,1,.725,.06;%
  DarkOrchid3 1308   DarkGray,.664,.664,.664;%
DarkSlateGrey 1309   DarkOrange1,1,.498,0;%
  DeepPink2 1310   DarkOrchid3,.604,.196,.804;%
  DeepSkyBlue2 1311   DarkSlateGrey,.185,.31,.31;%
  DodgerBlue1 1312   DeepPink2,.932,.07,.536;%
  DodgerBlue2 1313   DeepSkyBlue2,0,.698,.932;%
  DodgerBlue3 1314   DodgerBlue1,.116,.565,1;%
  DodgerBlue4 1315   DodgerBlue2,.11,.525,.932;%
  Firebrick1 1316   DodgerBlue3,.094,.455,.804;%
  ForestGreen 1317   DodgerBlue4,.064,.305,.545;%
  Green 1318   Firebrick1,1,.19,.19;%
  Green3 1319   ForestGreen,.132,.545,.132;%
  Ivory2 1320   Green,0,.5,0;%
  Ivory3 1321   Green3,0,.804,0;%
  Ivory4 1322   Ivory2,.932,.932,.88;%
  Lavender 1323   Ivory3,.804,.804,.756;%
  LavenderBlush1 1324   Ivory4,.545,.545,.512;%
  LavenderBlush2 1325   Lavender,.9,.9,.98;%
  LavenderBlush3 1326   LavenderBlush1,1,.94,.96;%
  LavenderBlush4 1327   LavenderBlush2,.932,.88,.898;%
  MediumPurple 1328   LavenderBlush3,.804,.756,.772;%
  MidnightBlue 1329   LavenderBlush4,.545,.512,.525;%
  MistyRose2 1330   MediumPurple,.576,.44,.86;%
  MistyRose3 1331   MidnightBlue,.098,.098,.44;%
  MistyRose4
  Orange
  OrangeRed1
  Purple0
  Red
  SeaGreen3
  Sepia112

```

```

1332 MistyRose2,.932,.835,.824;%
1333 MistyRose3,.804,.716,.71;%
1334 MistyRose4,.545,.49,.484;%
1335 Orange,1,.648,0;%
1336 OrangeRed1,1,.27,0;%
1337 Purple0,.628,.125,.94;%
1338 Red,1,0,0;%
1339 SeaGreen3,.264,.804,.5;%
1340 Seashell12,.932,.898,.87;%
1341 Seashell13,.804,.772,.75;%
1342 Seashell14,.545,.525,.51;%
1343 Silver,.752,.752,.752;%
1344 SpringGreen4,0,.545,.27;%
1345 Thistle2,.932,.824,.932;%
1346 Thistle3,.804,.71,.804;%
1347 Thistle4,.545,.484,.545;%
1348 Violet,.932,.51,.932;%
1349 Yellow,1,1,0;%
1350 darkgray,.25,.25,.25%
1351 }

```

`chronosCerulean` From `dvipsnames.def`

`chronosPeriwinkle`  
`chronosWildStrawberry`

```

1352 %^^A dvipsnames.def
1353 \definecolor{chronosCerulean} {cmyk}{0.94,0.11,0,0}
1354 \definecolor{chronosPeriwinkle} {cmyk}{0.57,0.55,0,0}
1355 \definecolor{chronosWildStrawberry}{cmyk}{0,0.96,0.39,0}

```

`cronoleg` colours

```

1356 \newcommand*\chronos@lliwiau@cronoleg{%
1357   \chronos@lliwiau@isod{%
1358     chronosRed,%
1359     chronosOrange,%
1360     chronosYellow,%
1361     chronosGreen,%
1362     chronosBlue,%
1363     chronosMidnightBlue,%
1364     chronosViolet%
1365   }%
1366   \chronos@lliwiau@uchod{%
1367     chronosRed,%
1368     chronosOrange,%
1369     chronosYellow,%
1370     chronosGreen,%
1371     chronosBlue,%
1372     chronosMidnightBlue,%
1373     chronosViolet%
1374   }%
1375   \chronos@lliwiau@isod[byw]{%
1376     chronosDodgerBlue3,%
1377     chronosGreen3,%
1378     chronosBlue3,%
1379     chronosSpringGreen4,%
1380     chronosDeepSkyBlue2,%
1381     chronosForestGreen,%
1382     chronosPeriwinkle,%
1383     chronosSeaGreen3%
1384   }%
1385   \chronos@lliwiau@uchod[byw]{%
1386     chronosDeepPink2,%
1387     chronosDarkOrange1,%

```

```

1388     chronosFirebrick1,%
1389     chronosPurple0,%
1390     chronosWildStrawberry,%
1391     chronosOrangeRed1,%
1392     chronosDarkGoldenrod1,%
1393     chronosDarkOrchid3%
1394 }%
1395 \chronos@lliwiau@isod[digwyddiad]{%
1396     chronosSeashell4,%
1397     chronosSeashell4!.5!chronosSeashell3,%
1398     chronosSeashell3,%
1399     chronosSeashell3!.5!chronosSeashell2,%
1400     chronosSeashell2%
1401 }%
1402 \chronos@lliwiau@uchod[digwyddiad]{%
1403     chronosThistle4,%
1404     chronosThistle4!.5!chronosThistle3,%
1405     chronosThistle3,%
1406     chronosThistle3!.5!chronosThistle2,%
1407     chronosThistle2%
1408 }%
1409 \chronos@lliwiau@isod[parhad]{%
1410     chronosIvory4,%
1411     chronosIvory4!.5!chronosIvory3,%
1412     chronosIvory3,%
1413     chronosIvory3!.5!chronosIvory2,%
1414     chronosIvory2%
1415 }%
1416 \chronos@lliwiau@uchod[parhad]{%
1417     chronosMistyRose4,%
1418     chronosMistyRose4!.5!chronosMistyRose3,%
1419     chronosMistyRose3,%
1420     chronosMistyRose3!.5!chronosMistyRose2,%
1421     chronosMistyRose2%
1422 }%

1423 \colorlet{chronos@prifliw}{black}% prifliw
1424 \colorlet{chronos@prifliw@cefndir}{white}% prifliw cefndir
1425 \colorlet{chronos@lliw@cefndir@llinell}{black}%^^A oedd lliw cefndir amser?
1426 \colorlet{chronos@lliw@llinell}{white}%^^A oedd lliw amser

1427 \colorlet{chronos@lliw@theori}{white}%
1428 \colorlet{chronos@lliw@cefndir@theori}{black}%
1429 \colorlet{chronos@lliw@cefndir@gwybodaeth}{chronos@prifliw!25!chronos@prifliw@cefndir}%^^A
    lliw cefndir ee = prifliw!25!prifliw cefndir
1430 \colorlet{chronos@lliw@gwybodaeth}{chronos@prifliw}% lliw ee = prifliw

1431 }

default colours

1432 \newcommand*\chronos@lliwiau@rhagosodedig{%
1433     \chronos@lliwiau@isod{%
1434         chronosRed,%
1435         chronosOrange,%
1436         chronosYellow,%
1437         chronosGreen,%
1438         chronosBlue,%
1439         chronosMidnightBlue,%
1440         chronosViolet%
1441     }%
1442     \chronos@lliwiau@uchod{%
1443         chronosRed,%

```

```

1444     chronosOrange,%
1445     chronosYellow,%
1446     chronosGreen,%
1447     chronosBlue,%
1448     chronosMidnightBlue,%
1449     chronosViolet%
1450 }%

1451 \colorlet{chronos@prifliw}{black}%^^A prifliw
1452 \colorlet{chronos@prifliw@cefndir}{white}%^^A prifliw cefndir
1453 \colorlet{chronos@lliw@cefndir@llinell}{black}%^^A oedd lliw cefndir amser?
1454 \colorlet{chronos@lliw@llinell}{white}%^^A oedd lliw amser

1455 \colorlet{chronos@lliw@theori}{white}%
1456 \colorlet{chronos@lliw@cefndir@theori}{black}%
1457 \colorlet{chronos@lliw@cefndir@gwybodaeth}
1458     {chronos@prifliw!25!chronos@prifliw@cefndir}%^^A lliw cefndir ee = prifliw!25!prifliw
    cefndir
1459 \colorlet{chronos@lliw@gwybodaeth}{chronos@prifliw}%^^A lliw ee = prifliw

1460 \colorlet{chronos@borderouter}{chronos@prifliw@cefndir}%
1461 \colorlet{chronos@borderinner}{chronos@lliw@cefndir@llinell}%
1462 \colorlet{chronos@bordermiddle}{chronos@borderouter!50!chronos@borderinner}%

1463 }

```

we need an English alias here

```

1464 \chronos@lliwiau@rhagosodedig
1465 \let\chronos@lliwiau@default\chronos@lliwiau@rhagosodedig

```

`\testunteit1` Main title tag.

```

1466
1467 \NewDocumentCommand \testunteit1 { 0 {/chronos/@amserau} m o m m r() }{%^^A <<<

1468 \coordinate (chronos@coord@temp) at ($(#4)!1/2!(#5)$);
1469 \IfValueTF {#3}{\def\chronos@tempa{#3}}{%
1470     \edef\chronos@tempa{\chronos@testunteit1@priflythrennu{#2}}%
1471 }%
1472 \node (#2) [anchor=base,#1] at (#6 -| chronos@coord@temp) {\chronos@tempa};
1473 \ifchronos@shownodes
1474     \begin{scope}[on chronos overlay layer]
1475         \draw [help lines, draw=chronos@lliw@node] (#2.north east)
1476             -| (#2.south west) -| cycle;
1477     \end{scope}%
1478 \fi
1479 }% >>>

```

Number format from fixedpointarithmetic.

```

1480 \pgfkeys{/pgf/number format,
1481     int detect,
1482     set thousands separator={},
1483 }

```

Layers

```

1484 \pgfqkeys{/chronos}{%
1485     declare layer/.code={%\DeclareDocumentCommand
1486         \pgfdeclarelayer{chronos #1}%
1487     },
1488     declare layer/.list={background,middle ground,foreground,overlay},
1489 }

```

```

1490 \IfFileExists{tikzlibrarycfrforeground.code.tex}{%
1491   \def\chronos@layers{%
1492     background,%
1493     chronos background,%
1494     chronos middle ground,%
1495     main,%
1496     chronos foreground,%
1497     chronos overlay,%
1498     foreground%
1499   }%
1500 }{%
1501   \def\chronos@layers{%
1502     background,%
1503     chronos background,%
1504     chronos middle ground,%
1505     main,%
1506     chronos foreground,%
1507     chronos overlay%
1508   }%
1509 }
1510 \pgfqkeys{/chronos}{%
1511   create layer/.code={%
1512     \tikzset{%

```

adapted from tex/generic/pgf/frontendlayer/tikz/libraries/tikzlibrarybackgrounds.code.tex

```

1513     on chronos #1 layer/.style={%
1514       execute at begin scope={%
1515         \pgfonlayer{chronos #1}%
1516         \let\tikz@options=\pgfutil@empty%
1517         \tikzset{every on chronos #1 layer/.try,##1}%
1518         \tikz@options%
1519       },
1520       execute at end scope={\endpgfonlayer}
1521     },
1522   }%
1523 },
1524 create layer/.list={background,middle ground,foreground,overlay},
1525 }

```

Adapt the rectangle shape to provide more anchors for easy placement of connectors. This is used locally within the package environment.

ateb Symbol 1: <https://tex.stackexchange.com/a/385953/>

```

1526 \def\pgf@sm@shape@name{rectangle}
1527 \pgf@sh@savedanchor\middenortheast{%
1528   \pgf@x=\the\wd\pgfnodeparttextbox%
1529   \pgfmathsetlength\pgf@xc{\pgfkeysvalueof{/pgf/inner xsep}}}%
1530   \advance\pgf@x by 2\pgf@xc%
1531   \pgfmathsetlength\pgf@xb{\pgfkeysvalueof{/pgf/minimum width}}}%
1532   \ifdim\pgf@x<\pgf@xb
1533     \pgf@x=\pgf@xb
1534   \fi
1535   \pgf@x=.5\pgf@x\advance\pgf@x by.5\wd\pgfnodeparttextbox%
1536   \pgf@y=\ht\pgfnodeparttextbox\advance\pgf@y by\dp\pgfnodeparttextbox%
1537   \pgfmathsetlength\pgf@yc{\pgfkeysvalueof{/pgf/inner ysep}}}%
1538   \advance\pgf@y by 2\pgf@yc%
1539   \pgfmathsetlength\pgf@yb{\pgfkeysvalueof{/pgf/minimum height}}}%
1540   \ifdim\pgf@y<\pgf@yb
1541     \pgf@y=\pgf@yb
1542   \fi

```

```

1543 \pgf@y=.5\pgf@y\advance\pgf@y by-.5\dp\pgfnodeparttextbox%
1544 \advance\pgf@y by.5\ht\pgfnodeparttextbox%
1545 }
1546 \pgf@sh@savedanchor\middlesouthwest{%
1547 \pgf@x=\wd\pgfnodeparttextbox%
1548 \pgfmathsetlength\pgf@xc{\pgfkeysvalueof{/pgf/inner xsep}}
1549 \advance\pgf@x by 2\pgf@xc%
1550 \pgfmathsetlength\pgf@xb{\pgfkeysvalueof{/pgf/minimum width}}%
1551 \ifdim\pgf@x<\pgf@xb
1552 \pgf@x=\pgf@xb
1553 \fi
1554 \pgf@x=-.5\pgf@x\advance\pgf@x by.5\wd\pgfnodeparttextbox%
1555 \pgf@y=\ht\pgfnodeparttextbox%
1556 \advance\pgf@y by\dp\pgfnodeparttextbox%
1557 \pgfmathsetlength\pgf@yc{\pgfkeysvalueof{/pgf/inner ysep}}%
1558 \advance\pgf@y by 2\pgf@yc%
1559 \pgfmathsetlength\pgf@yb{\pgfkeysvalueof{/pgf/minimum height}}%
1560 \ifdim\pgf@y<\pgf@yb
1561 \pgf@y=\pgf@yb
1562 \fi
1563 \pgf@y=-.5\pgf@y%
1564 \advance\pgf@y by-.5\dp\pgfnodeparttextbox%
1565 \advance\pgf@y by.5\ht\pgfnodeparttextbox%
1566 }
1567 \pgf@sh@anchor{middle north east}{\middlenortheast}
1568 \pgf@sh@anchor{middle south west}{\middlesouthwest}
1569 \pgf@sh@anchor{middle south east}{\middlenortheast\pgf@xa=\pgf@x%
1570 \middlesouthwest\pgf@x=\pgf@xa}
1571 \pgf@sh@anchor{middle north west}{\middlesouthwest\pgf@xa=\pgf@x%
1572 \middlenortheast\pgf@x=\pgf@xa}
1573 \pgf@sh@anchor{middle north}{%
1574 \pgf@process{\middlesouthwest}%
1575 \pgf@xa=.5\pgf@x%
1576 \pgf@process{\middlenortheast}%
1577 \pgf@x=.5\pgf@x\advance\pgf@x by \pgf@xa
1578 }
1579 \pgf@sh@anchor{middle south}{%
1580 \pgf@process{\middlenortheast}%
1581 \pgf@xa=.5\pgf@x%
1582 \pgf@process{\middlesouthwest}%
1583 \pgf@x=.5\pgf@x\advance\pgf@x by \pgf@xa
1584 }
1585 \pgf@sh@anchor{middle west}{%
1586 \pgf@process{\middlenortheast}%
1587 \pgf@ya=.5\pgf@y%
1588 \pgf@process{\middlesouthwest}%
1589 \pgf@y=.5\pgf@y%
1590 \advance\pgf@y by \pgf@ya
1591 }
1592 \pgf@sh@anchor{middle east}{%
1593 \pgf@process{\middlesouthwest}%
1594 \pgf@ya=.5\pgf@y%
1595 \pgf@process{\middlenortheast}%
1596 \pgf@y=.5\pgf@y%
1597 \advance\pgf@y by \pgf@ya
1598 }
1599 \pgf@sh@anchorborder{%
1600 \pgf@xb=\pgf@x\pgf@yb=\pgf@y%
1601 \ifchronos@middleanchorborder
1602 \middlesouthwest%
1603 \else

```

```

1604 \southwest
1605 \fi
1606 \pgf@xa=\pgf@x\pgf@ya=\pgf@y
1607 \ifchronos@middleanchorborder
1608 \midlenortheast%
1609 \else
1610 \northeast%
1611 \fi
1612 \advance\pgf@x by-\pgf@xa%
1613 \advance\pgf@y by-\pgf@ya%
1614 \pgf@xc=.5\pgf@x\pgf@yc=.5\pgf@y%
1615 \advance\pgf@xa by\pgf@xc%
1616 \advance\pgf@ya by\pgf@yc%
1617 \edef\pgf@marshal{\noexpand\pgfpointborderrectangle
1618 {\noexpand\pgfqpoint{\the\pgf@xb}{\the\pgf@yb}}%
1619 {\noexpand\pgfqpoint{\the\pgf@xc}{\the\pgf@yc}}%
1620 }%
1621 \pgf@process{\pgf@marshal}\advance\pgf@x by\pgf@xa\advance\pgf@y by\pgf@ya%
1622 }
1623 \tikzset{%
1624 /chronos/middle anchorborder/.is if=chronos@middleanchorborder,
1625 }

```

Context initialisation.

```

1626 \NewDocumentCommand \chronos@cyd@destun@init { s t {+} o m m } {% chronos context initialisa
    <<<
1627 \renewcommand* \chronos@ychwanegu@nodweddion [3]{\relax}%
1628 \renewcommand* \chronos@ychwanegu@nodweddion@rhag [2]{\relax}%
1629 \renewcommand* \chronos@cadw@nodweddion [3]{\relax}%
1630 \renewcommand* \chronos@cadw@nodweddion@rhag [2]{\relax}%
1631 \IfBooleanT {#2} {%
1632 \pgfqkeys{/chronos}{% paid ag ychwanegu i property lists rhagosodedig mewn cyd-destun
    lleoll

```

don't add to default property lists in a local context

```

1633 blynyddoedd yn unig/.code={%
1634 \chronos@dimondblynyddoeddtrue
1635 \ifchronos@dangoscyfnodau
1636 \pgfqkeys{/chronos/#4/dangos cyfnodau}{@blynyddoedd yn unig}%
1637 \else
1638 \pgfqkeys{/chronos/#4/heb gyfnodau}{@blynyddoedd yn unig}%
1639 \fi
1640 },
1641 dyddiadau llawn/.code={%
1642 \chronos@dimondblynyddoeddfalse
1643 \ifchronos@dangoscyfnodau
1644 \pgfqkeys{/chronos/#4/dangos cyfnodau}{@llawn}%
1645 \else
1646 \pgfqkeys{/chronos/#4/heb gyfnodau}{@llawn}%
1647 \fi
1648 },
1649 dangos cyfnodau/.code={%
1650 \chronos@dangoscyfnoda>true
1651 \ifchronos@dimondblynyddoedd
1652 \pgfqkeys{/chronos/#4/dangos cyfnodau}{@blynyddoedd yn unig}%
1653 \else
1654 \pgfqkeys{/chronos/#4/dangos cyfnodau}{@llawn}%
1655 \fi
1656 },
1657 heb gyfnodau/.code={%

```

```

1658     \chronos@dangoscyfnodaufalse
1659     \ifchronos@dimondblynnyddoedd
1660     \pgfqkeys{/chronos/#4/heb gyfnodau}{@blynnyddoedd yn unig}%
1661     \else
1662     \pgfqkeys{/chronos/#4/heb gyfnodau}{@llawn}%
1663     \fi
1664   },
1665   }%
1666 }%
1667 \pgfqkeys{/chronos}{%^^A paid ag ychwanegu i property lists rhagosodedig mewn cyd-destun
lleoll | ditto
1668   tags/.code={\pgfqkeys{/chronos}{@tag/.style={##1}}},
1669   tags+/.code={\pgfqkeys{/chronos}{@tag/.append style={##1}}},
1670   testunau/.code={\pgfqkeys{/chronos}{@testun/.style={##1}}},
1671   testunau+/.code={\pgfqkeys{/chronos}{@testun/.append style={##1}}},
1672   cysylltiadau/.code={\pgfqkeys{/chronos}{@cysylltiad/.style={##1}}},
1673   cysylltiadau+/.code={\pgfqkeys{/chronos}{@cysylltiad/.append style={##1}}},
1674   cysylltwyr chronos'/.code={\pgfqkeys{/chronos}{@cysylltwr@chronos/.style={##1}}},
1675   cysylltwyr chronos+/.code={%
1676     \pgfqkeys{/chronos}{@cysylltwr@chronos/.append style={##1}}%
1677   },
1678   cysylltwyr testun'/.code={\pgfqkeys{/chronos}{@cysylltwr@testun/.style={##1}}},
1679   cysylltwyr testun+/.code={\pgfqkeys{/chronos}{@cysylltwr@testun/.append style={##1}}},
1680   prif gysylltwyr testun'/.code={%
1681     \pgfqkeys{/chronos}{@cysylltwr@testun@prif/.style={##1}}%
1682   },
1683   prif gysylltwyr testun+/.code={%
1684     \pgfqkeys{/chronos}{@cysylltwr@testun@prif/.append style={##1}}%
1685   },
1686   llinellau/.code={\pgfqkeys{/chronos}{@llinell/.style={##1}}},
1687   llinellau+/.code={\pgfqkeys{/chronos}{@llinell/.append style={##1}}},
1688   phantom/.is if=chronos@phantom,
1689   phantom/.default=true,
1690   troi lliwiau/.is if=chronos@troilliwiau,
1691   troi lliwiau/.default=true,
1692   testun yshift/.chronos dimen=\chronos@testun@yshift,
1693   #4/tag'/.code={\pgfqkeys{/chronos}{@tag/.style={##1}}},
1694   #4/testun'/.code={\pgfqkeys{/chronos}{@testun/.style={##1}}},
1695   #4/cysylltiad'/.code={\pgfqkeys{/chronos}{@cysylltiad/.style={##1}}},
1696   #4/llinell'/.code={\pgfqkeys{/chronos}{@llinell/.style={##1}}},
1697   #4/cysylltwyr chronos'/.code={%
1698     \pgfqkeys{/chronos}{@cysylltwr@chronos/.style={##1}}%
1699   },
1700   #4/cysylltwyr testun'/.code={%
1701     \pgfqkeys{/chronos}{@cysylltwr@testun/.style={##1}}%
1702   },
1703   #4/prif gysylltwyr testun'/.code={%
1704     \pgfqkeys{/chronos}{@cysylltwr@testun@prif/.style={##1}}%
1705   },
1706   #4/tag+/.code={\pgfqkeys{/chronos}{@tag/.append style={##1}}},
1707   #4/testun+/.code={\pgfqkeys{/chronos}{@testun/.append style={##1}}},
1708   #4/cysylltiad+/.code={\pgfqkeys{/chronos}{@cysylltiad/.append style={##1}}},
1709   #4/llinell+/.code={\pgfqkeys{/chronos}{@llinell/.append style={##1}}},
1710   #4/cysylltwyr chronos+/.code={%
1711     \pgfqkeys{/chronos}{@cysylltwr@chronos/.append style={##1}}%
1712   },
1713   #4/cysylltwyr testun+/.code={%
1714     \pgfqkeys{/chronos}{@cysylltwr@testun/.append style={##1}}%
1715   },
1716   #4/prif gysylltwyr testun+/.code={%
1717     \pgfqkeys{/chronos}{@cysylltwr@testun@prif/.append style={##1}}%

```



```

1718   },
1719   #4/blynyddoedd yn unig/.forward to=/chronos/blynyddoedd yn unig,
1720   #4/dyddiadau llawn/.forward to=/chronos/dyddiadau llawn,
1721   #4/dangos cyfnodau/.forward to=/chronos/dangos cyfnodau,
1722   #4/heb gyfnodau/.forward to=/chronos/heb gyfnodau,
1723   #4/testun yn unig/.forward to=/chronos/testun yn unig,
1724   #4/troi lliwiau/.is if=chronos@troilliwiau,
1725   #4/troi lliwiau/.default=true,
1726   #4/phantom/.is if=chronos@phantom,
1727   #4/phantom/.default=true,
1728   #4/testun yshift/.chronos dimen=\chronos@testun@yshift,
1729   #4/lliw rhagosodedig/.code={%
1730     \edef\tempa{\csname chronos@#4@lliw\endcsname}%
1731     \edef\tempb{\csname chronos@#4@lliw@rhagosodedig\endcsname}%
1732     \expandafter\let\tempa\tempb
1733   },
1734 }%
1735 \def\chronos@cadw{}% clirio'r macro
1736 \IfBooleanF {#1}{%
1737   \chronos@gosod@nodweddion{#4}%
1738 }%
1739 \pgfqkeys{/pgf}{%
1740   key filters/defined/.install key filter,
1741   key filter handlers/append filtered to/.install key filter handler=\chronos@cadw,
1742 }%
1743 \IfValueTF {#3}{% defnyddio'r allweddau sy'n diffinio | define defined keys
1744   \pgfkeysfiltered{/chronos/#3/.cd,/chronos/@tag,#5}%
1745 }{%
1746   \pgfkeysfiltered{/chronos/#4/.cd,/chronos/@tag,#5}%
1747 }%

1748 \IfBooleanT {#2}{% set date formats, whether showing eras, whether using full dates
1749   \chronos@if@gosodF{@#4@fformatiau@dyddiadau}{%
1750     \ifchronos@dimondblynyddoedd
1751       \ifchronos@dangoscyfnodau
1752         \pgfqkeys{/chronos/#4/dangos cyfnodau}{@blynyddoedd yn unig}%
1753       \else
1754         \pgfqkeys{/chronos/#4/heb gyfnodau}{@blynyddoedd yn unig}%
1755       \fi
1756     \else
1757       \ifchronos@dangoscyfnodau
1758         \pgfqkeys{/chronos/#4/dangos cyfnodau}{@llawn}%
1759       \else
1760         \pgfqkeys{/chronos/#4/heb gyfnodau}{@llawn}%
1761       \fi
1762     \fi
1763   }%
1764 }%
1765 }% >>>

1766 \tikzset{%

1767 /handlers/.chronos dimen/.code={%
1768   \pgfkeysdef{\pgfkeyscurrentpath}{%
1769     \pgfmathparse{##1}%
1770     #1=\pgfmathresult pt
1771   }%
1772   \pgfkeysdef{\pgfkeyscurrentpath'}{#1=##1}%
1773   \pgfkeysdef{\pgfkeyscurrentpath'+}{\advance #1 by ##1}%
1774   \pgfkeysdef{\pgfkeyscurrentpath'-}{\advance #1 by -##1}%
1775   \pgfkeysdef{\pgfkeyscurrentpath+}{%
1776     \pgfmathparse{##1}%

```

```

1777     \advance #1 by \pgfmathresult pt
1778     }%
1779     \pgfkeysdef{\pgfkeyscurrentpath-}{%
1780       \pgfmathparse{##1}%
1781       \advance #1 by -\pgfmathresult pt
1782     }%
1783   },
1784   /handlers/.chronos 2 dimens/.code 2 args={%
1785     \pgfkeysdefargs{\pgfkeyscurrentpath}{##1:##2}{%
1786       \pgfmathparse{##1}%
1787       #1=\pgfmathresult pt
1788       \pgfmathparse{##2}%
1789       #2=\pgfmathresult pt
1790     }%
1791     \pgfkeysdefargs{\pgfkeyscurrentpath'}{##1:##2}{%
1792       #1=##1
1793       #2=##2
1794     }%
1795     \pgfkeysdefargs{\pgfkeyscurrentpath'+}{##1:##2}{%
1796       \advance #1 by ##1
1797       \advance #2 by ##2
1798     }%
1799     \pgfkeysdefargs{\pgfkeyscurrentpath'-}{##1:##2}{%
1800       \advance #1 by -##1
1801       \advance #2 by -##2
1802     }%
1803     \pgfkeysdefargs{\pgfkeyscurrentpath+}{##1:##2}{%
1804       \pgfmathparse{##1}\advance #1 by \pgfmathresult pt
1805       \pgfmathparse{##2}\advance #2 by \pgfmathresult pt
1806     }%
1807     \pgfkeysdefargs{\pgfkeyscurrentpath-}{##1:##2}{%
1808       \pgfmathparse{##1}\advance #1 by -\pgfmathresult pt
1809       \pgfmathparse{##2}\advance #2 by -\pgfmathresult pt
1810     }%
1811   },
1812   /handlers/.chronos layer choice/.code={%

```

`\chronos@ychwanegu@gosod` tracks the setting so if a user sets the layer explicitly, `chronos` won't override it

```

1813     \edef\chronos@temppgfpfpath{\pgfkeyscurrentpath}%
1814     \pgfkeys{%^^A set the layer to put all things of some kind on e.g. connections, lines,
      timeline border
1815       \pgfkeyscurrentpath/.is choice,
1816       \chronos@temppgfpfpath/.cd,
1817       background/.code={%
1818         \pgfkeys{/chronos/chronos@#1@haenen/.style={on chronos background layer}}%
1819         \chronos@ychwanegu@gosod{#1}%
1820       },
1821       middle ground/.code={%
1822         \pgfkeys{/chronos/chronos@#1@haenen/.style={on chronos middle ground layer}}%
1823         \chronos@ychwanegu@gosod{#1}%
1824       },
1825       foreground/.code={%
1826         \pgfkeys{/chronos/chronos@#1@haenen/.style={on chronos foreground layer}}%
1827         \chronos@ychwanegu@gosod{#1}%
1828       },
1829       overlay/.code={%
1830         \pgfkeys{/chronos/chronos@#1@haenen/.style=on chronos overlay layer}%
1831         \chronos@ychwanegu@gosod{#1}%
1832       },
1833       main/.code={%

```

```

1834     \pgfkeys{/chronos/chronos@#1@haenen/.style={}}%
1835     \chronos@ychwanegu@gosod{#1}%
1836   },
1837   }%
1838 },
1839 /handlers/.chronos lliw/.code={% chronos colour
1840   \pgfkeysdef{\pgfkeyscurrentpath}{\colorlet{chronos@#1}{##1}}%
1841 },
1842 /handlers/.chronos track/.code={% track setting of property by user
1843   \pgfkeys{%
1844     \pgfkeyscurrentpath/.append code={\chronos@ychwanegu@gosod{#1}},
1845   }%
1846 },
1847 /handlers/.chronos search/.code={%^^A set up search so english paths work e.g. /chronos/li
1848   \pgfkeys{%
1849     \pgfkeyscurrentpath/.unknown/.code={%
1850       \let\searchname=\pgfkeyscurrentname%
1851       \pgfkeysalso{^^A **angen** y {} o gwmpas ##1 isod! | **need** the {} around ##1
below!
1852         /chronos/#1/\searchname/.try={##1},
1853         /chronos/\searchname/.retry={##1},
1854         /tikz/\searchname/.retry={##1},
1855         /pgf/\searchname/.lastretry={##1}%
1856       }%
1857     },
1858   }%
1859 },

1860 /handlers/.chronos tag init/.code 2 args={%^^A initialise a chronos 'tag' e.g. life,
event, period
1861   \pgfkeys{%
1862     \pgfkeyscurrentpath/.cd,

english translations below

1863     enw/.store in/.expand once=\csname chronos@#1@enw\endcsname,

create a tikz-friendly version of name, in case name contains anything problematic

1864     chronos@tikzname/.code={\chronos@creu@tikzname {#1}{##1}},
1865     enw/.forward to=/chronos/#1/chronos@tikzname,
1866     fel y mae/.is if=chronos@felymae,
1867     fel y mae/.default=true,
1868     llinell'/.code={\chronos@cadw@nodweddion{#1}{@llinell}{##1}},
1869     llinell+/.code={\chronos@ychwanegu@nodweddion{#1}{@llinell}{##1}},
1870     llinell/.forward to=/chronos/#1/llinell',
1871     lliw/.store in/.expand once=\csname chronos@#1@lliw\endcsname,

1872     lliw rhagosodedig/.store in/.expand once=\csname chronos@#1@lliw@rhagosodedig\endcsname
1873     lliw rhagosodedig=chronos@prifliw,
1874     lliwiau uchod/.code={\chronos@lliwiau@uchod[#1]{##1}},
1875     lliwiau isod/.code={\chronos@lliwiau@isod[#1]{##1}},
1876     lliwiau uchod o clist/.code={\chronos@global@eq@clist{lliwiau_#1_uchod}{##1}},
1877     lliwiau isod o clist/.code={\chronos@global@eq@clist{lliwiau_#1_isod}{##1}},
1878     isod/.is if=chronos@#1@isod,
1879     uchod/.code/.expand once={\csname chronos@#1@isodfalse\endcsname},
1880     at/.store in/.expand once=\csname chronos@#1@at\endcsname,
1881     at/.expand once=\csname chronos@#1@tikzname\endcsname,
1882     angor/.store in/.expand once=\csname chronos@#1@angor\endcsname,
1883     angor/.forward to=/tikz/anchor,
1884     cysylltu/.is if=chronos@#1@cysylltiad,
1885     cysylltiad'/.code={\chronos@cadw@nodweddion{#1}{@cysylltiad}{##1}},
1886     cysylltiad+/.code={\chronos@ychwanegu@nodweddion{#1}{@cysylltiad}{##1}},

```

```

1887 cysylltiad/.forward to=/chronos/#1/cysylltiad',
1888 cysylltwr chronos'/.code={%
1889 \chronos@cadw@nodweddion{#1}@cysylltwr@chronos}{##1}},
1890 cysylltwr chronos+/.code={%
1891 \chronos@ychwanegu@nodweddion{#1}@cysylltwr@chronos}{##1}},
1892 cysylltwr chronos/.forward to=/chronos/#1/cysylltwr chronos+,
1893 cysylltwr testun'/.code={%
1894 \chronos@cadw@nodweddion{#1}@cysylltwr@testun}{##1}},
1895 cysylltwr testun+/.code={%
1896 \chronos@ychwanegu@nodweddion{#1}@cysylltwr@testun}{##1}},
1897 cysylltwr testun/.forward to=/chronos/#1/cysylltwr testun+,
1898 ffont testun/.code={%
1899 \expandafter\def\csname chronos@#1@ffonttestun\endcsname{##1}},
1900 ffont testun=,
1901 prif gysylltwr testun'/.code={%
1902 \chronos@cadw@nodweddion{#1}@cysylltwr@testun@prif}{##1}},
1903 prif gysylltwr testun+/.code={%
1904 \chronos@ychwanegu@nodweddion{#1}@cysylltwr@testun@prif}{##1}},
1905 prif gysylltwr testun/.forward to=/chronos/#1/prif gysylltwr testun',
1906 tag'/.code={\chronos@cadw@nodweddion{#1}@tag}{##1}},
1907 tag+/.code={\chronos@ychwanegu@nodweddion{#1}@tag}{##1}},
1908 tag/.forward to=/chronos/#1/tag+,
1909 testun'/.code={\chronos@cadw@nodweddion{#1}@testun}{##1}},
1910 testun+/.code={\chronos@ychwanegu@nodweddion{#1}@testun}{##1}},
1911 testun/.forward to=/chronos/#1/testun',
1912 cysylltwyr+/.code={%^^A rhan o /chronos/#1; paid â ddileu fe!! | part of /chronos/#1;
don't delete it!!
1913 \csname chronos@#1@cysylltiadtheoritrue\endcsname
1914 \IfExistTF \chronos@cysylltwyr {%
1915 \expandafter\def\expandafter\chronos@cysylltwyr\expandafter{%
1916 \chronos@cysylltwyr,##1}%
1917 }\def \chronos@cysylltwyr{##1}%
1918 },
1919 cysylltwyr'/.code={%
1920 \csname chronos@#1@cysylltiadtheoritrue\endcsname
1921 \def \chronos@cysylltwyr{##1}%
1922 },
1923 cysylltwyr/.forward to=/chronos/#1/cysylltwyr+,
1924 testun yn unig/.code={%
1925 \chronos@ychwanegu@nodweddion{#1}@tag}{/chronos/testun yn unig}},
1926 troi lliwiau/.code={%
1927 \chronos@ychwanegu@nodweddion{#1}@tag}{/chronos/troi lliwiau=##1}},
1928 troi lliwiau/.default=true,
1929 phantom/.code={%
1930 \chronos@ychwanegu@nodweddion{#1}@tag}{/chronos/phantom=##1}},
1931 phantom/.default=true,
1932 cynnwys testun/.store in=\chronos@cynnwys@testun,
1933 cynnwys enw/.store in=\chronos@cynnwys@enw,
1934 cynnwys dyddiadau/.store in=\chronos@cynnwys@dyddiadau,
1935 yshift/.store in=\chronos@yshift,
1936 yshift/.forward to=yshift,
1937 testun yshift/.code={%
1938 \chronos@ychwanegu@nodweddion{#1}@tag}{/chronos/testun yshift=##1}},
1939 testun yshift'/.code={%
1940 \chronos@ychwanegu@nodweddion{#1}@tag}{/chronos/testun yshift'=##1}},
1941 testun yshift+/.code={%
1942 \chronos@ychwanegu@nodweddion{#1}@tag}{/chronos/testun yshift+=##1}},
1943 testun yshift-/.code={%
1944 \chronos@ychwanegu@nodweddion{#1}@tag}{/chronos/testun yshift-=##1}},
1945 testun yshift'+/.code={%
1946 \chronos@ychwanegu@nodweddion{#1}@tag}{/chronos/testun yshift'+=##1}},

```

```

1947 testun yshift'-/.code={%
1948     \chronos@ychwanegu@nodweddiion{#1}{@tag}{/chronos/testun yshift'-=#1}},
1949 name/.forward to=/chronos/#1/enw,
1950 as is/.forward to=/chronos/#1/fel y mae,
1951 colour/.forward to=/chronos/#1/lliw,
1952 color/.forward to=/chronos/#1/lliw,
1953 default colour/.forward to=/chronos/#1/lliw rhagosodedig,
1954 default color/.forward to=/chronos/#1/lliw rhagosodedig,
1955 colours above/.forward to=/chronos/#1/lliwiau uchod,
1956 colours below/.forward to=/chronos/#1/lliwiau isod,
1957 colors above/.forward to=/chronos/#1/lliwiau uchod,
1958 colors below/.forward to=/chronos/#1/lliwiau isod,
1959 colours above from clist/.forward to=/chronos/#1/lliwiau uchod o clist,
1960 colours below from clist/.forward to=/chronos/#1/lliwiau isod o clist,
1961 colors above from clist/.forward to=/chronos/#1/lliwiau uchod o clist,
1962 colors below from clist/.forward to=/chronos/#1/lliwiau isod o clist,
1963 place below/.forward to=/chronos/#1/isod,
1964 place above/.forward to=/chronos/#1/uchod,
1965 tag anchor/.forward to=/chronos/#1/angor,
1966 connect/.forward to=/chronos/#1/cysylltu,
1967 connection/.forward to=/chronos/#1/cysylltiad,
1968 connection'/.forward to=/chronos/#1/cysylltiad',
1969 connection+/.forward to=/chronos/#1/cysylltiad+,
1970 connectors/.forward to=/chronos/#1/cysylltwyr,
1971 connectors+/.forward to=/chronos/#1/cysylltwyr+,
1972 connectors'/.forward to=/chronos/#1/cysylltwyr',
1973 text font/.forward to=/chronos/#1/ffont testun,
1974 text tag connector+/.forward to=/chronos/#1/cysylltwr testun+,
1975 text tag connector'/.forward to=/chronos/#1/cysylltwr testun',
1976 text tag connector/.forward to=/chronos/#1/cysylltwr testun,
1977 main text tag connector+/.forward to=/chronos/#1/prif gysylltwr testun+,
1978 main text tag connector'/.forward to=/chronos/#1/prif gysylltwr testun',
1979 main text tag connector/.forward to=/chronos/#1/prif gysylltwr testun,
1980 chronos connector+/.forward to=/chronos/#1/cysylltwr chronos+,
1981 chronos connector'/.forward to=/chronos/#1/cysylltwr chronos',
1982 chronos connector/.forward to=/chronos/#1/cysylltwr chronos,
1983 colour rotation/.forward to=/chronos/#1/troi lliwiau,
1984 color rotation/.forward to=/chronos/#1/troi lliwiau,
1985 line/.forward to=/chronos/#1/llynell,
1986 line'/.forward to=/chronos/#1/llynell',
1987 line+/.forward to=/chronos/#1/llynell+,
1988 only text/.forward to=/chronos/#1/testun yn unig,
1989 text tag/.forward to=/chronos/#1/testun,
1990 text tag'/.forward to=/chronos/#1/testun',
1991 text tag+/.forward to=/chronos/#1/testun+,
1992 text tag yshift/.forward to=/chronos/#1/testun yshift,
1993 text tag yshift'/.forward to=/chronos/#1/testun yshift',
1994 text tag yshift+/.forward to=/chronos/#1/testun yshift+,
1995 text tag yshift-/.forward to=/chronos/#1/testun yshift-,
1996 text tag yshift'+/.forward to=/chronos/#1/testun yshift'+,
1997 text tag yshift'-/.forward to=/chronos/#1/testun yshift'-,
1998 text content/.forward to=/chronos/#1/cynnwys testun,
1999 name content/.forward to=/chronos/#1/cynnwys enw,
2000 dates content/.forward to=/chronos/#1/cynnwys dyddiadau,
2001 /chronos/.cd,
2002 cysylltiad #1+/.forward to=/chronos/#1/cysylltiad+,
2003 cysylltiad #1'/.forward to=/chronos/#1/cysylltiad',
2004 cysylltiad #1/.forward to=/chronos/#1/cysylltiad,
2005 cysylltwr chronos #1+/.forward to=/chronos/#1/cysylltwr chronos+,

```

```

2006     cysylltwr chronos #1'/.forward to=/chronos/#1/cysylltwr chronos',
2007     cysylltwr chronos #1/.forward to=/chronos/#1/cysylltwr chronos,
2008     cysylltwr testun #1+/.forward to=/chronos/#1/cysylltwr testun+,
2009     cysylltwr testun #1'/.forward to=/chronos/#1/cysylltwr testun',
2010     cysylltwr testun #1/.forward to=/chronos/#1/cysylltwr testun,
2011     prif gysylltwr testun #1+/.forward to=/chronos/#1/prif gysylltwr testun+,
2012     prif gysylltwr testun #1'/.forward to=/chronos/#1/prif gysylltwr testun',
2013     prif gysylltwr testun #1/.forward to=/chronos/#1/prif gysylltwr testun,
2014     llinell #1+/.forward to=/chronos/#1/llinell+,
2015     llinell #1'/.forward to=/chronos/#1/llinell',
2016     llinell #1/.forward to=/chronos/#1/llinell,
2017     testun #1+/.forward to=/chronos/#1/testun+,
2018     testun #1'/.forward to=/chronos/#1/testun',
2019     testun #1/.forward to=/chronos/#1/testun,

2020     #2 connection+/.forward to=/chronos/#1/cysylltiad+,
2021     #2 connection'/.forward to=/chronos/#1/cysylltiad',
2022     #2 connection/.forward to=/chronos/#1/cysylltiad,
2023     #2 chronos connector+/.forward to=/chronos/#1/cysylltwr chronos+,
2024     #2 chronos connector'/.forward to=/chronos/#1/cysylltwr chronos',
2025     #2 chronos connector/.forward to=/chronos/#1/cysylltwr chronos,
2026     #2 text tag connector+/.forward to=/chronos/#1/cysylltwr testun+,
2027     #2 text tag connector'/.forward to=/chronos/#1/cysylltwr testun',
2028     #2 text tag connector/.forward to=/chronos/#1/cysylltwr testun,
2029     #2 main text tag connector+/.forward to=/chronos/#1/prif gysylltwr testun+,
2030     #2 main text tag connector'/.forward to=/chronos/#1/prif gysylltwr testun',
2031     #2 main text tag connector/.forward to=/chronos/#1/prif gysylltwr testun,
2032     #2 line+/.forward to=/chronos/#1/llinell+,
2033     #2 line'/.forward to=/chronos/#1/llinell',
2034     #2 line/.forward to=/chronos/#1/llinell,
2035     #2 text tag+/.forward to=/chronos/#1/testun+,
2036     #2 text tag'/.forward to=/chronos/#1/testun',
2037     #2 text tag/.forward to=/chronos/#1/testun,

2038     /chronos/#2/.chronos search=#1,
2039     /chronos/#1/.chronos search=#2,% heb bwrpas | pointless
2040     /chronos/#1/.code={\pgfqkeys{/chronos/#1}{##1}},
2041     /chronos/#2/.forward to=/chronos/#1,
2042     }%
2043 },

2044 /handlers/.chronos tag dyddiadau init/.code args={#1:#2:#3:#4:#5:#6:#7:#8:#9}{% e.g.
    /chronos/byw/.chronos tag dyddiadau init=byw:geni:marw:bu farw:bufarw:geni:marw:birth:death

```

for elements belonging to tags of types which span more than one date e.g. life, period. we need 3 date formats (possibly all the same). the first is for the begin date when both dates belong to the same era. the second is for the begin date when the eras differ. the third is for the end date (regardless).

```

2045     \pgfkeys{\pgfkeyscurrentpath/.cd,
2046     dyddiadau/.code args={##1:##2}{%~^A angen y llinell nesaf am y saesneg yn unig
2047     \pgfqkeys{/chronos/#1}{#2=##1}%~^A needed only for the english ?? (why?)
2048     \edef\tempa{##2}\edef\tempb{}}%
2049     \ifx\tempa\tempb
2050     \else
2051     \pgfqkeys{/chronos/#1}{#3=##2}%
2052     \fi
2053     },
2054     #4/.is if=chronos@#5,

```

paid â cheisio ddefnyddio macros yn lle allweddau yn y fan hon

don't try to use macros instead of keys here

```

2055 #2/.style={/chronos/set date aux/.expanded={##1-01-01-0@#6}},
2056 #3/.style={/chronos/set date aux/.expanded={##1-12-31-0@#7},/chronos/#1/#4=true},
2057 #3={\year-\month-\day},
2058 label #2/.store in/.expand once=\csname chronos@#1@label#2\endcsname,
2059 label #3/.store in/.expand once=\csname chronos@#1@label#3\endcsname,
2060 fformatiau dyddiadau/.style args={##1:##2:##3}{%
2061 /chronos/#1/fformat #2 yr un gyfnod={##1},
2062 /chronos/#1/fformat #2 cyfnodau gwahanol={##2},
2063 /chronos/#1/fformat #3={##3},
2064 },
2065 fformatiau dyddiadau/.chronos track={@#1@fformatiau@dyddiadau,@#1@cyfnodau,@#1@llawn},
2066 fformat #2 yr un gyfnod/.code={%
2067 \expandafter\def\csname chronos@#1@fformat#2@cyfnod\endcsname{##1}%
2068 \chronos@ychwanegu@nodweddion{#1}{@tag}{/chronos/#1/fformat #2 yr un gyfnod={##1}}%
2069 },
2070 fformat #2 cyfnodau gwahanol/.code={%
2071 \expandafter\def\csname chronos@#1@fformat#2@cyfnodau\endcsname{##1}%
2072 \chronos@ychwanegu@nodweddion{#1}{@tag}{%
2073 /chronos/#1/fformat #2 cyfnodau gwahanol={##1}}%
2074 },
2075 fformat #2/.forward to=/chronos/#1/fformat #2 yr un gyfnod,
2076 fformat #2/.forward to=/chronos/#1/fformat #2 cyfnodau gwahanol,
2077 fformat #3/.code={%
2078 \expandafter\def\csname chronos@#1@fformat#3\endcsname{##1}%
2079 \chronos@ychwanegu@nodweddion{#1}{@tag}{/chronos/#1/fformat #3={##1}}%
2080 },
2081 fformat #2 yr un gyfnod/.chronos track={%
2082 @#1@fformatiau@dyddiadau,@#1@cyfnodau,@#1@llawn},
2083 fformat #2 cyfnodau gwahanol/.chronos track={%
2084 @#1@fformatiau@dyddiadau,@#1@cyfnodau,@#1@llawn},
2085 fformat #2/.chronos track={%
2086 @#1@fformatiau@dyddiadau,@#1@cyfnodau,@#1@llawn},
2087 fformat #3/.chronos track={%
2088 @#1@fformatiau@dyddiadau,@#1@cyfnodau,@#1@llawn},
2089 dangos cyfnodau/@blynyddoedd yn unig/.code={%^A show eras + only years formats
2090 \expandafter\def\csname chronos@#1@fformat#2@cyfnod\endcsname{!Y}%
2091 \expandafter\def\csname chronos@#1@fformat#2@cyfnodau\endcsname{%
2092 !Y\thinspace !E}%
2093 \expandafter\def\csname chronos@#1@fformat#3\endcsname{!Y\thinspace !E}%
2094 },
2095 dangos cyfnodau/@llawn/.code={% show eras + full dates formats
2096 \expandafter\def\csname chronos@#1@fformat#2@cyfnod\endcsname{!d!/m!/Y}%
2097 \expandafter\def\csname chronos@#1@fformat#2@cyfnodau\endcsname{%
2098 !d!/m!/Y\thinspace !E}%
2099 \expandafter\def\csname chronos@#1@fformat#3\endcsname{%
2100 !d!/m!/Y\thinspace !E}%
2101 },
2102 dangos cyfnodau/@llawn/.code n args=3{%^A show eras + full dates set formats
2103 \pgfqkeys{/chronos/#1/dangos cyfnodau}{%
2104 @llawn/.code={%
2105 \expandafter\def\csname chronos@#1@fformat#2@cyfnod\endcsname{##1}%
2106 \expandafter\def\csname chronos@#1@fformat#2@cyfnodau\endcsname{##2}%
2107 \expandafter\def\csname chronos@#1@fformat#3\endcsname{##3}%
2108 }%
2109 }%
2110 },
2111 dangos cyfnodau/@blynyddoedd yn unig/.code n args=3{%^A show eras + only years set
formats
2112 \pgfqkeys{/chronos/#1/dangos cyfnodau}{%

```

```

2113         @blynyddoedd yn unig/.code={%
2114             \expandafter\def\csname chronos@#1@fformat#2@cyfnod\endcsname{##1}%
2115             \expandafter\def\csname chronos@#1@fformat#2@cyfnodau\endcsname{##2}%
2116             \expandafter\def\csname chronos@#1@fformat#3\endcsname{##3}%
2117         }%
2118     }%
2119 },
2120 heb gyfnodau/@blynyddoedd yn unig/.code={%^^A w/o eras + only years formats
2121     \expandafter\def\csname chronos@#1@fformat#2@cyfnod\endcsname{!Y}%
2122     \expandafter\def\csname chronos@#1@fformat#2@cyfnodau\endcsname{!Y}%
2123     \expandafter\def\csname chronos@#1@fformat#3\endcsname{!Y}%
2124 },
2125 heb gyfnodau/@llawn/.code={%^^A w/o eras + full dates formats
2126     \expandafter\def\csname chronos@#1@fformat#2@cyfnod\endcsname{!d/!m/!Y}%
2127     \expandafter\def\csname chronos@#1@fformat#2@cyfnodau\endcsname{!d/!m/!Y}%
2128     \expandafter\def\csname chronos@#1@fformat#3\endcsname{!d/!m/!Y}%
2129 },
2130 heb gyfnodau/@llawn/.code n args=3{%^^A w/o eras + full dates set formats
2131     \pgfqkeys{/chronos/#1/heb gyfnodau}{%
2132         @llawn/.code={%
2133             \expandafter\def\csname chronos@#1@fformat#2@cyfnod\endcsname{##1}%
2134             \expandafter\def\csname chronos@#1@fformat#2@cyfnodau\endcsname{##2}%
2135             \expandafter\def\csname chronos@#1@fformat#3\endcsname{##3}%
2136         }%
2137     }%
2138 },
2139 heb gyfnodau/@blynyddoedd yn unig/.code n args=3{%^^A w/o eras + only years set formats
2140     \pgfqkeys{/chronos/#1/heb gyfnodau}{%
2141         @blynyddoedd yn unig/.code={%
2142             \expandafter\def\csname chronos@#1@fformat#2@cyfnod\endcsname{##1}%
2143             \expandafter\def\csname chronos@#1@fformat#2@cyfnodau\endcsname{##2}%
2144             \expandafter\def\csname chronos@#1@fformat#3\endcsname{##3}%
2145         }%
2146     }%
2147 },

```

english translations below

```

2148     blynyddoedd yn unig/.code={%
2149         \chronos@ychwanegu@nodweddion{#1}{@tag}{/chronos/blynyddoedd yn unig}},
2150     dyddiadau llawn/.code={%
2151         \chronos@ychwanegu@nodweddion{#1}{@tag}{/chronos/dyddiadau llawn}},
2152     dangos cyfnodau/.code={%
2153         \chronos@ychwanegu@nodweddion{#1}{@tag}{/chronos/dangos cyfnodau}},
2154     heb gyfnodau/.code={%
2155         \chronos@ychwanegu@nodweddion{#1}{@tag}{/chronos/heb gyfnodau}},
2156     dangos cyfnodau/.chronos track={@#1@cyfnodau},
2157     dyddiadau llawn/.chronos track={@#1@llawn},
2158     heb gyfnodau/.chronos track={@#1@cyfnodau},
2159     blynyddoedd yn unig/.chronos track={@#1@llawn},
2160     ffont dyddiad/.code={%
2161         \expandafter\def\csname chronos@#1@ffontdyddiad\endcsname{##1}},
2162     ffont dyddiad=,

2163     dates/.forward to=/chronos/#1/dyddiadau,
2164     #8/.forward to=/chronos/#1/#2,
2165     #9/.forward to=/chronos/#1/#3,
2166     date formats/.forward to=/chronos/#1/fformatiau dyddiadau,
2167     #8 format/.forward to=/chronos/#1/fformat #2,
2168     same era #8 format/.forward to=/chronos/#1/fformat #2 yr un gyfnod,
2169     different eras #8 format/.forward to=/chronos/#1/fformat #2 cyfnodau gwahanol,
2170     #9 format/.forward to=/chronos/#1/fformat #3,

```



```

2171     show eras/full/.forward to=/chronos/#1/dangos cyfnodau/llawn,
2172     show eras/only years/.forward to=/chronos/#1/dangos cyfnodau/blynyddoedd yn unig,
2173     without eras/full/.forward to=/chronos/#1/heb gyfnodau/llawn,
2174     without eras/only years/.forward to=/chronos/#1/heb gyfnodau/blynyddoedd yn unig,
2175     #8 label/.forward to=/chronos/#1/label #2,
2176     #9 label/.forward to=/chronos/#1/label #3,
2177     only years/.forward to=/chronos/#1/blynyddoedd yn unig,
2178     full dates/.forward to=/chronos/#1/dyddiadau llawn,
2179     without eras/.forward to=/chronos/#1/heb gyfnodau,
2180     show eras/.forward to=/chronos/#1/dangos cyfnodau,
2181     date font/.forward to=/chronos/#1/ffont dyddiad,

2182     }%
2183 },

2184 /handlers/.chronos key maker/.code n args=3{%
2185     \chronos@keymaker{#1}{#2}{#3}%
2186 },

2187 chronos/.code={\PackageError{chronos}{%
2188     The key chronos is deprecated.\MessageBreak
2189     Use the environment chronos instead.}},

2190 byw/.code={\chronos@cyd@destun@init+{byw}{#1}},
2191 byw/.default={},

2192 digwyddiad/.code={\chronos@cyd@destun@init+{digwyddiad}{#1}},
2193 digwyddiad/.default={},

2194 parhad/.code={\chronos@cyd@destun@init+{parhad}{#1}},
2195 parhad/.default={},

2196 theori/.code={\chronos@cyd@destun@init{theori}{#1}\chronos@tag@cysylltufalse},
2197 theori/.default={},

2198 cylch theori/.code={%
2199     \chronos@cyd@destun@init[theori/cylchau]{theori}{#1}%
2200     \chronos@tag@cysylltufalse},
2201 cylch theori/.default={},

2202 gwybodaeth/.code={%
2203     \chronos@cyd@destun@init{gwybodaeth}{#1}\chronos@tag@cysylltufalse},
2204 gwybodaeth/.default={},

2205 prif/.code={\chronos@cyd@destun@init*{prif}{#1}},
2206 prif/.default={},

2207 hawlfraint/.code={\chronos@cyd@destun@init*{hawlfraint}{#1}},
2208 hawlfraint/.default={},

2209 life/.forward to=/tikz/byw,
2210 event/.forward to=/tikz/digwyddiad,
2211 period/.forward to=/tikz/parhad,
2212 theory/.forward to=/tikz/theori,
2213 theory circle/.forward to=/tikz/cylch theori,
2214 main/.forward to=/tikz/prif,
2215 copyright/.forward to=/tikz/hawlfraint,
2216 copyleft/.forward to=/tikz/hawlfraint,

2217 chronos connect/.style args={#1:#2}{#1,/chronos/@cysylltiad=lliw #2},
2218 chronos create chronos connector/.style args={#1:#2}{%
2219     #1,/chronos/@cysylltwr@chronos=lliw #2},
2220 chronos create text tag connector/.style args={#1:#2}{%
2221     #1,/chronos/@cysylltwr@testun=lliw #2},
2222 chronos mark line/.style args={#1:#2}{#1,/chronos/@llinell=lliw #2},

```

```

2223 chronos text tag/.style args={#1:#2}{#1,/chronos/@testun=lliw #2},
2224 chronos tikz'/.code={\pgfkeysdef{/chronos/@tikz}{#1}},
2225 chronos tikz+/.code={\pgfkeys{/chronos}{@tikz/.append code={#1}}},
2226 chronos tikz/.forward to=/chronos tikz+,
2227 chronos tikz outside bb'/.code={\pgfkeysdef{/chronos/@@tikz}{#1}},
2228 chronos tikz outside bb+/.code={\pgfkeys{/chronos}{@@tikz/.append code={#1}}},
2229 chronos tikz outside bb/.forward to=/chronos tikz outside bb+,

2230 /chronos/.search also={/chronos/l1nell amser,/tikz,/pgf},
2231 /chronos/l1nell amser/.search also={/chronos,/tikz,/pgf},
2232 /chronos/byw/.search also={/chronos,/tikz,/pgf},
2233 /chronos/digwyddiad/.search also={/chronos,/tikz,/pgf},
2234 /chronos/parhad/.search also={/chronos,/tikz,/pgf},
2235 /chronos/theori/.search also={/chronos,/tikz,/pgf},
2236 /chronos/theori/cylchau/.search also={/chronos/theori,/chronos,/tikz,/pgf},

2237 /chronos/.cd,
2238 @before@headings/.code={},
2239 before headings+/.code={\pgfkeys{/chronos}{@before@headings/.append code={#1}}},
2240 before headings'/.code={\pgfkeys{/chronos}{@before@headings/.code={#1}}},
2241 before headings/.forward to=/chronos/before headings+,
2242 @before@frame/.code={},
2243 before drawing frame+/.code={%
2244   \pgfkeys{/chronos}{@before@frame/.append code={#1}}},
2245 before drawing frame'/.code={\pgfkeys{/chronos}{@before@frame/.code={#1}}},
2246 before drawing frame/.forward to=/chronos/before drawing frame+,
2247 tikz'/.forward to=/tikz/chronos tikz',
2248 tikz+/.forward to=/tikz/chronos tikz+,
2249 tikz/.forward to=/tikz/chronos tikz,
2250 tikz outside bb'/.forward to=/tikz/chronos tikz outside bb',
2251 tikz outside bb+/.forward to=/tikz/chronos tikz outside bb+,
2252 tikz outside bb/.forward to=/tikz/chronos tikz outside bb,

@tikz is for standard ; @@tikz ignores bb ; for both user code and chronos

2253 @tikz/.style={},
2254 @@tikz/.style={},

@timeline@config is for indirect user code or overwritable chronos ; @@ is reserved for chronos

2255 @timeline@config/.code={},
2256 @@timeline@config/.code={%
2257   \chronos@if@gosodF {@byw@cyfnodau}
2258     {\pgfkeys{/chronos/byw}{dangos cyfnodau}}%
2259   \chronos@if@gosodF {@parhad@cyfnodau}
2260     {\pgfkeys{/chronos/parhad}{dangos cyfnodau}}%
2261   \chronos@if@gosodF {@digwyddiad@cyfnodau}
2262     {\pgfkeys{/chronos/digwyddiad}{dangos cyfnodau}}%
2263   \chronos@if@gosodF {@byw@llawn}
2264     {\pgfkeys{/chronos/byw}{blynyddoedd yn unig}}%
2265   \chronos@if@gosodF {@parhad@llawn}
2266     {\pgfkeys{/chronos/parhad}{blynyddoedd yn unig}}%
2267   \chronos@if@gosodF {@digwyddiad@llawn}
2268     {\pgfkeys{/chronos/digwyddiad}{dyddiadau llawn}}%
2269   \chronos@if@gosodF{timeline@years}
2270     {\pgfkeys{/chronos/l1nell amser}{blynyddoedd=ar y l1nell}}%
2271   \ifchronos@yearsonline
2272     \chronos@ychwanegu@nodweddion@rhestr^{byw,parhad}{@l1nell}%
2273     {fill=####1,fill opacity=.25,draw=none}%
2274     \chronos@ychwanegu@nodweddion@rhestr^{digwyddiad}{@l1nell}%
2275     {draw=####1,fill=none,opacity=.25}%
2276   \else
2277     \chronos@ychwanegu@nodweddion@rhestr^{byw,parhad}{@l1nell}%

```

```

2278     {draw=####1,thick,fill opacity=.75}%
2279     \chronos@ychwanegu@nodweddion@rhestr^{digwyddiad}{@llinell}%
2280     {draw=####1,draw opacity=.75,fill=None}%
2281     \fi

efallai bod yn anghywir tan inni ailosod yn hwyrach!! | maybe wrong until we reset later!!

2282     \let\timelineht\chronos@height
2283     },
2284     @style/.style={},
2285     @@timeline@config@diwedd/.style={},
2286     @@timeline@config@dechrau/.style={},
2287     chronos tweak/.code={\pgfqkeys{/chronos}{@style/.append style={#1}}},
2288     chronos opacity/.code={%
2289     \ifchronos@preset\chronos@temptrue\else\chronos@tempfalse\fi
2290     \chronos@presettrue
2291     \pgfqkeys{/chronos}{%
2292     @style/.append style={transparency group,opacity=#1},
2293     every cysylltiadau+={opacity=#1},
2294     every cysylltwyr chronos+={opacity=#1},
2295     /chronos/prif/@frame/.append style={opacity=#1},
2296     /chronos/llinell amser/.cd,
2297     llinell+={draw opacity=#1,fill opacity=#1},
2298     timeline@bare@mark@on@line/.append style={opacity=#1},
2299     timeline@minor@mark@on@line/.append style={opacity=#1},
2300     timeline@mark@on@line/.append style={opacity=#1},
2301     timeline@bare@mark@off@line/.append style={opacity=#1},
2302     timeline@minor@mark@off@line/.append style={opacity=#1},
2303     timeline@mark@off@line/.append style={opacity=#1},
2304     timeline@year@on@line/.append style={opacity=#1},
2305     timeline@year@ff@line/.append style={opacity=#1},
2306     border+={opacity=#1}}%
2307     \ifchronos@temp\chronos@presettrue\else\chronos@presetfalse\fi
2308     },

2309     set date aux/.code={% paid â geisio dorri hwn - mae'n torri pethau'n ddrwg ond *dim
                ond yn nifer bach o achosion felly rhy hawdd i feddwl bod popeth yn iawn ...
2310     \chronos@set@date@aux{#1}%
2311     },

2312     headings+/.code={%
2313     \chronos@headingstrue
2314     \chronos@to@clist+{headings}{#1}%
2315     },
2316     heading+/.code n args=3{% name/content; start ; end
2317     \chronos@headingstrue
2318     \chronos@to@clist+{headings}{#1/#2/#3}%
2319     },
2320     subheading+/.code n args=4{% name/content; start ; end; pos
2321     \chronos@headingstrue
2322     \chronos@to@clist+{subheadings}{#1/#2/#3/#4}%
2323     },
2324     subheadings+/.code={% name/content; start ; end; pos
2325     \chronos@headingstrue
2326     \chronos@to@clist+{subheadings}{#1}%
2327     },
2328     heading'/.code n args=3{%
2329     \chronos@headingstrue
2330     \chronos@to@clist{headings}{#1/#2/#3}%
2331     },
2332     headings'/.code={%
2333     \chronos@headingstrue

```

```

2334   \chronos@to@clist{headings}{#1}%
2335 },
2336 subheading'/.code n args=4{%
2337   \chronos@headingstrue
2338   \chronos@to@clist{subheadings}{#1/#2/#3/#4}%
2339 },
2340 subheadings'/.code={%
2341   \chronos@headingstrue
2342   \chronos@to@clist{subheadings}{#1}%
2343 },
2344 century subheading+/.code 2 args={% name/content; start ; end; pos
2345   \chronos@headingstrue
2346   \chronos@global@to@clist+{century_subheadings}{#1/#2}%
2347 },
2348 century subheadings+/.code 2 args={% name/content; start ; end; pos
2349   \chronos@headingstrue
2350   \foreach \i in {#1} {\chronos@global@to@clist+{century_subheadings}{\i/#2}}%
2351 },
2352 century subheading'/.code 2 args={% name/content; start ; end; pos
2353   \chronos@headingstrue
2354   \chronos@global@to@clist{century_subheadings}{#1/#2}%
2355 },
2356 century subheadings'/.code 2 args={% name/content; start ; end; pos
2357   \chronos@headingstrue
2358   \chronos@global@clear@to@clist{century_subheadings}%
2359   \foreach \i in {#1} {\chronos@global@to@clist{century_subheadings}{\i/#2}}%
2360 },
2361 heading/.forward to=/chronos/heading+,
2362 headings/.forward to=/chronos/headings+,
2363 subheading/.forward to=/chronos/subheading+,
2364 subheadings/.forward to=/chronos/subheadings+,
2365 century subheading/.forward to=/chronos/century subheading+,
2366 century subheadings/.forward to=/chronos/century subheadings+,
2367 subheadings drops/.chronos 2 dimens={\chronos@subheading@drop@uchod}%
2368   {\chronos@subheading@drop@isod},
2369 heading drop/.chronos dimen=\chronos@heading@drop,
2370 headings drops'/.code args={#1:#2:#3}{%
2371   \chronos@heading@drop=#1
2372   \chronos@subheading@drop@uchod=#2
2373   \chronos@subheading@drop@isod=#3%
2374 },
2375 headings drops'+/.code args={#1:#2:#3}{%
2376   \advance \chronos@heading@drop by #1
2377   \advance \chronos@subheading@drop@uchod by #2
2378   \advance\chronos@subheading@drop@isod by #3%
2379 },
2380 headings drops'-/.code args={#1:#2:#3}{%
2381   \advance \chronos@heading@drop by -#1
2382   \advance \chronos@subheading@drop@uchod by -#2
2383   \advance\chronos@subheading@drop@isod by -#3%
2384 },
2385 headings drops'=0pt:0pt:0pt,
2386 chronos coords'/.code={\chronos@to@clist{dyddiadau_coords}{#1}},
2387 chronos coords+/.code={\chronos@to@clist+{dyddiadau_coords}{#1}},
2388 chronos coords/.forward to=/chronos/chronos coords+,
2389 frame/.is if=chronos@frame,
2390 frame/.default=true,
2391 frame uses bb/.is if=chronos@framedefnyddiobb,
2392 frame/.default=true,
2393 }

```

2394 \ExplSyntaxOn

set up every byw, every byw', every byw+, every life, every life', every life+ etc.; #3 gives default (' or +)

```
2395 \__chronos_kexpandtotags:nnm { byw } { life } { + }
2396 \__chronos_kexpandtotags:nnm { digwyddiad } { event } { + }
2397 \__chronos_kexpandtotags:nnm { parhad } { period } { + }
2398 \__chronos_kexpandtotags:nnm { theori } { theory } { + }
2399 \__chronos_kexpandtotags:nnm { gwybodaeth } { info } { + }
```

like kexpander but without every keys

```
2400 \__chronos_kextripler:nnnnn { every ~ cylch ~ cylch ~ theori }
2401 { every ~ theory ~ circle ~ text } { every@cylch ~ cylch ~ theori } { + }
2402 { style }
2403 \__chronos_kextripler:nnnnn { every ~ testun ~ cylch ~ theori }
2404 { every ~ theory ~ circle ~ circle } { every@testun ~ cylch ~ theori }
2405 { + } { style }
2406 \__chronos_kextripler:nnnnn { llinell ~ amser / llinell } { timeline ~ line }
2407 { llinell ~ amser / timeline@line } { ' } { style }
2408 \__chronos_kextripler:nnnnn { llinell ~ amser / border } { timeline ~ border }
2409 { llinell ~ amser / timeline@border } { ' } { style }
2410 \__chronos_kextripler:nnnnn { prif / teitl } { prif / title } { prif / @teitl }
2411 { ' } { style }
2412 \__chronos_kextripler:nnnnn { amserau } { subheadings ~ style } { @amserau }
2413 { ' } { style }
2414 \__chronos_kextripler:nnnnn { amseraumawr } { headings ~ style }
2415 { @amseraumawr } { ' } { style }
2416 \__chronos_kextripler:nnnnn { hawlfraint } { copyright } { @hawlfraint }
2417 { ' } { style }
2418 \__chronos_kextripler:nnnnn { hawlfraint } { copyright } { @hawlfraint } { ' }
2419 { style }
2420 \__chronos_kexforwardtriple:nn { hawlfraint } { copyleft }
2421 \__chronos_kextripler:nnnn { timeline ~ config } { @timeline@config } { + } { code }
2422 \__chronos_kextripler:nnnn { gwybodaeth / label } { gwybodaeth / @label } { ' }
2423 { style }
2424 \__chronos_kextripler:nnnn { prif / frame } { prif / @frame } { ' } { style }
2425 \__chronos_kextripler:nnnn { theori / cylchau / label }
2426 { theori / cylchau / @label } { ' } { style }
2427 \ExplSyntaxOff
2428 \pgfqkeys{/chronos}{%

2429 every@cylch cylch theori/.style={%
2430 fill=chronos@prifliw, draw=chronos@prifliw, even odd rule},
2431 every@testun cylch theori/.style={%
2432 decoration={text effects along path, text={#1}, text effects/.cd,%
2433 fit text to path, text=chronos@prifliw@cefndir,%
2434 characters={text along path, font=\scriptsize\scshape}}, decorate},
2435 every byw isod/.code={%
2436 \chronos@every@byw@isodtrue
2437 \chronos@every@byw@uchodfalse
2438 \chronos@byw@isodtrue
2439 },
2440 every digwyddiad isod/.code={%
2441 \chronos@every@digwyddiad@isodtrue
2442 \chronos@every@digwyddiad@uchodfalse
2443 \chronos@digwyddiad@isodtrue
2444 },
2445 every parhad isod/.code={%
2446 \chronos@every@parhad@isodtrue
2447 \chronos@every@parhad@uchodfalse
2448 \chronos@parhad@isodtrue
```

```

2449 },
2450 every byw uchod/.code={%
2451   \chronos@every@byw@uchodtrue
2452   \chronos@every@byw@isodfalse
2453   \chronos@byw@isodfalse
2454 },
2455 every digwyddiad uchod/.code={%
2456   \chronos@every@digwyddiad@uchodtrue
2457   \chronos@every@digwyddiad@isodfalse
2458   \chronos@digwyddiad@isodfalse
2459 },
2460 every parhad uchod/.code={%
2461   \chronos@every@parhad@uchodtrue
2462   \chronos@every@parhad@isodfalse
2463   \chronos@parhad@isodfalse
2464 },

2465 every life below/.forward to=/chronos/every byw isod,
2466 every period below/.forward to=/chronos/every parhad isod,
2467 every event below/.forward to=/chronos/every digwyddiad isod,
2468 every life above/.forward to=/chronos/every byw uchod,
2469 every period above/.forward to=/chronos/every parhad uchod,
2470 every event above/.forward to=/chronos/every digwyddiad uchod,

2471 }
2472 \tikzset{%

2473 /chronos/llynell amser/.code={\pgfqkeys{/chronos/llynell amser}{#1}},
2474 /chronos/timeline/.forward to=/chronos/llynell amser,
2475 /chronos/timeline.chronos search=llynell amser,
2476 /chronos/llynell amser/.cd,
2477 timeline arrow/.is if=chronostimelinearrow,
2478 timeline arrow/.default=true,
2479 no timeline arrow/.code={\chronostimelinearrowfalse},
2480 timeline@arrow/.style={},
2481 no@timeline@arrow/.style={},
2482 do timeline arrow/.code={},
2483 conditional timeline arrow/.code 2 args={%
2484   \pgfqkeys{/chronos}{%
2485     llynell amser/.cd,
2486     timeline@arrow/.style={/chronos/.cd,#1},
2487     no@timeline@arrow/.style={/chronos/.cd,#2},
2488     do timeline arrow/.add code={%
2489       \ifchronostimelinearrow
2490         \tikzset{/chronos/llynell amser/timeline@arrow}%
2491       \else
2492         \tikzset{/chronos/llynell amser/no@timeline@arrow}%
2493       \fi
2494     },
2495   }%
2496 },

2497 ffont camau mawr/.store in=\chronos@ffont@camaumawr,
2498 ffont camau bach/.store in=\chronos@ffont@camaubach,
2499 ffont cyfnodau/.store in=\chronos@ffont@cyfnodau,
2500 ffont/.forward to=/chronos/llynell amser/ffont cyfnodau,
2501 ffont/.forward to=/chronos/llynell amser/ffont camau bach,
2502 ffont/.forward to=/chronos/llynell amser/ffont camau mawr,

2503 major step font/.forward to=/chronos/llynell amser/ffont camau mawr,
2504 minor step font/.forward to=/chronos/llynell amser/ffont camau bach,
2505 eras font/.forward to=/chronos/llynell amser/ffont cyfnodau,
2506 timeline font/.forward to=/chronos/llynell amser/ffont,

```

```

2507 border ar/.chronos layer choice=border,
2508 border ar=background,
2509 llinell amser ar/.chronos layer choice=llinell amser,
2510 llinell amser ar=foreground,

2511 border on/.forward to=/chronos/llinell amser/border ar,
2512 timeline on/.forward to=/chronos/llinell amser/llinell amser ar,

2513 dyddiad diwedd/.style={%
2514   /chronos/@@timeline@config@diwedd/.code={%
2515     \pgfqkeys{/chronos}{set date aux/.expanded={#1-12-31-0@end}}%
2516   },
2517 },
2518 dyddiad dechrau/.style={%
2519   /chronos/@@timeline@config@dechrau/.code={%
2520     \pgfqkeys{/chronos}{set date aux/.expanded={#1-01-01-0@start}}%
2521   },
2522 },
2523 dyddiadau/.code args={#1:#2}{%^A angen y llinell nesaf am y saesneg yn unig <= ???!!
2524   \pgfqkeys{/chronos/llinell amser}{dyddiad dechrau=#1,dyddiad diwedd=#2}%
2525 },

2526 cam blwyddyn fawr/.store in=\chronos@cam@blwyddyn@fawr, %^A oedd cam mawr
2527 cam blwyddyn fach/.store in=\chronos@cam@blwyddyn@fach, %^A oedd cam bach
2528 rhaniadau cam/.store in=\chronos@camrhaniadau,%^A cam rhaniadau %^A oedd camau bach
  / \chronos@minorsteps
2529 camu o flwyddyn/.store in=\chronos@stepfrom,
2530 cam blwyddyn/.code={%
2531   \pgfqkeys{/chronos/llinell amser}{cam blwyddyn fawr=#1}%
2532   \Undefined\chronos@cam@blwyddyn@fach
2533 },

2534 lliw mewnlol y border/.chronos lliw=borderinner,
2535 timeline border inner colour/.forward to=/chronos/llinell amser/lliw mewnlol y border,
2536 timeline border inner color/.forward to=/chronos/llinell amser/lliw mewnlol y border,
2537 lliw allanol y border/.chronos lliw=borderouter,
2538 timeline border outer colour/.forward to=/chronos/llinell amser/lliw allanol y border,
2539 timeline border outer color/.forward to=/chronos/llinell amser/lliw allanol y border,
2540 lliw canol y border/.chronos lliw=bordermiddle,
2541 timeline border middle colour/.forward to=/chronos/llinell amser/lliw canol y border,
2542 timeline border middle color/.forward to=/chronos/llinell amser/lliw canol y border,
2543 cefndir/.chronos lliw=lliw@cefndir@llinell,
2544 blaendir/.chronos lliw=lliw@llinell,
2545 timeline background/.forward to=/chronos/llinell amser/cefndir,
2546 timeline foreground/.forward to=/chronos/llinell amser/blaendir,
2547 background/.forward to=/chronos/llinell amser/cefndir,
2548 foreground/.forward to=/chronos/llinell amser/blaendir,

2549 nodi cyfnodau/.is if=chronos@markeras,% cyfnodau ar y llinell amser
2550 @nodi cyfnodau/.code={\chronos@ychwanegu@gosod{markeras}},
2551 nodi cyfnodau/.forward to=/chronos/llinell amser/@nodi cyfnodau,
2552 timeline mark eras/.forward to=/chronos/llinell amser/nodi cyfnodau,
2553 mark eras/.forward to=/chronos/llinell amser/nodi cyfnodau,
2554 timeline years set/.store in=\chronos@timelinyears,
2555 blynyddoedd/.is choice,
2556 timeline years/.forward to=/chronos/llinell amser/blynyddoedd,

2557 blynyddoedd/.forward to=/chronos/llinell amser/timeline years set,
2558 blynyddoedd/dim/.code={%
2559   \chronos@timeline@showyearsfalse
2560   \chronos@blynyddoedduchodfalse
2561   \chronos@blynyddoedddisodfalse
2562   \pgfqkeys{/chronos/llinell amser}{%

```

```

2563     timeline@years/.style={},
2564     angor blynyddoedd=base,
2565     }%
2566 },% oedd /chronos/llinell amser/heb flynyddoedd
2567 blynyddoedd/none/.forward to=/chronos/llinell amser/blynyddoedd/dim,%^A oedd /chronos/tim
no years
2568 blynyddoedd/uchod/.code={%
2569     \chronos@yearsonlinefalse
2570     \chronos@blynyddoedduchodtrue
2571     \chronos@blynyddoeddisodfalse
2572     \pgfqkeys{/chronos/llinell amser}{%
2573         timeline@years/.style={%
2574             above, anchor=\chronos@timelineyearsanchor, yshift=.5*\chronos@height},
2575             angor blynyddoedd=south,
2576         }%
2577 },
2578 blynyddoedd/above/.forward to=/chronos/llinell amser/blynyddoedd/uchod,
2579 blynyddoedd/isod/.code={%
2580     \chronos@yearsonlinefalse
2581     \chronos@blynyddoedduchodfalse
2582     \chronos@blynyddoeddisodtrue
2583     \pgfqkeys{/chronos/llinell amser}{%
2584         timeline@years/.style={%
2585             below, anchor=\chronos@timelineyearsanchor, yshift=-.5*\chronos@height},
2586             angor blynyddoedd=north,
2587         }%
2588 },
2589 blynyddoedd/below/.forward to=/chronos/llinell amser/blynyddoedd/isod,
2590 blynyddoedd/ar y llinell/.code={%
2591     \chronos@yearsonlinetrue
2592     \chronos@blynyddoedduchodfalse
2593     \chronos@blynyddoeddisodfalse
2594     \pgfqkeys{/chronos/llinell amser}{%
2595         timeline@years/.style={anchor=\chronos@timelineyearsanchor},
2596         angor blynyddoedd=center,
2597     }%
2598 },
2599 blynyddoedd/on line/.forward to=/chronos/llinell amser/blynyddoedd/ar y llinell,
2600 blynyddoedd/off line/.code={%
2601     \IfBooleanExprTF {%
2602         ! ( \LegacyBoolean {chronos@blynyddoedduchod} %
2603         || \LegacyBoolean {chronos@blynyddoeddisod} )
2604     }{%
2605         \pgfqkeys{/chronos/llinell amser}{blynyddoedd=uchod}%
2606     }{%
2607         \chronos@yearsonlinefalse
2608     }%
2609 },
2610 blynyddoedd/.chronos track=timeline@years,
2611 angor blynyddoedd/.store in=\chronos@timelineyearsanchor,
2612 angor blynyddoedd/.chronos track={angor@blynyddoedd},
2613 timeline years anchor/.forward to=/chronos/llinell amser/angor blynyddoedd,
2614 blwyddyn sero/.is if=chronos@yearzero,
2615 year zero/.forward to=/chronos/llinell amser/blwyddyn sero,
2616 mark at era switch/.is if=chronos@markateraswitch,
2617 mark at era switch/.default=true,
2618 @mark at era switch/.code={\chronos@ychwanegu@gosod{markateraswitch}},
2619 mark at era switch/.forward to=/chronos/llinell amser/@mark at era switch,
2620 year at era switch/.code={%
2621     \chronos@legacy@if@set{chronos@temp}{#1}%
2622     \ifchronos@temp

```



```

2623     \chronos@markateraswitchfalse
2624     \else
2625     \chronos@markateraswitchtrue
2626     \fi
2627     \chronos@ychwanegu@gosod{markateraswitch}},
2628 year at era switch/.default=true,
2629 blynyddoedd bychain/.is if=chronos@minoryears,
2630 blynyddoedd bychain/.default=true,
2631 minor years/.forward to=/chronos/llynell amser/blynyddoedd bychain,
2632 nodau/.is if=chronos@marks,
2633 nodau/.default=true,
2634 timeline marks/.forward to=/chronos/llynell amser/nodau,
2635 nodau bach/.is if=chronos@marks@minor,
2636 nodau bach/.default=true,
2637 timeline minor marks/.forward to=/chronos/llynell amser/nodau bach,
2638 dangos blynyddoedd/.is if=chronos@timeline@showyears,
2639 dangos blynyddoedd/.default=true,
2640 timeline show years/.forward to=/chronos/llynell amser/dangos blynyddoedd,
2641 nodau noeth/.is if=chronos@marks@bare,
2642 nodau noeth/.default=true,
2643 nodau noeth/.chronos track={@bare},
2644 timeline bare marks/.forward to=/chronos/llynell amser/nodau noeth,
2645 timeline@year@off@line/.style={%
2646     text=chronos@lliw@llynell, text opacity=1, align=center, %
2647     fill opacity=.75, anchor=\chronos@timelineyearsanchor},
2648 timeline@mark@off@line/.style={draw=chronos@lliw@llynell,%
2649     {Triangle[width=Opt 3,reversed,length=Opt 1.5]}-, thin, shorten >=-2.5pt},
2650 timeline@minor@mark@off@line/.style={draw=chronos@lliw@llynell,%
2651     {Triangle[width=Opt 3,reversed,length=Opt 1.5]}-, very thin,%
2652     shorten >=-2.5pt},
2653 era switch off line/.style={thick, shorten >=Opt},
2654 timeline@bare@mark@off@line/.style={draw=chronos@lliw@llynell,%
2655     {Triangle[width=Opt 3,reversed,length=Opt 1.5]}-, very thin,%
2656     shorten >=-1.5pt},
2657 timeline@year@on@line/.style={text=chronos@lliw@llynell, anchor=center},
2658 timeline@mark@on@line/.style={draw=chronos@lliw@llynell},
2659 timeline@minor@mark@on@line/.style={draw=chronos@lliw@llynell, thin},
2660 timeline@bare@mark@on@line/.style={draw=chronos@lliw@llynell, thick},
2661 timeline mark@too/.code={%
2662     \pgfqkeys{/chronos/llynell amser}{%
2663         timeline@mark@on@line/.append style={#1},
2664         timeline@mark@off@line/.append style={#1},
2665     }%
2666 },
2667 timeline minor mark@too/.code={%
2668     \pgfqkeys{/chronos/llynell amser}{%
2669         timeline minor marks,
2670         timeline@minor@mark@on@line/.append style={#1},
2671         timeline@minor@mark@off@line/.append style={#1},
2672     }%
2673 },
2674 timeline bare mark@too/.code={%
2675     \pgfqkeys{/chronos/llynell amser}{%
2676         timeline bare marks,
2677         timeline@bare@mark@on@line/.append style={#1},
2678         timeline@bare@mark@off@line/.append style={#1},
2679     }%
2680 },
2681 timeline year@too/.code={%
2682     \pgfqkeys{/chronos/llynell amser}{%
2683         timeline@year@on@line/.append style={#1},

```

```

2684     timeline@year@off@line/.append style={#1},
2685     }%
2686 },

2687 }
2688 \ExplSyntaxOn

forward each key in #3 to the key in #2; all keys on /chronos/#1

2689 \__chronos_kexforwarder:nnn { llinell ~ amser } { timeline ~ mark@too }
2690 { timeline ~ mark, timeline ~ all ~ marks }
2691 \__chronos_kexforwarder:nnn { llinell ~ amser } { timeline ~ minor ~ mark@too }
2692 { timeline ~ minor ~ mark, timeline ~ all ~ marks }
2693 \__chronos_kexforwarder:nnn { llinell ~ amser } { timeline ~ bare ~ mark@too }
2694 { timeline ~ bare ~ mark, timeline ~ all ~ marks }
2695 \__chronos_kexforwarder:nnn { llinell ~ amser } { timeline ~ year@too }
2696 { timeline ~ year, timeline ~ all ~ marks }
2697 \__chronos_kexforwarder:nnn { llinell ~ amser } {dyddiadau } { dates }
2698 \__chronos_kexforwarder:nnn { llinell ~ amser } {dyddiad ~ dechrau }
2699 { dechrau, start ~ date, start }
2700 \__chronos_kexforwarder:nnn { llinell ~ amser } {dyddiad ~ diwedd }
2701 { diwedd, end ~ date, end }
2702 \__chronos_kexforwarder:nnn { llinell ~ amser } {cam ~ blwyddyn ~ fawr }
2703 { step ~ major ~ years, step ~ major ~ year, cam ~ blwyddyn ~ mawr }
2704 \__chronos_kexforwarder:nnn { llinell ~ amser } {cam ~ blwyddyn ~ fach }
2705 { cam ~ blynyddoedd ~ bach, step ~ minor ~ years, step ~ minor ~ year }
2706 \__chronos_kexforwarder:nnn { llinell ~ amser } {rhaniadau ~ cam }
2707 { step ~ divisions } %^A oedd camau bach, minor steps
2708 \__chronos_kexforwarder:nnn { llinell ~ amser } {cam ~ blwyddyn }
2709 { cam ~ blynyddoedd, step ~ years, step ~ year }
2710 \__chronos_kexforwarder:nnn { llinell ~ amser } {camu ~ o ~ flwyddyn }
2711 { step ~ from ~ year }
2712 \ExplSyntaxOff
2713 \pgfqkeys{/chronos}{%

2714 ce year label/.store in=\chronos@yearce,
2715 bce year label/.store in=\chronos@yearbce,
2716 timeline ce label/.store in=\chronos@ce,
2717 timeline bce label/.store in=\chronos@bce,

2718 cefndir/.chronos lliw=prifliw@cefndir,
2719 background/.forward to=/chronos/cefndir,
2720 blaendir/.chronos lliw=prifliw,
2721 foreground/.forward to=/chronos/blaendir,
2722 troi lliwiau/.code={%
2723   \chronos@ychwanegu@nodweddion@rhag{tag}{/chronos/troi lliwiau=#1}%
2724   \chronos@legacy@if@set{chronos@troilliwiau}{#1}%
2725 },
2726 troi lliwiau/.default=true,
2727 colour rotation/.forward to=/chronos/troi lliwiau,
2728 color rotation/.forward to=/chronos/troi lliwiau,
2729 heb droi lliwiau/.code={%
2730   \chronos@ychwanegu@nodweddion@rhag{tag}{/chronos/troi lliwiau=false}%
2731   \chronos@troilliwiaufalse
2732 },
2733 no colour rotation/.forward to=/chronos/heb droi lliwiau,
2734 no color rotation/.forward to=/chronos/heb droi lliwiau,
2735 troi pob liw/.style={/chronos/.cd, byw/troi lliwiau=true,%
2736   digwyddiad/troi lliwiau=true, parhad/troi lliwiau=true,%
2737   theori/troi lliwiau=true, troi lliwiau=true},
2738 rotate all colours/.forward to=/chronos/troi pob liw,
2739 rotate all colors/.forward to=/chronos/troi pob liw,
2740 troi dim lliwiau/.style={/chronos/.cd, byw/troi lliwiau=false,%

```

```

2741     digwyddiad/troi lliwiau=false, parhad/troi lliwiau=false,%
2742     theori/troi lliwiau=false, heb droi lliwiau},
2743     rotate no colours/.forward to=/chronos/troi dim lliwiau,
2744     rotate no colors/.forward to=/chronos/troi dim lliwiau,

2745     lefelau/.style args={#1:#2}{
2746 /chronos/uchod=#1,
2747 /chronos/isod=#2,
2748     },
2749     lefelau at/.store in=\chronos@lefelau@at,
2750     lefelau at=chronos mid,
2751     uchod/.store in=\chronos@uchod,
2752     isod/.store in=\chronos@isod,

2753     fformat dyddiad/.code={\chronos@setdateformat{#1}},
2754     date format/.forward to=/chronos/ffformat dyddiad,
2755     year format/.code={\chronos@setyearformat{#1}},
2756     minor year format/.code={\chronos@setminoryearformat{#1}},
2757     dangos cyfnodau/@blynyddoedd yn unig/.code={%
2758     \chronos@setdateformat{!Y\thinspace !E}%
2759     },
2760     dangos cyfnodau/@llawn/.code={\chronos@setdateformat{!d!/m!/Y\thinspace !E}},
2761     dangos cyfnodau/llawn/.code={%
2762     \pgfqkeys{/chronos/dangos cyfnodau}{%
2763     @llawn/.code={\chronos@setdateformat{#1}}%
2764     }%
2765     },
2766     dangos cyfnodau/blynyddoedd yn unig/.code={%
2767     \pgfqkeys{/chronos/dangos cyfnodau}{%
2768     @blynyddoedd yn unig/.code={\chronos@setdateformat{#1}}%
2769     }%
2770     },
2771     heb gyfnodau/@blynyddoedd yn unig/.code={\chronos@setdateformat{!Y}},
2772     heb gyfnodau/@llawn/.code={\chronos@setdateformat{!d!/m!/Y}},
2773     heb gyfnodau/llawn/.code={%
2774     \pgfqkeys{/chronos/heb gyfnodau}{@llawn/.code={\chronos@setdateformat{#1}}}%
2775     },
2776     heb gyfnodau/blynyddoedd yn unig/.code={%
2777     \pgfqkeys{/chronos/heb gyfnodau}{%
2778     @blynyddoedd yn unig/.code={\chronos@setdateformat{#1}}%
2779     }%
2780     },
2781     blynyddoedd yn unig/.code={%
2782     \chronos@ychwanegu@nodweddion@rhag{tag}{/chronos/blynyddoedd yn unig}%
2783     \chronos@ychwanegu@nodweddion{byw}{tag}{/chronos/blynyddoedd yn unig}%
2784     \chronos@ychwanegu@nodweddion{digwyddiad}{tag}{/chronos/blynyddoedd yn unig}%
2785     \chronos@ychwanegu@nodweddion{parhad}{tag}{/chronos/blynyddoedd yn unig}%
2786     \chronos@dimondblynyddoeddtrue
2787     \ifchronos@dangoscyfnodau
2788     \pgfqkeys{/chronos}{%
2789     dangos cyfnodau/@blynyddoedd yn unig,
2790     }%
2791     \else
2792     \pgfqkeys{/chronos}{%
2793     heb gyfnodau/@blynyddoedd yn unig,
2794     }%
2795     \fi
2796     },
2797     only years/.forward to=/chronos/blynyddoedd yn unig,
2798     dyddiadau llawn/.code={%
2799     \chronos@ychwanegu@nodweddion@rhag{tag}{/chronos/dyddiadau llawn}%
2800     \chronos@ychwanegu@nodweddion{byw}{tag}{/chronos/dyddiadau llawn}%

```

```

2801 \chronos@ychwanegu@nodweddion{digwyddiad}{@tag}{/chronos/dyddiadau llawn}%
2802 \chronos@ychwanegu@nodweddion{parhad}{@tag}{/chronos/dyddiadau llawn}%
2803 \chronos@dimondblynyddoeddfalse
2804 \ifchronos@dangoscyfnodau
2805 \pgfqkeys{/chronos}{%
2806     dangos cyfnodau/@llawn,
2807 }%
2808 \else
2809 \pgfqkeys{/chronos}{%
2810     heb gyfnodau/@llawn,
2811 }%
2812 \fi
2813 },
2814 full dates/.forward to=/chronos/dyddiadau llawn,
2815 dangos cyfnodau/.code={%
2816 \chronos@ychwanegu@nodweddion@rhag{@tag}{/chronos/dangos cyfnodau}%
2817 \chronos@ychwanegu@nodweddion{byw}{@tag}{/chronos/dangos cyfnodau}%
2818 \chronos@ychwanegu@nodweddion{digwyddiad}{@tag}{/chronos/dangos cyfnodau}%
2819 \chronos@ychwanegu@nodweddion{parhad}{@tag}{/chronos/dangos cyfnodau}%
2820 \chronos@dangoscyfnodauftrue
2821 \ifchronos@dimondblynyddoedd
2822 \pgfqkeys{/chronos}{%
2823     dangos cyfnodau/@blynyddoedd yn unig,
2824 }%
2825 \else
2826 \pgfqkeys{/chronos}{%
2827     dangos cyfnodau/@llawn,
2828 }%
2829 \fi
2830 },
2831 show eras/.forward to=/chronos/dangos cyfnodau,
2832 heb gyfnodau/.code={%
2833 \chronos@ychwanegu@nodweddion@rhag{@tag}{/chronos/heb gyfnodau}%
2834 \chronos@ychwanegu@nodweddion{byw}{@tag}{/chronos/heb gyfnodau}%
2835 \chronos@ychwanegu@nodweddion{digwyddiad}{@tag}{/chronos/heb gyfnodau}%
2836 \chronos@ychwanegu@nodweddion{parhad}{@tag}{/chronos/heb gyfnodau}%
2837 \chronos@dangoscyfnodaufalse
2838 \ifchronos@dimondblynyddoedd
2839 \pgfqkeys{/chronos}{%
2840     heb gyfnodau/@blynyddoedd yn unig,
2841 }%
2842 \else
2843 \pgfqkeys{/chronos}{%
2844     heb gyfnodau/@llawn,
2845 }%
2846 \fi
2847 },
2848 without eras/.forward to=/chronos/heb gyfnodau,
2849 show eras/only years/.forward to=/chronos/dangos cyfnodau/blynyddoedd yn unig,
2850 show eras/full dates/.forward to=/chronos/dangos cyfnodau/dyddiadau llawn,
2851 without eras/only years/.forward to=/chronos/heb gyfnodau/blynyddoedd yn unig,
2852 without eras/full dates/.forward to=/chronos/heb gyfnodau/dyddiadau llawn,
2853 heb gyfnodau/.chronos track={@digwyddiad@cyfnodau,@byw@cyfnodau,@parhad@cyfnodau},
2854 dangos cyfnodau/.chronos track={@digwyddiad@cyfnodau,@byw@cyfnodau,@parhad@cyfnodau},
2855 dyddiadau llawn/.chronos track={@digwyddiad@llawn,@byw@llawn,@parhad@llawn},
2856 blynyddoedd yn unig/.chronos track={@digwyddiad@llawn,@byw@llawn,@parhad@llawn},
2857 every date format/.code={%^^A defnyddio macros yn lle allweddau rhag ofn , yn #1 =>
pam ar ddaear?
2858 \chronos@setdateformat{#1}%
2859 \def\chronos@digwyddiad@fformatdyddiad{#1}%
2860 \def\chronos@parhad@fformatdechrau@cyfnod{#1}%

```

```

2861 \def\chronos@parhad@fformatdechrau@cyfnodau{#1}%
2862 \def\chronos@parhad@fformatdiwedd{#1}%
2863 \def\chronos@byw@fformatgeni@cyfnod{#1}%
2864 \def\chronos@byw@fformatgeni@cyfnodau{#1}%
2865 \def\chronos@byw@fformatmarw{#1}%
2866 },
2867 every date format/.chronos track={%
2868 @digwyddiad@fformatiau@dyddiadau,@digwyddiad@cyfnodau,@digwyddiad@llawn},
2869 every date format/.chronos track={%
2870 @byw@fformatiau@dyddiadau,@byw@cyfnodau,@byw@llawn},
2871 every date format/.chronos track={%
2872 @parhad@fformatiau@dyddiadau,@parhad@cyfnodau,@parhad@llawn},
2873 testun yn unig/.code={%
2874 \chronos@ychwanegu@nodweddion@rhag{tag}{/chronos/testun yn unig}%
2875 \chronos@setdateformat{}}%
2876 \chronos@onlytexttrue
2877 },
2878 only text/.forward to=/chronos/testun yn unig,
2879 event years on line/.code={%
2880 \chronos@eventyearsonlinetrue
2881 \chronos@timeline@showyearsfalse
2882 \pgfqkeys{/chronos/digwyddiad}{blynnyddoedd yn unig,heb gyfnodau}%
2883 \chronos@onlytexttrue
2884 },
2885 event year on line/.style={%
2886 /chronos/llynell amser/timeline@years,%
2887 /chronos/llynell amser/timeline@year@on@line,%
2888 font=\chronos@ffont@camaumawr%
2889 },
2890 event year on line skip/.code={\gdef\chronos@specialdate{}}},
2891 event dates split/.is if=chronos@eventdatessplit,
2892 event date split/.style={},
2893 testun yshift/.code={%
2894 \pgfmathparse{#1}%
2895 \chronos@ychwanegu@nodweddion@rhag{tag}{/chronos/testun yshift=\pgfmathresult pt}%
2896 \chronos@testun@yshift=\pgfmathresult pt
2897 },
2898 testun yshift'/.code={%
2899 \chronos@ychwanegu@nodweddion@rhag{tag}{/chronos/testun yshift=#1}%
2900 \chronos@testun@yshift=#1
2901 },
2902 testun yshift+/.code={%
2903 \pgfmathparse{#1}%
2904 \chronos@ychwanegu@nodweddion@rhag{tag}{/chronos/testun yshift'+=\pgfmathresult pt}%
2905 \advance \chronos@testun@yshift by \pgfmathresult pt
2906 },
2907 testun yshift'+/.code={%
2908 \chronos@ychwanegu@nodweddion@rhag{tag}{/chronos/testun yshift'+=#1}%
2909 \advance \chronos@testun@yshift by #1
2910 },
2911 text tag yshift/.forward to=/chronos/testun yshift,
2912 text tag yshift'/.forward to=/chronos/testun yshift,
2913 text tag yshift'+/.forward to=/chronos/testun yshift,
2914 text tag yshift+/.forward to=/chronos/testun yshift,
2915 special date/.code={\gdef\chronos@specialdate{#1}},

```

saesneg: /chronos (mwy uchod)

```

2916 levels/.forward to=/chronos/lefelau,
2917 levels at/.forward to=/chronos/lefelau at,

```

ateb Qrrbrbirlbel <https://tex.stackexchange.com/a/694967/> permission for lppl: <https://>

[tex.stackexchange.com/questions/694799/how-can-i-disable-shadows-and-similar-preaction-694967#comment1725164\\_694967](https://tex.stackexchange.com/questions/694799/how-can-i-disable-shadows-and-similar-preaction-694967#comment1725164_694967)

```
2918 discard node/.code={% ^^A
2919   \setbox\pgfutil@tempboxa\box\pgfutil@voidb@x % empty out box
2920   \def\tikz@whichbox{\pgfutil@tempboxa}%
2921 },
```

ateb Qrrbrbirlbel uchod ac ateb arall fe: <https://tex.stackexchange.com/a/688111/> ; defnyddio yn lle \chronosphantom

```
2922 phantom node/.code=\tikz@addoption{%
2923   \expandafter\let\csname pgf@sh@boxes@\tikz@shape\endcsname\pgfutil@empty},
```

sylwad Qrrbrbirlbel: [https://tex.stackexchange.com/questions/694799/how-can-i-disable-shadows-and-similar-preaction-694967#comment1724762\\_694799](https://tex.stackexchange.com/questions/694799/how-can-i-disable-shadows-and-similar-preaction-694967#comment1724762_694799)

```
2924 zap preactions/.code=\let\tikz@preactions\@empty,
2925 zap postactions/.code=\let\tikz@postactions\@empty,
2926 placeholders/.is choice,
2927 placeholders/off/.code={%
2928   \chronos@placeholdersfalse
2929   \pgfqkeys{/chronos}{%
2930     placeholder/.style={fill=none, draw=none,/chronos/discard node},%^^A phantom node,zap
preactions,zap postactions},
2931   }%
2932 },
2933 placeholders/on/.code={%
2934   \pgfqkeys{/chronos}{%
2935     placeholder/.style={on chronos middle ground layer,fill opacity=.1,%
2936       draw opacity=.25,text opacity=.5,/chronos/.cd,zap preactions,%
2937       zap postactions},
2938   }%
2939 },
2940 placeholders/.default=on,
2941 placeholders=off,
2942 placeholder lines/.style={help lines,%
2943   every node/.append style={rotate=-90,anchor=south,pos=.25,inner sep=0pt}},
2944 show coords/.is if=chronos@showcoords,
2945 show coords/.default=true,
2946 show nodes/.is if=chronos@shownodes,
2947 show nodes/.default=true,
2948 show coordinate/.style n args=5{fill=#1, circle, anchor=center,%
2949   inner sep=1pt, text=#1, pin=[[#1, inner sep=0pt, pin edge={draw=#1}],%
2950   pin distance=#4, #5]#2:#3}},
2951 show coord/.style 2 args={%
2952   /chronos/show coordinate={chronos@lliw@coord}{#1}{#2}{30pt}{}},
2953 show node coord/.style 2 args={%
2954   /chronos/show coordinate={chronos@lliw@node}{#1}{#2}{30pt}{}},
2955 show node/.style={},
2956 show bounding box/.is if=chronos@showbb,
2957 show bounding box/.default=true,
2958 show node colour/.chronos lliw=lliw@node,
2959 show bb colour/.chronos lliw=lliw@bb,
2960 show coordinate colour/.chronos lliw=lliw@coord,
2961 show node color/.forward to=/chronos/show node colour,
2962 show coordinate color/.forward to=/chronos/show coordinate colour,
2963 show bb color/.forward to=/chronos/show bb colour,
2964 show node colour=blue,
2965 show coordinate colour=red,
2966 show bb colour=chronosGreen,
```

```

2967 dadfygio/.code={%
2968   \pgfqkeys{/chronos}{%
2969     placeholders,show coords,show node colour=blue,show coordinate colour=red,%
2970     show bounding box,show nodes,show node/.style={draw=chronos@lliw@node}},
2971 debug/.forward to=/chronos/dadfygio,

2972 enwau lliw syml/.is if=chronos@enwaulliwsyml,
2973 enwau lliw syml/.default=true,
2974 dim enwau lliw syml/.code={\chronos@enwaulliwsymlfalse},
2975 tags/.code={%
2976   \pgfqkeys{/chronos}{@tag/.style={#1}}%
2977   \chronos@cadw@nodweddion@rhag{@tag}{#1}},
2978 tags+/.code={%
2979   \pgfqkeys{/chronos}{@tag/.append style={#1}}%
2980   \chronos@ychwanegu@nodweddion@rhag{@tag}{#1}},
2981 tags={},
2982 cysylltiad ar/.chronos layer choice=cysylltiad,
2983 cysylltiadau ar/.forward to=/chronos/cysylltiad ar,
2984 cysylltiad ar=main,
2985 llinell ar/.chronos layer choice=llinell,
2986 llinellau ar/.forward to=/chronos/llinell ar,
2987 llinell ar=middle ground,

2988 cysylltwyr theori/.forward to=/chronos/theori/cysylltwr testun,

2989 theori dash/.style={},
2990 lliwiau uchod/.code={\chronos@lliwiau@uchod{#1}},
2991 lliwiau isod/.code={\chronos@lliwiau@isod{#1}},
2992 lliwiau uchod o clist/.code={\chronos@global@eq@clist{lliwiau_uchod}{#1}},
2993 lliwiau isod o clist/.code={\chronos@global@eq@clist{lliwiau_isod}{#1}},
2994 }
2995 \ExplSyntaxOn

2996 \__chronos_kexpander:nnnnn { llinellau } { lines } { @llinell } { ' }
2997 { byw, digwyddiad, parhad }
2998 \__chronos_kexpander:nnnnn { cysylltwyr ~ chronos } { chronos ~ connectors }
2999 { @cysylltwr@chronos } { + } { byw, digwyddiad, parhad }
3000 \__chronos_kexpander:nnnnn { cysylltwyr ~ testun } { text ~ tag ~ connectors }
3001 { @cysylltwr@testun } { + } { byw, digwyddiad, parhad, theori }
3002 \__chronos_kexpander:nnnnn { prif ~ gysylltwyr ~ testun }
3003 { main ~ text ~ tag ~ connectors } { @cysylltwr@testun@prif } { ' }
3004 { byw, digwyddiad, parhad, theori }
3005 \__chronos_kexpander:nnnnn { cysylltiadau } { connections } { @cysylltiad }
3006 { ' } { byw, digwyddiad, parhad, theori }
3007 \__chronos_kexpander:nnnnn { testunau } { text ~ tags } { @testun }
3008 { ' } { byw, digwyddiad, parhad, theori, gwybodaeth }
3009 \__chronos_kexpander:nnnnn { fformat ~ dyddiad } { date ~ format }
3010 { @fformat@dyddiad } { ' } { byw, digwyddiad, parhad, theori, gwybodaeth }
3011 \ExplSyntaxOff
3012 \pgfqkeys{/chronos}{%
3013   llinell amser/.cd,
3014   lled/.chronos dimen=\chronos@width,
3015   uchder/.chronos dimen=\chronos@height,
3016   uchder y border/.chronos dimen=\chronos@borderheight,
3017   timeline era margin/.chronos dimen=\chronos@eramargin,
3018   timeline margin/.chronos dimen=\chronos@timelinemargin,
3019   timeline width/.chronos dimen=\chronos@width,
3020   width/.chronos dimen=\chronos@width,
3021   timeline height/.chronos dimen=\chronos@height,
3022   height/.chronos dimen=\chronos@height,
3023   timeline border height/.chronos dimen=\chronos@borderheight,
3024   /chronos/.cd,
3025   llinell yshift/.chronos dimen=\chronos@llinell@yshift,

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3026 line yshift/.chronos dimen=\chronos@llinell@yshift,
3027 border penawdau/.chronos dimen=\chronos@border@penawdau,
3028 border pen/.chronos dimen=\chronos@border@pen,
3029 border gwaelod/.chronos dimen=\chronos@border@gwaelod,
3030 border de/.chronos dimen=\chronos@border@de,
3031 border chwith/.chronos dimen=\chronos@border@chwith,
3032 border allanol/.chronos dimen=\chronos@border@allanol,
3033 headings border/.chronos dimen=\chronos@border@penawdau,
3034 top border/.chronos dimen=\chronos@border@penawdau,
3035 bottom border/.chronos dimen=\chronos@border@gwaelod,
3036 right border/.chronos dimen=\chronos@border@de,
3037 left border/.chronos dimen=\chronos@border@chwith,
3038 outer border/.chronos dimen=\chronos@border@allanol,
3039 }
3040 \tikzset{/chronos/.cd,
3041 no connections/.code={%
3042   \chronos@byw@cysylltiadfals
3043   \chronos@digwyddiad@cysylltiadfals
3044   \chronos@parhad@cysylltiadfals
3045 },
3046 no connectors/.code={%
3047   \pgfqkeys{/chronos}{every cysylltwyr testun'={coordinate}},%
3048   every cysylltwyr chronos'={coordinate}}},
3049 no text tag connectors/.code={%
3050   \pgfqkeys{/chronos}{every cysylltwyr testun'={coordinate}}},

3051 simple colour names/.forward to=/chronos/enwau lliw syml,
3052 simple color names/.forward to=/chronos/enwau lliw syml,
3053 no simple colour names/.forward to=/chronos/dim enwau lliw syml,
3054 no simple color names/.forward to=/chronos/dim enwau lliw syml,
3055 connection/.forward to=/chronos/@cysylltiad,
3056 connection on/.forward to=/chronos/cysylltiad ar,
3057 connections on/.forward to=/chronos/cysylltiadau ar,
3058 colours above/.forward to=/chronos/lliwiau uchod,
3059 colours below/.forward to=/chronos/lliwiau isod,
3060 colors above/.forward to=/chronos/lliwiau uchod,
3061 colors below/.forward to=/chronos/lliwiau isod,
3062 colours above from clist/.forward to=/chronos/lliwiau uchod o clist,
3063 colours below from clist/.forward to=/chronos/lliwiau isod o clist,
3064 colors above from clist/.forward to=/chronos/lliwiau uchod o clist,
3065 colors below from clist/.forward to=/chronos/lliwiau isod o clist,
3066 lines on/.forward to=/chronos/llinell ar,
3067 line on/.forward to=/chronos/llinell ar,

3068 }
3069 \tikzset{%

3070 /chronos/byw/.chronos tag init={byw}{life},
3071 /chronos/byw/.chronos tag dyddiadau init=byw:geni:marw:bu farw:bufarw:geni:marw:birth:deat
3072 /chronos/byw/.cd,

3073 /chronos/digwyddiad/.chronos tag init={digwyddiad}{event},
3074 /chronos/digwyddiad/.cd,
3075 dyddiad/.style={/chronos/set date aux/.expanded={#1-01-01-0@dig}},
3076 ffont dyddiad/.code={\def\chronos@digwyddiad@ffontdyddiad{#1}},
3077 ffont dyddiad=,
3078 fformat dyddiad/.code={%
3079   \def\chronos@digwyddiad@fformatdyddiad{#1}%
3080   \chronos@ychwanegu@nodweddion{digwyddiad}{@tag}%
3081   {/chronos/digwyddiad/fformat dyddiad={#1}}%
3082 },
3083 fformat dyddiad/.chronos track={%
3084   @digwyddiad@fformatiau@dyddiadau,@digwyddiad@cyfnodau,@digwyddiad@llawn},

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3085 dangos cyfnodau/@blynyddoedd yn unig/.code={%
3086   \def\chronos@digwyddiad@fformatdyddiad{!Y\thinspace !E}},
3087 dangos cyfnodau/@llawn/.code={%
3088   \def\chronos@digwyddiad@fformatdyddiad{!d!/m!/Y\thinspace !E}},
3089 dangos cyfnodau/llawn/.code={%
3090   \pgfqkeys{/chronos/digwyddiad/dangos cyfnodau}{%
3091     @llawn/.code={\def\chronos@digwyddiad@fformatdyddiad{#1}}}},
3092 dangos cyfnodau/blynyddoedd yn unig/.code={%
3093   \pgfqkeys{/chronos/digwyddiad/dangos cyfnodau}{%
3094     @blynyddoedd yn unig/.code={\def\chronos@digwyddiad@fformatdyddiad{#1}}}},
3095 heb gyfnodau/@blynyddoedd yn unig/.code={\def\chronos@digwyddiad@fformatdyddiad{!Y}},
3096 heb gyfnodau/@llawn/.code={\def\chronos@digwyddiad@fformatdyddiad{!d!/m!/Y}},
3097 heb gyfnodau/llawn/.code={%
3098   \pgfqkeys{/chronos/digwyddiad/heb gyfnodau}{%
3099     @llawn/.code={\def\chronos@digwyddiad@fformatdyddiad{#1}},@llawn/.show code}},
3100 heb gyfnodau/blynyddoedd yn unig/.code={%
3101   \pgfqkeys{/chronos/digwyddiad/heb gyfnodau}{%
3102     @blynyddoedd yn unig/.code={\def\chronos@digwyddiad@fformatdyddiad{#1}}}},
3103 dangos cyfnodau/.code={%
3104   \chronos@ychwanegu@nodweddion{digwyddiad}{@tag}{/chronos/dangos cyfnodau}},
3105 heb gyfnodau/.code={%
3106   \chronos@ychwanegu@nodweddion{digwyddiad}{@tag}{/chronos/heb gyfnodau}},
3107 dyddiadau llawn/.code={%
3108   \chronos@ychwanegu@nodweddion{digwyddiad}{@tag}{/chronos/dyddiadau llawn}},
3109 blynyddoedd yn unig/.code={%
3110   \chronos@ychwanegu@nodweddion{digwyddiad}{@tag}{/chronos/blynyddoedd yn unig}},
3111 dangos cyfnodau/.chronos track={@digwyddiad@cyfnodau},
3112 dyddiadau llawn/.chronos track={@digwyddiad@llawn},
3113 heb gyfnodau/.chronos track={@digwyddiad@cyfnodau},
3114 blynyddoedd yn unig/.chronos track={@digwyddiad@llawn},

3115 date/.forward to=/chronos/digwyddiad/dyddiad,
3116 date font/.forward to=/chronos/digwyddiad/ffont dyddiad,
3117 date format/.forward to=/chronos/digwyddiad/fformat dyddiad,
3118 show eras/.forward to=/chronos/digwyddiad/dangos cyfnodau,
3119 only years/.forward to=/chronos/digwyddiad/blynyddoedd yn unig,
3120 full dates/.forward to=/chronos/digwyddiad/dyddiadau llawn,
3121 without eras/.forward to=/chronos/digwyddiad/heb gyfnodau,
3122 show eras/only years/.forward to=/chronos/digwyddiad/dangos cyfnodau/blynyddoedd yn
unig,
3123 show eras/full dates/.forward to=/chronos/digwyddiad/dangos cyfnodau/dyddiadau llawn,
3124 without eras/only years/.forward to=/chronos/digwyddiad/heb gyfnodau/blynyddoedd yn
unig,
3125 without eras/full dates/.forward to=/chronos/digwyddiad/heb gyfnodau/dyddiadau llawn,

3126 /chronos/parhad/.chronos tag init={parhad}{period},
3127 /chronos/parhad/.chronos tag dyddiadau init=parhad:dechrau:diwedd:gorffenedig:gorffenedig:
3128 /chronos/parhad/.cd,

3129 /chronos/theori/.chronos tag init={theori}{theory},
3130 /chronos/theori/.cd,

3131 /chronos/theori/cylchau/.cd,
3132 enw/.store in=\chronos@cylchtheori@enw,

3133 chronos@tikzname/.code={%
3134   \chronos@creu@tikzname {cylchtheori}{#1}
3135 },
3136 enw/.forward to=/chronos/theori/cylchau/chronos@tikzname,

3137 at/.code={\coordinate (chronos@cylchtheori@at) at (#1);},

3138 meintiau/.chronos 2 dimens={\chronos@cylchtheori@mawr}{\chronos@cylchtheori@bach},

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3139 mawr/.chronos dimen=\chronos@cylchtheori@mawr,
3140 bach/.chronos dimen=\chronos@cylchtheori@bach,
3141 labeli/.style args={#1:#2}{
3142 /chronos/theori/cylchau/label uchod=#1,
3143 /chronos/theori/cylchau/label isod=#2,
3144 },
3145 label uchod/.store in=\chronos@cylchtheori@label@uchod,
3146 label isod/.store in=\chronos@cylchtheori@label@isod,
3147 testunau cylch/.style args={#1:#2}{
3148 /chronos/theori/cylchau/testun cylch uchod=#1,
3149 /chronos/theori/cylchau/testun cylch isod=#2,
3150 },
3151 testun cylch uchod/.store in=\chronos@cylchtheori@circletext@uchod,
3152 testun cylch isod/.store in=\chronos@cylchtheori@circletext@isod,

3153 /chronos/theory/circles/.chronos search=theori/cylchau,
3154 name/.forward to=/chronos/theori/cylchau/enw,

3155 sizes/.chronos 2 dimens={\chronos@cylchtheori@mawr}{\chronos@cylchtheori@bach},

3156 circle texts/.forward to=/chronos/theori/cylchau/testunau cylch,
3157 labels/.forward to=/chronos/theori/cylchau/labeli,

3158 /chronos/gwybodaeth/.cd,
3159 enw/.store in=\chronos@gwybodaeth@enw,
3160 chronos@tikzname/.code={%
3161 \chronos@creu@tikzname {gwybodaeth}{#1}
3162 },
3163 enw/.forward to=/chronos/gwybodaeth/chronos@tikzname,
3164 angor/.store in=\chronos@gwybodaeth@angor,
3165 at/.store in=\chronos@gwybodaeth@at,
3166 capsiwn/.store in=\chronos@gwybodaeth@capsiw,
3167 lliw/.store in=\chronos@gwybodaeth@lliw,
3168 lliw rhagosodedig/.store in=\chronos@gwybodaeth@lliw@rhagosodedig,
3169 lliw rhagosodedig=chronos@lliw@gwybodaeth,
3170 tag'/.code={%
3171 \chronos@cadw@nodweddion{gwybodaeth}{@tag}{#1}%
3172 },
3173 tag+/.code={%
3174 \chronos@ychwanegu@nodweddion{gwybodaeth}{@tag}{#1}%
3175 },
3176 testun'/.code={%
3177 \chronos@cadw@nodweddion{gwybodaeth}{@testun}{#1}%
3178 },
3179 testun+/.code={%
3180 \chronos@ychwanegu@nodweddion{gwybodaeth}{@testun}{#1}%
3181 },
3182 testun/.forward to=/chronos/gwybodaeth/testun',
3183 tag/.forward to=/chronos/gwybodaeth/tag+,
3184 cynnwys testun/.store in=\chronos@cynnwys@testun,
3185 cynnwys enw/.store in=\chronos@cynnwys@enw,

3186 /chronos/info/.chronos search=gwybodaeth,
3187 name/.forward to=/chronos/gwybodaeth/enw,
3188 caption/.forward to=/chronos/gwybodaeth/capsiw,
3189 colour/.forward to=/chronos/gwybodaeth/lliw,
3190 color/.forward to=/chronos/gwybodaeth/lliw,
3191 default colour/.forward to=/chronos/gwybodaeth/lliw rhagosodedig,
3192 default color/.forward to=/chronos/gwybodaeth/lliw rhagosodedig,
3193 text tag/.forward to=/chronos/gwybodaeth/testun,
3194 text tag'/.forward to=/chronos/gwybodaeth/testun',
3195 text tag+/.forward to=/chronos/gwybodaeth/testun+,
3196 tag anchor/.forward to=/chronos/gwybodaeth/angor,

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3197 text content/.forward to=/chronos/gwybodaeth/cynnwys testun,
3198 name content/.forward to=/chronos/gwybodaeth/cynnwys enw,

3199 /chronos/prif/.cd,
3200 enw/.store in=\chronos@prifdeitl@enw,
3201 chronos@tikzname/.code={%
3202   \chronos@creu@tikzname {prifdeitl}{#1}
3203 },
3204 enw/.forward to=/chronos/prif/chronos@tikzname,
3205 angor/.store in=\chronos@prifdeitl@angor,
3206 angor/.forward to=/tikz/anchor,
3207 at/.code={\coordinate (chronos@prifdeitl@at) at (#1);},
3208 cynnwys enw/.store in=\chronos@prifdeitl@cynnwys,
3209 llinellau teitl/.style={%
3210   /tikz/.cd,draw=chronos@prifliw,inner xsep=0pt,#1,%
3211   append after command={%
3212     (main title.north west)--(main title.north east) (main title.south west)%
3213     --(main title.south east)},draw=none},

3214 /chronos/main/.chronos search=prif,
3215 name/.forward to=/chronos/prif/enw,
3216 tag anchor/.forward to=/chronos/prif/angor,
3217 name content/.forward to=/chronos/prif/cynnwys enw,
3218 title lines/.forward to=/chronos/prif/llinellau teitl,

3219 /chronos/hawlfraint/.cd,
3220 enw/.store in=\chronos@hawlfraint@enw,
3221 chronos@tikzname/.code={%
3222   \chronos@creu@tikzname {hawlfraint}{#1}
3223 },
3224 enw/.forward to=/chronos/hawlfraint/chronos@tikzname,
3225 angor/.store in=\chronos@hawlfraint@angor,
3226 angor/.forward to=/tikz/anchor,
3227 at/.code={\coordinate (chronos@hawlfraint@at) at (#1);},
3228 awdur/.store in=\chronos@hawlfraint@awdur,
3229 blwyddyn/.store in=\chronos@hawlfraint@blwyddyn,
3230 cynnwys enw/.store in=\chronos@hawlfraint@cynnwys,
3231 cylchdroi/.store in=\chronos@hawlfraint@cylchdroi,
3232 notis/.code={\def\chronos@hawlfraint@notis##1##2{#1}\show\chronos@hawlfraint@notis},
3233 copyleft/.is if=chronos@copyleft,
3234 copyleft/.default=true,

3235 /chronos/copyright/.chronos search=hawlfraint,
3236 /chronos/copyleft/.chronos search=hawlfraint,
3237 author/.forward to=/chronos/hawlfraint/awdur,
3238 name/.forward to=/chronos/hawlfraint/enw,
3239 name content/.forward to=/chronos/hawlfraint/cynnwys enw,
3240 notice/.forward to=/chronos/hawlfraint/notis,
3241 rotate/.forward to=/chronos/hawlfraint/cylchdroi,
3242 tag anchor/.forward to=/chronos/hawlfraint/angor,
3243 year/.forward to=/chronos/hawlfraint/blwyddyn,

3244 /chronos/.cd,

3245 borders'/.code args={#1:#2:#3:#4:#5:#6}{%^^A penawdau:pen:de:gwaelod:chwith:allanol
3246   \chronos@border@penawdau=#1
3247   \chronos@border@pen=#2
3248   \chronos@border@de=#3
3249   \chronos@border@gwaelod=#4
3250   \chronos@border@chwith=#5
3251   \chronos@border@allanol=#6
3252 },
3253 borders'+/.code args={#1:#2:#3:#4:#5:#6}{%^^A penawdau:pen:de:gwaelod:chwith:allanol

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```

3254 \advance\chronos@border@penawdau by #1
3255 \advance\chronos@border@pen by #2
3256 \advance\chronos@border@de by #3
3257 \advance\chronos@border@gwaelod by #4
3258 \advance\chronos@border@chwith by #5
3259 \advance\chronos@border@allanol by #6
3260 },
3261 borders'-/.code args={#1:#2:#3:#4:#5:#6}{%^^A penawdau:pen:de:gwaelod:chwith:allanol
3262 \advance\chronos@border@penawdau by -#1
3263 \advance\chronos@border@pen by -#2
3264 \advance\chronos@border@de by -#3
3265 \advance\chronos@border@gwaelod by -#4
3266 \advance\chronos@border@chwith by -#5
3267 \advance\chronos@border@allanol by -#6
3268 },
3269 cysylltwyr chronos={anchor=center,inner sep=Opt,outer sep=Opt},%^^A oedd cylch chronos
3270 cysylltwyr testun={anchor=center,inner sep=Opt,outer sep=Opt},%^^A oedd cylch
3271 prif gysylltwyr testun={},
3272 @llinell/.style={},
3273 testunau+={outer sep=Opt,text=#1!75!black},%^^A every eisiau ##
3274 cysylltiadau={draw=#1},

3275 cynllun lliwiau/.code={\csname chronos@lliwiau@#1\endcsname},
3276 colour scheme/.forward to=/chronos/cynllun lliwiau,
3277 color scheme/.forward to=/chronos/cynllun lliwiau,
3278 lliwiau cronoleg/.code={%
3279 \chronos@lliwiau@cronoleg
3280 \@ifpackageloaded{memoize}{%
3281 \mmzset{csname meaning to context={chronos@lliwiau@cronoleg}}%
3282 }{}%
3283 },
3284 lliwiau rhagosodedig/.code={\chronos@lliwiau@rhagosodedig},

3285 }
3286

3287 \pgfqkeys{/chronos}{%
3288 cronoleg/.style={% mewnlol | internal
3289 /chronos/.cd,
3290 cronoleg/.meaning to context,
3291 cynllun lliwiau=cronoleg,
3292 byw/troi lliwiau=true,
3293 digwyddiad/troi lliwiau=true,
3294 parhad/troi lliwiau=true,
3295 theori/troi lliwiau=false,
3296 theori/lliw rhagosodedig=chronos@lliw@theori,
3297 digwyddiad/lliw rhagosodedig=chronos@prifliw!75!chronos@prifliw@cefndir,
3298 parhad/lliw rhagosodedig=chronos@prifliw!75!chronos@prifliw@cefndir,
3299 gwybodaeth/lliw rhagosodedig=chronos@lliw@gwybodaeth,
3300 cefndir=chronos@prifliw@cefndir,
3301 blaendir=chronos@prifliw,
3302 blynyddoedd yn unig,
3303 llinell amser={%
3304 timeline years=on line,
3305 llinell={chronos@lliw@cefndir@llinell, opacity=.8},
3306 ffont camau mawr=\normalfont\bfseries,
3307 ffont camau bach=\normalfont\bfseries\footnotesize,
3308 ffont cyfnodau=\normalfont\normalsize\bfseries,
3309 timeline year={text=chronos@lliw@llinell, align=center},
3310 timeline mark={draw=chronos@lliw@llinell, ultra thick, shorten >=1.5pt},
3311 timeline minor mark={draw=chronos@lliw@llinell, thick, shorten >=3pt},
3312 timeline height'=10mm,

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3313     timeline border height'=2.5mm,
3314     width=235mm,
3315     cam blwyddyn fawr=500,
3316     cam blwyddyn fach=100,
3317     timeline border outer colour=chronos@prifliw@cefndir,
3318     timeline border inner colour=chronos@lliw@cefndir@llynell!80!chronos@borderouter,
3319     timeline border middle colour=chronos@lliw@cefndir@llynell!20!chronos@borderouter,
3320     timeline mark eras,
3321     timeline marks,
3322     minor years,
3323     llynell amser ar=foreground,
3324     border ar=background,
3325     start date={-500},
3326     end date=2050,
3327     timeline margin'=10pt,
3328     timeline era margin'=15pt,
3329 },
3330 timeline ce label={CE},
3331 timeline bce label={BCE},
3332 cysylltiadau={draw=##1, opacity=.75, thick},
3333 cysylltwyr testun={fill=##1, fill opacity=1, circle, minimum size=5pt, %
3334     anchor=center, inner sep=0pt, outer sep=0pt},
3335 cyffredin/cysylltiad/.style={draw=##1, opacity=.5, thick},
3336 every cysylltwyr chronos={fill=####1, opacity=.75, circle, %
3337     minimum size=2.5pt, anchor=center, inner sep=0pt, outer sep=0pt},
3338 cyffredin/testun/.style={outer xsep=0pt, rounded corners=2pt, thick, %
3339     text opacity=1, draw opacity=1, inner sep=2pt, fill opacity=.25,%
3340     font=\scshape\footnotesize},
3341 digwyddiad/cysylltiad={/chronos/cyffredin/cysylltiad=##1},
3342 byw/cysylltiad={/chronos/cyffredin/cysylltiad=##1, opacity=.75},
3343 parhad/cysylltiad={/chronos/cyffredin/cysylltiad=##1},
3344 theori/cysylltiad={thick, draw=chronos@prifliw, double=chronos@prifliw@cefndir},

3345 theori/cysylltwr testun={fill=chronos@prifliw@cefndir, circle, %
3346     minimum size=5pt, anchor=center, inner sep=0pt, outer sep=0pt, thick, %
3347     draw=chronos@prifliw},
3348 byw/testun={/chronos/cyffredin/testun, align=left, text=##1!50!black, %
3349     fill=##1, draw=##1},

3350 digwyddiad/testun={/chronos/cyffredin/testun, align=left, text=##1!50!black, %
3351     fill=##1, draw=##1},
3352 parhad/testun={/chronos/cyffredin/testun, align=left, text=##1!50!black, %
3353     fill=##1, draw=##1},
3354 theori/testun={/chronos/cyffredin/testun, align=center, inner sep=3pt, %
3355     text=chronos@lliw@theori, fill=chronos@lliw@cefndir@theori, %
3356     fill opacity=.8, draw=chronos@prifliw, double=chronos@prifliw@cefndir, %
3357     font=\bfseries},
3358 byw/llynell={fill=##1, fill opacity=.25, draw=none},
3359 digwyddiad/llynell={draw=##1, draw opacity=.25, fill=none},
3360 parhad/llynell={fill=##1, fill opacity=.25, draw=none},
3361 llynell ar=main,
3362 cysylltiad ar=middle ground,

3363 theori/cylchau/label={align=center, inner sep=0pt, outer sep=0pt,%
3364     font=\scriptsize\scshape, text=chronos@prifliw},
3365 every cylch cylch theori'={fill=chronos@prifliw, draw=chronos@prifliw, %
3366     thick, even odd rule, fill opacity=.8},
3367 every testun cylch theori'={decoration={text effects along path, text={##1}, %
3368     text effects/.cd, fit text to path, text=chronos@prifliw@cefndir, %
3369     characters={text along path, font=\scriptsize\scshape}}, decorate},
3370 theori/cylchau/labels=: ,
3371 theori/cylchau/circle texts=: ,

```

```

3372   theori/cylchau/meintiau'=15pt:9pt,
3373   gwybodaeth/label={/chronos/@amserau, font=\itshape\footnotesize, %
3374     anchor=north, yshift=-2.5pt},% oedd pethau
3375   gwybodaeth/testun={/chronos/cyffredin/testun, align=left, text=##1, %
3376     outer sep=0pt, fill=chronos@lliw@cefndir@gwybodaeth, draw opacity=.8, %
3377     text opacity=.8, font=\scriptsize, draw=chronos@prifliw},% oedd ee ? oedd testun
ee?
3378   theori dash/.style={chronos@prifliw, opacity=.75, thick, densely dashed},
3379   theory dash/.link=/chronos/theori dash,
3380   amserau={align=center, anchor=base, inner sep=0pt, outer sep=0pt, %
3381     color=chronos@prifliw!75!chronos@prifliw@cefndir, opacity=.8, %
3382     font=\bfseries\itshape\footnotesize},
3383   amseraumawr={align=center, anchor=base, inner sep=0pt, outer sep=0pt, %
3384     color=chronos@prifliw, opacity=.8, font=\bfseries},
3385   prif/frame={inner sep=5pt, ultra thick, draw=chronos@prifliw, %
3386     double=chronos@prifliw@cefndir, fill=none},% oedd chronos@prifliw@cefndir
3387   prif/teitl={/chronos/prif/@frame, font=\Huge\bfseries, text=chronos@prifliw,%
3388     anchor=center, align=center, rounded corners=5pt},
3389   borders'=55pt:0pt:105pt:15pt:7.5pt:5pt,
3390   headings drops'=10pt:10pt:7.5pt,
3391   hawlfraint={font=\footnotesize\bfseries, inner sep=0pt, outer sep=0pt, %
3392     chronos@prifliw, fill=chronos@prifliw@cefndir},

3393   llinellau={color=black!50, opacity=.5},
3394   lefelau=10:10,
3395   special date=none,
3396   ce year label={\textsc{ce}},
3397   bce year label={\textsc{bce}},
3398   testun yshift=10pt,
3399   frame uses bb=false,
3400   frame,
3401 },
3402 }

3403 \RequirePackage{chronos-lib-colschemes,chronos-lib-styles}

```

**chronos** Main environment. Avoid expl3 syntax here.

```

3404 \NewDocumentEnvironment {chronos} { > { \TrimSpaces } 0 {} }
3405 {% http://tex.stackexchange.com/a/159856/ - Claudio Fiandrino
3406   \chronos@env@begin
3407   \begin{tikzpicture}[%
3408     align=center,
3409     anchor=mid,
3410     fixed point arithmetic,
3411     /chronos/.cd,
3412     prif/frame/.append code={\chronos@frametrue},
3413     prif/frame+/.append code={\chronos@frametrue},
3414     prif/frame'/.append code={\chronos@frametrue},
3415     #1,
3416     @@timeline@config@diwedd,
3417     @@timeline@config@dechrau,
3418     @@timeline@config@diwedd/.code={},
3419     @@timeline@config@dechrau/.code={},
3420     @@timeline@config,
3421     @@timeline@config/.code={},
3422     @timeline@config,
3423     @timeline@config/.code={},
3424     name prefix=\chronos@tikzprefix,
3425   ]%
3426   \IfBooleanExprT { \CSFreeBoolean \chronos@startyear || \CSFreeBoolean \chronos@endyear
}

```

```

3427   {%
3428     \PackageError{chronos}{%
3429       Missing start and/or end date for timeline.
3430       I will attempt to fathom the concept of a timeline without time,
3431       but I predict unpredictable results}%
3432     {%
3433       You must specify both a start and end date.
3434       If I try to start at the beginning or finish at the end,
3435       I exceed TeX's maximum dimension.
3436       Besides, what if time is cyclical?
3437       My author didn't tell me how to draw a 3D timeline.}%
3438     \IfFreeT \chronos@startyear {\chronos@set@date{1800}{01}{01}{start}}%
3439     \IfFreeT \chronos@endyear {\chronos@set@date{2050}{12}{31}{end}}%
3440   }%
3441   \ifnum\thechronos@startdate>\thechronos@enddate
3442     \PackageWarning{chronos}{%
3443       Sorry, but I cannot reverse time.
3444       Perhaps you could ask a metaphysician?
3445       Setting end to start and start to end}%

```

paid ag anghofio am awto-cywiro yn functions chronos re. blwyddyn sero

don't forget about auto-correction in chronos functions re. year zero

```

3446     \setcounter{chronos@tempcnta}{\thechronos@startdate}%
3447     \setcounter{chronos@startdate}{\thechronos@enddate}%
3448     \setcounter{chronos@enddate}{\thechronos@tempcnta}%
3449     \let\chronos@tmpstartyear\chronos@startyear
3450     \let\chronos@tmpstartmonth\chronos@startmonth
3451     \let\chronos@tmpstartday\chronos@startday
3452     \let\chronos@startyear\chronos@endyear
3453     \let\chronos@startmonth\chronos@endmonth
3454     \let\chronos@startday\chronos@endday
3455     \let\chronos@endyear\chronos@tmpstartyear
3456     \let\chronos@endmonth\chronos@tmpstartmonth
3457     \let\chronos@endday\chronos@tmpstartday
3458   \fi
3459   \begin{scope}[/chronos/@style]
3460     \extractcolorspec{chronos@lliw@llinell}{\chronos@temp1lll}%^^A \show\chronos@temp1lll
3461     \extractcolorspec{chronos@lliw@cefindir@llinell}{\chronos@temp1lllc}%^^A \show\chronos@
3462     \extractcolorspec{white}{\chronos@temp1llw}%^^A \show\chronos@temp1llw
3463     \extractcolorspec{chronos@prifliw}{\chronos@temp1llpl}%^^A \show\chronos@temp1llpl
3464     \extractcolorspec{chronos@prifliw@cefindir}{\chronos@temp1llplc}%^^A \show\chronos@temp1
3465     \ifchronos@yearsonline % BEGIN
3466       \chronos@if@gosodF{border}{\pgfqkeys{/chronos}{border ar=middle ground}}%
3467       \chronos@if@gosodF{llinell}{\pgfqkeys{/chronos}{llinell ar=middle ground}}%
3468       \chronos@if@gosodF{llinell amser}{\pgfqkeys{/chronos}{llinell amser ar=main}}%
3469       \chronos@if@gosodF{cysylltiad}{\pgfqkeys{/chronos}{cysylltiad ar=background}}%

```

rhag: llunio ar y border | default: draw on the border

```

3470     \ifdim\chronos@llinell@yshift=\pi pt
3471       \chronos@llinell@yshift=0pt %
3472     \fi
3473     \ifchronostimelinearrow
3474       \chronostimelinearrowfalse
3475       \PackageWarning{chronos}{%
3476         A timeline arrow requires a suitable off line style}
3477     \fi
3478   \else
3479     \chronos@if@gosodF{border}{\pgfqkeys{/chronos}{border ar=middle ground}}%
3480     \chronos@if@gosodF{llinell}{\pgfqkeys{/chronos}{llinell ar=main}}%
3481     \chronos@if@gosodF{llinell amser}{\pgfqkeys{/chronos}}%

```

```

3482     {\lmlinell amser ar=main}}%
3483     \chronos@if@gosodF{cysylltiad}{\pgfqkeys{/chronos}%
3484     {cysylltiad ar=background}}%
3485     \ifx\chronos@templlll\chronos@templplc
3486     \ifx\chronos@templlll\chronos@templlw
3487     \colorlet{chronos@lliw@llinell}{chronos@prifliw}%
3488     \colorlet{chronos@lliw@cefndir@llinell}{chronos@prifliw@cefndir}%
3489     \fi
3490     \fi
3491     \fi
3492     \providecolor{chronos main colour}{named}{chronos@prifliw}%
3493     \providecolor{chronos main background colour}{named}%
3494     {chronos@prifliw@cefndir}%
3495     \providecolor{chronos main color}{named}{chronos@prifliw}%
3496     \providecolor{chronos main background color}{named}%
3497     {chronos@prifliw@cefndir}%
3498     \providecolor{chronos prifliw}{named}{chronos@prifliw}%
3499     \providecolor{chronos prifliw cefndir}{named}%
3500     {chronos@prifliw@cefndir}%
3501     \providecolor{chronos timeline foreground colour}{named}%
3502     {chronos@lliw@llinell}%
3503     \providecolor{chronos timeline background colour}{named}%
3504     {chronos@lliw@cefndir@llinell}%
3505     \providecolor{chronos timeline foreground color}{named}%
3506     {chronos@lliw@llinell}%
3507     \providecolor{chronos timeline background color}{named}%
3508     {chronos@lliw@cefndir@llinell}%
3509     \providecolor{chronos lliw llinell amser blaendir}{named}%
3510     {chronos@lliw@llinell}%
3511     \providecolor{chronos lliw llinell amser cefndir}{named}%
3512     {chronos@lliw@cefndir@llinell}%
3513     \providecolor{chronos timeline border inner colour}{named}%
3514     {chronos@borderinner}%
3515     \providecolor{chronos timeline border outer colour}{named}%
3516     {chronos@borderouter}%
3517     \providecolor{chronos timeline border middle colour}{named}%
3518     {chronos@bordermiddle}%
3519     \providecolor{chronos timeline border inner color}{named}
3520     {chronos@borderinner}%
3521     \providecolor{chronos timeline border outer color}{named}
3522     {chronos@borderouter}%
3523     \providecolor{chronos timeline border middle color}{named}
3524     {chronos@bordermiddle}%
3525     \providecolor{chronos lliw llinell amser border mewnlol}{named}
3526     {chronos@borderinner}%
3527     \providecolor{chronos lliw llinell amser border allanol}{named}
3528     {chronos@borderouter}%
3529     \providecolor{chronos lliw llinell amser border canol}{named}
3530     {chronos@bordermiddle}%
3531     \colorlet{chronos current tag colour}{chronos@prifliw}%
3532     \colorlet{chronos current tag color}{chronos@prifliw}%
3533     \ifdim\chronos@height=\pi pt %^A BEGIN
3534     \PackageInfo{chronos}{Timeline height unset.
3535     Guessing an appropriate value.}%
3536     \ifchronos@yearsonline
3537     \chronos@height=10mm
3538     \ifdim\chronos@borderheight=\pi pt
3539     \PackageInfo{chronos}{%
3540     Timeline border height unset. Guessing an appropriate value.}%
3541     \chronos@borderheight=2.5mm
3542     \fi

```



```

3543     \else % off line
3544         \ifdim\chronos@borderheight=\pi pt
3545             \PackageInfo{chronos}{%
3546                 Timeline border height unset. Guessing an appropriate value.}%
3547             \chronos@height=1pt
3548             \chronos@borderheight=0pt
3549         \else
3550             \pgfmathsetlength \chronos@height {4*\chronos@borderheight}%
3551         \fi
3552     \fi
3553 \fi % END \ifdim\chronos@height=\pi pt
3554 \ifdim\chronos@borderheight=\pi pt %^^A angen height am hwn ; angen hwn am llinell
yshift
3555     \PackageInfo{chronos}{%
3556         Timeline border height unset. Guessing an appropriate value.}%
3557     \ifchronos@yearsonline
3558         \pgfmathsetlength \chronos@borderheight {\chronos@height/4}
3559     \else
3560         \chronos@borderheight=0pt
3561     \fi
3562 \fi
3563 \ifchronos@yearsonline %^^A BEGIN \ifchronos@yearsonline
3564 \else
3565     \pgfqkeys{/chronos/timeline}{do timeline arrow}%
3566     \ifdim\chronos@llinell@yshift=\pi pt %^^A BEGIN
3567         \ifdim\chronos@height<5pt %^^A BEGIN
3568             \ifdim\chronos@borderheight<.5pt %^^A BEGIN
3569                 \ifchronos@blynyddoeddisod%^^A BEGIN
3570                     \chronos@llinell@yshift=5pt
3571                 \else
3572                     \ifchronos@blynyddoedduchod%^^A BEGIN
3573                         \chronos@llinell@yshift=-5pt
3574                     \fi %^^A END \ifchronos@blynyddoedduchod
3575                 \fi %^^A END \ifchronos@blynyddoeddisod
3576             \else
3577                 \ifchronos@blynyddoeddisod %^^A BEGIN
3578                     \chronos@llinell@yshift=\chronos@borderheight
3579                 \else
3580                     \ifchronos@blynyddoedduchod %^^A BEGIN
3581                         \chronos@llinell@yshift=-\chronos@borderheight
3582                     \fi %^^A END \ifchronos@blynyddoedduchod
3583                 \fi %^^A END % \ifchronos@blynyddoeddisod
3584             \fi %^^A END \ifdim\chronos@borderheight<.5pt
3585         \else
3586             \ifchronos@blynyddoeddisod %^^A BEGIN
3587                 \chronos@llinell@yshift=2pt
3588             \else
3589                 \ifchronos@blynyddoedduchod %^^A BEGIN
3590                     \chronos@llinell@yshift=-2pt
3591                 \fi %^^A END \ifchronos@blynyddoedduchod
3592             \fi %^^A END \ifchronos@blynyddoeddisod
3593         \fi %^^A END \ifdim\chronos@height<5pt
3594     \fi %^^A END \ifdim\chronos@llinell@yshift=\pi pt
3595 \fi %^^A END ifchronos@yearsonline
3596 \ifx\chronos@templpl\chronos@templplc \PackageWarning{chronos}{%
3597     You've set the main colour and the main background colour to the same.}\fi
3598 \ifnum\chronos@startyear=0\relax
3599     \chronos@yearzerotrue
3600 \else
3601     \ifnum\chronos@endyear=0\relax
3602         \chronos@yearzerotrue

```

```

3603     \fi
3604     \fi
3605     \IfExistT \chronos@camrhaniadau {\chronos@if@gosodF{@bare}}{%
3606         \ifnum\chronos@camrhaniadau>1
3607             \chronos@marks@baretrue
3608         \fi
3609     }%
3610 }%
3611 \setlength\chronos@diwedd@diwedd{0pt}%
3612 \setlength\chronos@dechrau@dechrau{0pt}%
3613 \chronos@if@gosodF{markeras}{%
3614     \ifnum\chronos@startyear<0
3615     \ifnum\chronos@endyear>0
3616     \chronos@markerastrue
3617     \fi
3618     \fi
3619 }% \chronos@if@gosodF{markeras}
3620 \ifchronos@markeras % BEGIN

```

angen cōd Martin Scharrer uchod - needs the above code by Martin Scharrer

Rmano: <https://chat.stackexchange.com/transcript/message/64273912#64273912>

```

3621     \ifnum\chronos@endyear>0
3622     \settowidth\chronos@diwedd@diwedd{\chronos@ffont@cyfnodau\chronos@ce}%
3623     \addtolength{\chronos@diwedd@diwedd}{\chronos@eramargin}%
3624     \else
3625     \let\chronos@ce\relax
3626     \fi

```

Rmano: <https://chat.stackexchange.com/transcript/message/64273912#64273912>

```

3627     \ifnum\chronos@startyear<0
3628     \settowidth\chronos@dechrau@dechrau{\chronos@ffont@cyfnodau\chronos@bce}%
3629     \addtolength{\chronos@dechrau@dechrau}{\chronos@eramargin}%
3630     \else
3631     \let\chronos@bce\relax
3632     \fi
3633 \fi % END \ifchronos@markeras

```

cofia!! \chronos@set@date a ffrindiau'n awto-cywiro am flwyddyn sero!!

remember!! \chronos@set@date and friends auto-correct for year zero!!

cofia! ti'n defnyddio **\*\*pgfcalendar\*\*** yn lle blynyddoedd nawr!!

remember! you use pgfcalendar in place of years now!! (but I have no idea what I meant by this ...)

```

3634     \pgfmathsetmacro\chronos@unit{%
3635         (\chronos@width-2*\chronos@timelinemargin-\chronos@dechrau@dechrau-%
3636         \chronos@diwedd@diwedd)/(\thechronos@enddate-\thechronos@startdate)%
3637     }%
3638     \pgfmathsetmacro{\chronos@amser@diwedd}{%
3639         (\thechronos@enddate-\thechronos@startdate)*\chronos@unit}%
3640     \addtolength{\chronos@dechrau@dechrau}{\chronos@timelinemargin}%
3641     \addtolength{\chronos@diwedd@diwedd}{\chronos@timelinemargin}%
3642     \path (Opt,Opt) ++(-\chronos@dechrau@dechrau,Opt) coordinate (chronos pre);%^^A
oedd chronos@dechrau
3643     \path (\chronos@amser@diwedd pt,Opt) ++(\chronos@diwedd@diwedd,Opt)
3644     coordinate (chronos post);%^^A oedd chronos@diwedd
3645     \chronos@inner@halfheight \dimexpr0.5\dimexpr\chronos@height\relax%
3646     \chronos@outer@halfheight \dimexpr\chronos@inner@halfheight+\dimexpr\chronos@borderhei
3647     \coordinate (chronos top) at (Opt,\chronos@inner@halfheight);%^^A oedd chronos@height

```

```

3648     \coordinate (chronos base) at (Opt,-\chronos@inner@halfheight);%^^A oedd chronos@depth
3649     \coordinate (chronos foot) at (Opt,-\chronos@outer@halfheight);
3650     \coordinate (chronos head) at (Opt,\chronos@outer@halfheight);

```

chronos pre-top, chronos post-top, chronos pre-base, chronos post-base

```

3651     \foreach \i/\j in {%
3652         pre/top,post/top,pre/base,post/base,pre/head,post/head,pre/foot,post/foot%
3653     } \coordinate (chronos \i-\j) at (chronos \i |- chronos \j);
3654     \coordinate (chronos start) at (0pt,0pt);% dal yn gywir?
3655     \coordinate (chronos origin) at (chronos start);% newid isod efaillai
3656     \coordinate (chronos end) at (\chronos@amser@diwedd pt,0pt);
3657     \coordinate (chronos mid) at ($(chronos pre)!.5!(chronos post)$);
3658     \coordinate (chronos mid-time) at ($(chronos start)!.5!(chronos end)$);

```

styles which rotate labels need this earlier; reset here in case altered

```

3659     \let\timelineht\chronos@height
3660     \begin{scope}[/chronos/chronos@border@haenen]
3661         \ifdim\chronos@borderheight>Opt
3662             \path [%
3663                 top color=chronos@borderouter,%
3664                 bottom color=chronos@borderinner,%
3665                 middle color=chronos@bordermiddle,%
3666                 /chronos/l1inell amser/timeline@border%
3667             ] (chronos pre-top) rectangle (chronos post-head);
3668             \path [%
3669                 bottom color=chronos@borderouter,%
3670                 top color=chronos@borderinner,%
3671                 middle color=chronos@bordermiddle,%
3672                 /chronos/l1inell amser/timeline@border%
3673             ] (chronos post-base) rectangle (chronos pre-foot);
3674         \fi
3675     \end{scope}% [/chronos/chronos@border@haenen]
3676     \begin{scope}[/chronos/chronos@l1inell amser@haenen]
3677         \ifchronos@yearsonline

```

fill the timeline if putting the years etc. onto it

```

3678         \fill [%
3679             chronos@l1iw@cefndir@l1inell,%
3680             /chronos/l1inell amser/timeline@line%
3681         ] (chronos pre-top) rectangle (chronos post-base);
3682     \else

```

fel arall, draw

```

3683         \draw [%
3684             chronos@l1iw@l1inell,%
3685             line width=\chronos@height,%
3686             /chronos/l1inell amser/timeline@line%
3687         ] (chronos pre) -- (chronos post);

```

gweler ateb Qrrbrbirbel: <https://tex.stackexchange.com/a/701524/> i fy nghwestiwn: <https://tex.stackexchange.com/q/701518/>

```

3688         \coordinate (tmpa) at (current bounding box.north);
3689         \coordinate (tmpb) at (current bounding box.south);
3690         \pgfresetboundingbox
3691         \path (chronos pre) -- (chronos post) -- (tmpa) -- (tmpb);
3692     \fi % \ifchronos@yearsonline

```

prif label - main label lau cyfnodau - eras

```

3693 \ifchronos@markeras % BEGIN
3694 \ifchronos@yearsonline
3695 \node (chronos bce) [%
3696 text=chronos@lliw@llinell,%
3697 font=\chronos@ffont@cyfnodau,%
3698 inner xsep=0pt,%
3699 xshift=-\chronos@eramargin,%
3700 anchor=east%
3701 ] at (chronos start) {\chronos@bce};
3702 \node (chronos ce) [%
3703 text=chronos@lliw@llinell,%
3704 font=\chronos@ffont@cyfnodau,%
3705 inner xsep=0pt,%
3706 xshift=\chronos@eramargin,%
3707 anchor=west%
3708 ] at (chronos end) {\chronos@ce};
3709 \else
3710 \settowidth \chronos@templgthc {\chronos@ffont@cyfnodau\chronos@bce}%
3711 \node (chronos bce) [%
3712 /chronos/llinell amser/timeline@years,%
3713 /chronos/llinell amser/timeline@year@off@line,%
3714 text=chronos@lliw@llinell,%
3715 font=\chronos@ffont@cyfnodau,%
3716 inner xsep=0pt,%
3717 xshift=-\chronos@eramargin-.5\chronos@templgthc%
3718 ] at (chronos start) {\chronos@bce};
3719 \settowidth \chronos@templgthc {\chronos@ffont@cyfnodau\chronos@ce}%
3720 \node (chronos ce) [%
3721 /chronos/llinell amser/timeline@years,%
3722 /chronos/llinell amser/timeline@year@off@line,%
3723 text=chronos@lliw@llinell,%
3724 font=\chronos@ffont@cyfnodau,%
3725 inner xsep=0pt,%
3726 xshift=\chronos@eramargin+.5\chronos@templgthc%
3727 ] at (chronos end) {\chronos@ce};
3728 \fi
3729 \fi % END \ifchronos@markeras
3730 \ifchronos@timeline@showyears % BEGIN
3731 \pgfmathsetcounter{chronos@startyear}{\chronos@startyear}%
3732 \pgfmathsetcounter{chronos@startmarkyear}{\chronos@startyear}%
3733 \pgfmathsetcounter{chronos@endyear}{\chronos@endyear}%
3734 \def\tempa{none}%
3735 \setcounter{chronos@tempcnta}{\value{chronos@endyear}}%
3736 \stepcounter{chronos@tempcnta}%
3737 \addtocounter{chronos@tempcnta}{-\value{chronos@startyear}}%
3738 \IfExistTF \chronos@cam@blwyddyn@fawr {%
3739 \IfExistTF \chronos@cam@blwyddyn@fach {%
3740 \ifnum\chronos@cam@blwyddyn@fach>\chronos@cam@blwyddyn@fawr
3741 \def\chronos@cam@blwyddyn@fach{0}%
3742 \PackageWarning{chronos}{Setting minor step year to zero}%
3743 \else
3744 \IfBooleanExprT {%
3745 (\IntCompareBoolean {\chronos@cam@blwyddyn@fach} > {0}) &&
3746 ! (\LegacyBoolean {chronos@minoryears}) &&
3747 ! (\LegacyBoolean {chronos@marks@minor}) &&
3748 (\LegacyBoolean {chronos@marks@bare})
3749 }{%
3750 \PackageWarning{chronos}{%
3751 Setting minor step year to zero so your marks are evenly spaced%
3752 }%
3753 \def\chronos@cam@blwyddyn@fach{0}%

```

```

3754     }%
3755     \fi
3756   }{\def\chronos@cam@blwyddyn@fach{0}}%
3757 }{%
3758   \IfExistTF \chronos@cam@blwyddyn@fach {%
3759     \let\chronos@cam@blwyddyn@fawr\chronos@cam@blwyddyn@fach
3760     \def\chronos@cam@blwyddyn@fach{0}%
3761     \PackageWarning{chronos}{%
3762       Using minor step year as step year and setting minor step %
3763       year to zero%
3764     }%
3765   }{%
3766     \PackageWarning{chronos}{%
3767       You have not specified how frequently years should be marked %
3768       on the timeline.
3769       Guessing appropriate values.
3770       Set step major year and/or step minor year to specify%
3771     }%
3772     \ifnum\value{chronos@tempcnta}>1500
3773       \def\chronos@cam@blwyddyn@fawr{500}%
3774       \def\chronos@cam@blwyddyn@fach{100}%
3775     \else\ifnum\value{chronos@tempcnta}>1000
3776       \def\chronos@cam@blwyddyn@fawr{250}%
3777       \def\chronos@cam@blwyddyn@fach{50}%
3778     \else\ifnum\value{chronos@tempcnta}>300
3779       \def\chronos@cam@blwyddyn@fawr{100}%
3780       \def\chronos@cam@blwyddyn@fach{50}%
3781     \else\ifnum\value{chronos@tempcnta}>150
3782       \def\chronos@cam@blwyddyn@fawr{100}%
3783       \def\chronos@cam@blwyddyn@fach{25}%
3784     \else\ifnum\value{chronos@tempcnta}>100
3785       \def\chronos@cam@blwyddyn@fawr{50}%
3786       \def\chronos@cam@blwyddyn@fach{10}%
3787     \else\ifnum\value{chronos@tempcnta}>50
3788       \def\chronos@cam@blwyddyn@fawr{20}%
3789       \def\chronos@cam@blwyddyn@fach{10}%
3790     \else\ifnum\value{chronos@tempcnta}>20
3791       \def\chronos@cam@blwyddyn@fawr{10}%
3792       \def\chronos@cam@blwyddyn@fach{2}%
3793     \else\ifnum\value{chronos@tempcnta}>10
3794       \def\chronos@cam@blwyddyn@fawr{5}%
3795       \def\chronos@cam@blwyddyn@fach{1}%
3796     \else\def\chronos@cam@blwyddyn@fawr{1}%
3797     \def\chronos@cam@blwyddyn@fach{0}%
3798     \fi % >10
3799     \fi % >20
3800     \fi % >50
3801     \fi % > 100
3802     \fi % > 150
3803     \fi % >300
3804     \fi % >1000
3805     \fi % >1500
3806   }%
3807 }% \IfExistTF \chronos@cam@blwyddyn@fawr
3808 \chronos@if@gosodF{markateraswitch}{%
3809   \ifnum\chronos@cam@blwyddyn@fach=1
3810     \chronos@markateraswitchfalse
3811   \else
3812     \ifnum\chronos@cam@blwyddyn@fawr=1
3813       \chronos@markateraswitchfalse
3814     \else

```

```

3815         \chronos@markateraswitchtrue
3816         \fi
3817     \fi
3818 }%
3819 \ifnum\chronos@cam@blwyddyn@fach=0
3820     \let\chronos@tempv\chronos@cam@blwyddyn@fawr
3821 \else
3822     \let\chronos@tempv\chronos@cam@blwyddyn@fach
3823 \fi
3824 \IfExistF \chronos@camrhaniadau {%^A rhaid \chronos@marks@baretrue o achos
y cõd uchod
3825     \ifnum\value{chronos@tempcnta}<5
3826         \chronos@marks@baretrue
3827         \PackageInfo{chronos}{%
3828             I'm guessing you want bare marks on your timeline.
3829             If I'm wrong, specify step divisions=0 to override my decision}%
3830     \ifnum\value{chronos@tempcnta}>2
3831         \def\chronos@camrhaniadau{4}%
3832     \else
3833         \ifnum\value{chronos@tempcnta}>1
3834             \def\chronos@camrhaniadau{6}%
3835         \else
3836             \def\chronos@camrhaniadau{12}%
3837         \fi % >1
3838     \fi % >2
3839 \else
3840     \ifchronos@marks@bare\relax
3841     \else
3842         \chronos@marks@barefalse
3843         \PackageInfo{chronos}{%
3844             I'm guessing you don't want bare marks on your timeline.
3845             If I'm wrong, specify step divisions to override my decision}%
3846     \fi
3847     \fi % <5
3848 }% \chronos@camrhaniadau
3849 \ifchronos@marks@bare
3850     \IfExistF \chronos@camrhaniadau {%
3851         \PackageInfo{chronos}{%
3852             You have requested bare marks but not specified how many.
3853             Guessing 4 per minor step. Set step divisions to specify}%
3854         \def\chronos@camrhaniadau{4}%
3855     }% \IfExistT \chronos@camrhaniadau
3856 \fi % \ifchronos@marks@bare
3857 \IfFreeTF \chronos@stepfrom {%
3858     \ifnum\thechronos@startyear=\thechronos@endyear
3859     \else
3860         \def\tempa{01}%
3861         \ifx\chronos@startmonth\tempa
3862             \ifx\chronos@startday\tempa
3863             \else
3864                 \stepcounter{chronos@startmarkyear}%
3865                 \fi % \ifx\chronos@startday\tempa
3866             \else
3867                 \stepcounter{chronos@startmarkyear}%
3868                 \fi % \ifx\chronos@startmonth\tempa
3869             \fi % \ifnum\thechronos@startyear=\thechronos@endyear
3870     \pgfmathsetmacro\chronos@tempremainder{%
3871         int(mod(\thechronos@startmarkyear,\chronos@tempv))}%
3872     \ifnum\chronos@tempremainder=0\relax
3873     \else
3874         \IfBooleanExprTF {%

```

```

3875         ! (\LegacyBoolean{chronos@yearzero}) &&
3876         (\IntCompareBoolean{\thechronos@startmarkyear}{=} {1}) %
3877     }{%
3878     \setcounter{chronos@startmarkyear}{0}% => 1 fel chronos@startmarkyear
3879 }{%
3880     \ifnum\chronos@tempremainder<0
3881         \pgfmathsetcounter{chronos@startmarkyear}{%
3882             int(\thechronos@startmarkyear-\chronos@tempremainder)}%
3883     \else
3884         \pgfmathparse{%
3885             int(\thechronos@startmarkyear-\chronos@tempremainder+\chronos@tempv)}%
3886     }%
3887     \ifnum\pgfmathresult>\thechronos@endyear
3888         \PackageWarning{chronos}{Ignoring steps}%
3889     \else
3890         \setcounter{chronos@startmarkyear}{\pgfmathresult}%
3891     \fi
3892 \fi
3893 }%
3894 \fi
3895 }{%
3896 \pgfmathsetcounter{chronos@startmarkyear}{\chronos@stepfrom}%
3897 \pgfmathparse{int(mod(\thechronos@startmarkyear,\chronos@tempv))}%
3898 \ifnum\pgfmathresult=0\relax
3899 \else
3900     \PackageWarning{chronos}{%
3901         You have explicitly requested years marked on your timeline %
3902         which are not modulo the steps you have specified.
3903         I'm setting the year format to show full years, which should %
3904         make the result a bit more intelligible.%
3905     }%
3906     \chronos@setminoryearformat{!Y}%
3907 \fi
3908 }% \IfFreeTF \chronos@stepfrom
3909 \ifnum\chronos@cam@blwyddyn@fach=0
3910     \pgfmathsetmacro\chronos@nextstep{%
3911         int(((\thechronos@startmarkyear+\chronos@cam@blwyddyn@fawr)>\thechronos@endyear
3912             ? \thechronos@endyear :
3913             (\thechronos@startmarkyear+\chronos@cam@blwyddyn@fawr))%
3914     }%
3915 \else
3916     \pgfmathsetmacro\chronos@nextstep{%
3917         int(((\thechronos@startmarkyear+\chronos@cam@blwyddyn@fach)>\thechronos@endyear
3918             ? \thechronos@endyear :
3919             (\thechronos@startmarkyear+\chronos@cam@blwyddyn@fach))%
3920     }%
3921 \fi
3922 \chronos@global@clear@to@clist{tmpa}{}%
3923 \IfExistT \chronos@camrhaniadau
3924     {\pgfmathsetmacro \chronos@tempml{int(\chronos@camrhaniadau-1)}}%
3925 \ifchronos@yearzero
3926     \setcounter{chronos@tempcnta}{1}
3927 \else
3928     \setcounter{chronos@tempcnta}{0}%
3929 \fi
3930 \IfBooleanExprTF {%
3931     (\IntCompareBoolean{\chronos@nextstep}{=}{\thechronos@startmarkyear})
3932     || ! (\IntCompareBoolean{\chronos@nextstep}{<}{\thechronos@endyear})
3933     || ( ( \IntCompareBoolean{\chronos@nextstep}{=} {0} ) ||
3934         (\IntCompareBoolean{\thechronos@startmarkyear}{=} {0} ) ) &&
3935     (\IntCompareBoolean{\thechronos@startmarkyear}{<}{-\thechronos@endyear})

```

```

3936      && ! \LegacyBoolean {chronos@yearzero} )
3937 }{%^^A osgoi infinite loop yn pgf \foreach isod
3938 \setcounter{chronos@tempcntb}{\thechronos@endyear}%
3939 \addtocounter{chronos@tempcntb}{-\thechronos@startyear}%
3940 \IfBooleanExprT {%
3941 ! \LegacyBoolean {chronos@yearzero} &&
3942 (\IntCompareBoolean{\thechronos@startmarkyear}{>}{-\thechronos@endyear})
3943 && ( (\IntCompareBoolean{\chronos@nextstep}{=}{0}) ||
3944 (\IntCompareBoolean{\thechronos@startmarkyear}{=}{0}) )
3945 } {\addtocounter{chronos@tempcntb}{-1}}%
3946 \ifnum\thechronos@tempcntb<2
3947 \IfExistTF \chronos@camrhaniadau
3948 {%
3949 \pgfmathparse{int(mod(12,\chronos@camrhaniadau))}%
3950 \ifnum\pgfmathresult=0\relax
3951 \else
3952 \PackageWarning{%
3953 Since your timeline spans fewer than two years, %
3954 step divisions must be a factor of 12.
3955 I will use 4 if you requested 5 and 6 otherwise}%
3956 \ifnum\pgfmathresult=5
3957 \def\chronos@camrhaniadau{4}%
3958 \else
3959 \ifnum\pgfmathresult>6
3960 \def\chronos@camrhaniadau{6}%
3961 \fi % \fnum\pgfmathresult>6 hynny yw 7,8,9,10,11
3962 \fi % \ifnum\pgfmathresult=5
3963 \fi % \ifnum\pgfmathresult=0
3964 \setcounter{chronos@tempcntb}{\chronos@startmonth}%
3965 \ifnum\chronos@startday>1 \stepcounter{chronos@tempcntb}\fi
3966 \edef\chronos@tmpstartmonth{\thechronos@tempcntb}%
3967 \IfBooleanExprF {%
3968 (\IntCompareBoolean{\chronos@tmpstartmonth}{=}{\chronos@endmonth})
3969 &&
3970 (\IntCompareBoolean{\thechronos@startyear}{=}{\thechronos@endyear})
3971 }
3972 {%
3973 \pgfmathsetcounter{chronos@tempcntc}{int{12/\chronos@camrhaniadau}}%
3974 \addtocounter{chronos@tempcntb}{\thechronos@tempcntc}%
3975 \ifnum\thechronos@tempcntb>11
3976 \edef\chronos@tempu{\chronos@tmpstartmonth,12}%
3977 \else
3978 \edef\chronos@tempu{%
3979 \chronos@tmpstartmonth,\thechronos@tempcntb,...,12}%
3980 \fi
3981 \foreach \m [expand list] in {\chronos@tempu}%
3982 {%
3983 \chronos@set@date {\thechronos@startyear}{\m}{01}{tempa}%
3984 \ifnum\thechronos@tempdate>\thechronos@enddate
3985 \breakforeach
3986 \else
3987 \ifnum\m=1
3988 \chronos@global@to@clist**{tempa}{%
3989 \thechronos@tempdate/\thechronos@startyear/\thechronos@startyear}%
3990 }%
3991 \else
3992 \chronos@global@to@clist**{tempa}{%
3993 \thechronos@tempdate/-5000/\thechronos@startyear}%
3994 }%
3995 \fi % \m=1
3996 \fi % \thechronos@tempdate>\thechronos@enddate

```



```

3997         }% \foreach \m in {\chronos@tmpstartmonth,...,12}
3998         \ifnum\thechronos@startyear<\thechronos@endyear
3999         \stepcounter{chronos@tempcntc}%
4000         \ifnum\thechronos@tempcntc<\chronos@endmonth
4001         \edef\chronos@tempu{1,\thechronos@tempcntc,...,\chronos@endmonth}%
4002         \else
4003         \edef\chronos@tempu{1,\thechronos@tempcntc}%
4004         \fi
4005         \foreach \m [expand list] in {\chronos@tempu} %^A {1,...,\chronos@endm
4006         {%
4007         \chronos@set@date {\thechronos@endyear}{\m}{01}{tempa}%^A awto-cywiro
    am flwyddyn sero
4008         \ifnum\thechronos@tempadate>\thechronos@enddate
4009         \breakforeach
4010         \else
4011         \ifnum\m=1
4012         \chronos@global@to@clist*+{tempa}{%
4013         \thechronos@tempadate/\thechronos@endyear/\thechronos@endyear%
4014         }%
4015         \else
4016         \chronos@global@to@clist*+{tempa}{%
4017         \thechronos@tempadate/-5000/\thechronos@endyear%
4018         }%
4019         \fi %^A \m=1
4020         \fi %^A \thechronos@tempadate>\thechronos@enddate
4021         }%^A \foreach \m in {1,...,\chronos@endmonth}
4022         \fi % \thechronos@startyear<\thechronos@endyear
4023         }%^A \ifboolexpr { test {\ifnum\thechronos@tmpstartmonth=\thechronos@endm
    and test {\ifnum\thechronos@startyear=\thechronos@endyear} }
4024         }%^A \IfExistTF \chronos@camrhaniadau F
4025         \chronos@global@to@clist*+{tempa}{%
4026         \thechronos@startdate/\thechronos@startmarkyear/\thechronos@startmarkyear,
4027         \thechronos@enddate/\thechronos@endyear/\thechronos@endyear%
4028         }%
4029         }%^A \IfExistTF \chronos@camrhaniadau
4030         \chronos@marks@barefalse
4031         \else
4032         \foreach \b [%
4033         evaluate=\b as \i using {%
4034         ((\b==0)&&(\thechronos@tempcnta==0)) ? 1 : int(\b)}%
4035         ] in {\thechronos@startmarkyear,\thechronos@endyear} {%
4036         \chronos@set@date{\i}{01}{01}{year}%^A awto-cywiro am flwyddyn sero
4037         \chronos@global@to@clist*+{tempa}{\thechronos@yeardate/\b/\i}%
4038         }%
4039         \fi % \ifnum\thechronos@tempcntb<2
4040         }{%
4041         \foreach \b [%
4042         evaluate=\b as \i using {%
4043         ((\b==0)&&(\thechronos@tempcnta==0)) ? 1 : int(\b)}%
4044         ] in {%
4045         \thechronos@startmarkyear,\chronos@nextstep,...,\thechronos@endyear%
4046         } {%
4047         \chronos@set@date{\i}{01}{01}{year}% awto-cywiro am flwyddyn sero
4048         \chronos@global@to@clist*+{tempa}{\thechronos@yeardate/\b/\i}%
4049         }%
4050         }%^A \ifboolexpr { test {\ifnumcomp{\chronos@nextstep}={}\thechronos@startyear}}
    or test {\ifnumcomp{\chronos@nextstep}={}\thechronos@endyear}} }
4051         \foreach \d/\b/\chronosyeari [%
4052         expand list,%
4053         remember=\chronosyeari as \ilast (initially \pi),%

```

```

4054         remember=\d as \dlast (initially \pi)%
4055     ] in {\chronos@global@from@clist{tmpa}}
4056     {% BEGIN \foreach \b ...
4057         \ifnum\d=\dlast\relax % BEGIN
4058         \else
4059             \pgfmathsetmacro\chronos@tempa{(\d-\thechronos@startdate)*\chronos@unit}%
4060             \coordinate (chronos date \d) at (\chronos@tempa pt,0pt);
4061             \pgfqkeys{/chronos}{% defnyddio am nodau noeth beth bynnag ac am marciau
cyffredinol os y llinell amser yn fyr
4062                 temp@on/.style={/chronos/llinell amser/timeline@minor@mark@on@line},
4063                 temp@off/.style={/chronos/llinell amser/timeline@minor@mark@off@line},
4064             }%
4065             \ifnum\dlast=\pi
4066                 \let\chronos@tempff\chronos@ffont@camaubach
4067                 \ifchronos@yearsonline
4068                     \node (chronos phantom year) [%
4069                         rotate around/.style={},%
4070                         rotate/.style={},%
4071                         /chronos/llinell amser/timeline@years,%
4072                         /chronos/llinell amser/timeline@year@on@line,%
4073                         font=\chronos@tempff%
4074                     ] at (chronos start) {\phantom{1}};
4075                 \else
4076                     \node (chronos phantom year) [%
4077                         rotate around/.style={},%
4078                         rotate/.style={},%
4079                         /chronos/llinell amser/timeline@years,%
4080                         /chronos/llinell amser/timeline@year@off@line,%
4081                         font=\chronos@tempff,%
4082                         fill=none%
4083                     ] at (chronos start)
4084                     {\phantom{\chronos@showyear[\chronos@minoryearformat]{1}}};
4085                 \fi
4086             \fi % \ifnum\dlast=\pi
4087             \ifnum\b=-5000
4088                 \ifchronos@yearsonline
4089                     \path [/chronos/temp@on]
4090                     (chronos phantom year.south -| chronos date \d) --
4091                     (chronos phantom year.north -| chronos date \d);
4092                 \else
4093                     \path [/chronos/temp@off] (chronos date \d) --
4094                     (chronos date \d |- chronos phantom year.\chronos@timelinyearsanchor)
4095                     ;
4096                 \fi
4097             \else % \ifnum\b=-5000
4098                 \coordinate (chronos year \chronosyeari) at (\chronos@tempa pt,0pt);
4099                 \ifnum\b=\thechronos@startmarkyear
4100                     \xdef\chronos@firstmarkedyeardate{\d}%
4101                     \coordinate (chronos first marked year) at (chronos year \chronosyeari);
4102                 \ifnum\chronosyeari=0
4103                     \coordinate (chronos origin) at (\chronos@tempa pt,0pt);
4104                 \fi
4105                 \else
4106                     \ifnum\chronosyeari=1
4107                         \ifchronos@yearzero\relax
4108                         \else
4109                             \coordinate (chronos origin) at (\chronos@tempa pt,0pt);

```

make \foreach loops work straightforwardly (not used in main code)

```

4110         \coordinate (chronos year 0) at (chronos year 1);
4111     \fi % \ifchronos@yearzero

```

```

4112         \fi % \ifnum\chronosyeari=1
4113     \fi % \ifnum\b=\thechronos@startmarkyear
4114     \ifnum\b=\chronos@nextstep
4115         \ifchronos@marks@bare
4116             \pgfmathsetmacro\chronos@tempg{%
4117                 ((\d-\chronos@firstmarkedyeardate)*\chronos@unit)/\chronos@camrhaniada
4118             }%
4119             \global\let\chronos@tempg\chronos@tempg
4120         \fi
4121     \fi % \ifnum\b=\chronos@nextstep
4122     \ifnum\chronos@cam@blwyddyn@fach=0
4123         \chronos@cam@modtrue
4124     \else
4125         \pgfmathparse{int(mod(\chronosyeari,\chronos@cam@blwyddyn@fawr))}%
4126         \ifnum\pgfmathresult=0\relax
4127             \chronos@cam@modtrue
4128         \else
4129             \IfBooleanExprT {%
4130                 ! \LegacyBoolean {chronos@yearzero} &&
4131                 \IntCompareBoolean {\chronosyeari}={1}
4132             }{%
4133                 \pgfmathparse{int(mod((\chronosyeari-1),\chronos@cam@blwyddyn@fawr))}%
4134                 \ifnum\pgfmathresult=0\relax
4135                     \chronos@cam@modtrue
4136                 \fi
4137             }%
4138         \fi % \ifnum\pgfmathresult=0
4139     \fi % \ifnum\chronos@cam@blwyddyn@fach=0
4140     \ifchronos@cam@mod
4141         \pgfqkeys{/chronos}{%
4142             temp@on/.style={%
4143                 /chronos/l1line1 amser/timeline@mark@on@line},
4144             temp@off/.style={%
4145                 /chronos/l1line1 amser/timeline@mark@off@line},
4146         }%
4147         \let\chronos@tempff\chronos@ffont@camaumawr
4148         \def\chronos@tempf{%
4149     \else
4150         \pgfqkeys{/chronos}{%
4151             temp@on/.style={%
4152                 /chronos/l1line1 amser/timeline@minor@mark@on@line},
4153             temp@off/.style={%
4154                 /chronos/l1line1 amser/timeline@minor@mark@off@line},
4155         }%
4156         \let\chronos@tempff\chronos@ffont@camaubach
4157         \xdef\chronos@tempf{\chronos@minoryearformat}%
4158         \ifchronos@marks@minor
4159             \chronos@markstrue
4160         \else
4161             \chronos@marksfalse
4162         \fi
4163     \fi % ^A \ifchronos@cam@mod

\ifchronos@temp tracks whether we draw a node (T) or coordinate (F)

4164     \ifchronos@markateraswitch %
4165         \ifnum\b=0
4166             \chronos@tempfalse
4167         \else
4168             \chronos@temptrue
4169         \fi
4170     \ifchronos@minoryears \else \ifchronos@cam@mod \else \chronos@tempfalse

```

```

\fi\fi
4171             \else
4172             \chronos@temptrue
4173             \fi

BEGIN \ifchronos@yearsonline ...

4174             \ifchronos@yearsonline

if labelling era switch or not switching here, use a node

4175             \ifchronos@temp
4176             \node (chronos year \chronosyeari) [%
4177             /chronos/llinell amser/timeline@years,%
4178             /chronos/llinell amser/timeline@year@on@line,%
4179             font=\chronos@tempff%
4180             ] at (chronos year \chronosyeari)
4181             {\chronos@showyear[\chronos@temp]{\chronosyeari}};
4182 \fi %^^A END \ifchronos@temp
4183 \ifchronos@marks %^^A BEGIN
4184 \path [/chronos/temp@on] (chronos year \chronosyeari.south) --
4185 (chronos year \chronosyeari |- chronos base);%^^A rhag ofn rotate
      (pwy sy'n gwybod?)
4186 \path [/chronos/temp@on] (chronos year \chronosyeari.north) --
4187 (chronos year \chronosyeari |- chronos top);%^^A rhag ofn rotate
      (pwy sy'n gwybod?)
4188 \ifchronos@marks@bare % BEGIN
4189 \ifnum\dlast=\pi\relax % BEGIN
4190 \else
4191 \ifnum\chronos@camrhaniadau>1 % BEGIN
4192 \foreach \m [evaluate=\m as \n using {int(\m-1)}]
4193 in {2,...,\chronos@camrhaniadau}
4194 {%
4195 \path [%
4196 /chronos/llinell amser/timeline@bare@mark@on@line%
4197 ] ([xshift={-\n*\chronos@tempg pt}]chronos year
4198 \chronosyeari |- chronos phantom year.south)
4199 -- ([xshift={-\n*\chronos@tempg pt}]chronos year
4200 \chronosyeari |- chronos phantom year.north);
4201 }%
4202 \ifnum\b=\chronos@nextstep % BEGIN
4203 \path (chronos year \ilast);
4204 \pgfgetlastxy{\chronos@tempgx}{\chronos@tempgy}%
4205 \setlength \chronos@templgtha{%
4206 \chronos@tempgx-\chronos@tempg pt}%
4207 \ifdim\chronos@templgtha<Opt\relax % BEGIN
4208 \else
4209 \foreach \n in {1,...,\chronos@tempml}
4210 {%
4211 \coordinate (a) at (\chronos@templgtha,Opt);
4212 \path [%
4213 /chronos/llinell amser/timeline@bare@mark@on@line%
4214 ] (a |- chronos phantom year.south) --
4215 (a |- chronos phantom year.north);
4216 \addtolength \chronos@templgtha{-\chronos@tempg pt}%
4217 \ifdim\chronos@templgtha<Opt
4218 \breakforeach
4219 \fi
4220 \global\chronos@templgtha\chronos@templgtha
4221 }%
4222 \fi % END \ifdim\chronos@templgtha<Opt
4223 \fi % END \ifnum\b=\chronos@nextstep

```

```

4224         \edef\chronos@tempey{\thechronos@endyear}%
4225         \pgfmathsetmacro\chronos@tempny{int(\b+\chronos@tempv)}%
4226         \ifnum\chronos@tempny>\thechronos@endyear % BEGIN
4227         \path (chronos year \chronosyeari);
4228         \pgfgetlastxy{\chronos@tempgx}{\chronos@tempgy}%
4229         \setlength \chronos@templgtha{%
4230         \chronos@tempgx+\chronos@tempg pt}%
4231         \path (chronos end);
4232         \pgfgetlastxy{\chronos@tempgx}{\chronos@tempgy}%
4233         \ifdim\chronos@templgtha>\chronos@tempgx\relax % BEGIN
4234         \else
4235         \foreach \n in {1,...,\chronos@tempml}
4236         {%
4237         \coordinate (a) at (\chronos@templgtha,0pt);
4238         \path [%
4239         /chronos/l1line1l amser/timeline@bare@mark@on@line%
4240         ]
4241         (a |- chronos phantom year.south) --
4242         (a |- chronos phantom year.north);
4243         \addtolength \chronos@templgtha{\chronos@tempg pt}%
4244         \ifdim\chronos@templgtha>\chronos@tempgx
4245         \breakforeach
4246         \fi
4247         \global\chronos@templgtha\chronos@templgtha
4248         }%
4249         \fi % END \ifdim\chronos@templgtha<0pt
4250         \fi % END \ifnum\chronos@tempny>\thechronos@endyear
4251         \fi % END \ifnum\chronos@camrhaniadau>1
4252         \fi % END \ifnum\dlast=\pi
4253         \fi % END \ifchronos@marks@bare
4254         \fi % END \ifchronos@marks
4255         \else % chronos@yearsonline yw F

```

if labelling era switch or not switching here, use a node

```

4256         \ifchronos@temp
4257         \node (chronos node year \chronosyeari) [%
4258         /chronos/l1line1l amser/timeline@years,%
4259         /chronos/l1line1l amser/timeline@year@off@line,%
4260         font=\chronos@tempff%
4261         ] at (chronos year \chronosyeari)
4262         {\chronos@showyear[\chronos@temp]{\chronosyeari}};
4263         \else
4264         \node (chronos node year \chronosyeari) [%
4265         /chronos/l1line1l amser/timeline@years,%
4266         /chronos/l1line1l amser/timeline@year@off@line,%
4267         font=\chronos@ffont@camaumawr,%
4268         draw=none,%
4269         fill=none%
4270         ] at (chronos year \chronosyeari)
4271         {\phantom{\chronos@showyear[\chronos@temp]{\chronosyeari}}};
4272         \fi %^^A END % \ifchronos@temp
4273         \ifchronos@marks %^^A BEGIN
4274         \ifchronos@temp
4275         \else
4276         \ifnum\b=0
4277         \path [%
4278         shorten <=.5*\chronos@height,
4279         /chronos/temp@off,
4280         /chronos/l1line1l amser/era switch off line%
4281         ] (\chronos@tempa pt,0pt) --
4282         (chronos node year \chronosyeari.center -| chronos year \chronosyeari)

```

```

4283             ;%^^A rhag ofn rotate
4284             \chronos@temptrue
4285             \fi
4286         \fi
4287             \path [shorten <=.5*\chronos@height, /chronos/temp@off]
4288             (\chronos@tempa pt,0pt) --
4289             (chronos node year \chronosyeari.\chronos@timelinyearsanchor
-| chronos year \chronosyeari) ;
4290             \ifnum\dlast=\pi\relax
4291             \else
4292             \ifchronos@marks@bare % BEGIN
4293             \ifnum\chronos@camrhaniadau>1
4294             \foreach \m [evaluate=\m as \n using {int(\m-1)}] in
4295             {2,...,\chronos@camrhaniadau}
4296             \path [%
4297             shorten <=.5*\chronos@height,
4298             /chronos/llinell amser/timeline@bare@mark@off@line%
4299             ] ([xshift={-\n*\chronos@tempg pt}]\chronos@tempa pt,0pt)
4300             coordinate (\chronosyeari-\n) --
4301             (\chronosyeari-\n |- chronos node year \chronosyeari.\chronos@
4302             \ifnum\b=\chronos@nextstep % BEGIN
4303             \path (chronos year \ilast);
4304             \pgfgetlastxy{\chronos@tempgx}{\chronos@tempgy}%
4305             \setlength \chronos@templgtha{%
4306             \chronos@tempgx-\chronos@tempg pt}%
4307             \ifdim\chronos@templgtha<Opt\relax % BEGIN
4308             \else
4309             \foreach \n in {1,...,\chronos@tempml}
4310             {%
4311             \path [%
4312             shorten <=.5*\chronos@height,
4313             /chronos/llinell amser/timeline@bare@mark@off@line%
4314             ] (\chronos@templgtha,0pt) coordinate (a) --
4315             (a |- chronos node year \chronosyeari.\chronos@timelinyea
4316             \addtolength \chronos@templgtha{-\chronos@tempg pt}%
4317             \ifdim\chronos@templgtha<Opt \breakforeach\fi
4318             \global\chronos@templgtha\chronos@templgtha
4319             }%
4320             \fi % \ifdim\chronos@templgtha<Opt
4321             \fi % \ifnum\b=\chronos@nextstep
4322             \edef\chronos@temppey{\thechronos@endyear}%
4323             \pgfmathsetmacro\chronos@tempny{int(\b+\chronos@tempv)}%
4324             \ifnum\chronos@tempny>\thechronos@endyear % BEGIN
4325             \path (chronos year \chronosyeari);
4326             \pgfgetlastxy{\chronos@tempgx}{\chronos@tempgy}%
4327             \setlength \chronos@templgtha{%
4328             \chronos@tempgx+\chronos@tempg pt}%
4329             \path (chronos end);
4330             \pgfgetlastxy{\chronos@tempgx}{\chronos@tempgy}%
4331             \ifdim\chronos@templgtha>\chronos@tempgx\relax % BEGIN
4332             \else
4333             \foreach \n in {1,...,\chronos@tempml}
4334             {%
4335             \path [%
4336             shorten <=.5*\chronos@height,%
4337             /chronos/llinell amser/timeline@bare@mark@off@line,%
4338             magenta%
4339             ] (\chronos@templgtha,0pt) coordinate (a) --
4340             (a |- chronos node year \chronosyeari.\chronos@timelinyea
4341             \addtolength \chronos@templgtha{\chronos@tempg pt}%
4342             \ifdim\chronos@templgtha>\chronos@tempgx

```

```

4343             \breakforeach
4344             \fi
4345             \global\chronos@templgtha\chronos@templgtha
4346             }%
4347             \fi % END \ifdim\chronos@templgtha<Opt
4348             \fi % END \ifnum\b=\thechronos@endyear
4349             \fi % END \ifnum\chronos@camrhaniadau>1below
4350             \fi % END \ifchronos@marks@bare
4351             \fi % END \ifnum\dlast=\pi
4352             \fi % END \ifchronos@marks
4353             \fi % END years on line
4354             \fi % \ifnum\b=-5000
4355             \fi % \ifnum\d=\dlast % END
4356             }% END \foreach \b ...
4357     \fi % END showing years
4358     \chronos@from@clist{dyddiadau_coords}{\chronos@coords}%
4359     \ifx\chronos@coords\@empty\relax % BEGIN
4360     \else
4361         \foreach \i in \chronos@coords {%
4362             \chronos@set@date{\i}{01}{01}{tempa}% awto-cywiro am flwyddyn sero
4363             \pgfmathsetmacro\chronos@tempb{%
4364                 (\thechronos@tempdate-\thechronos@startdate)*\chronos@unit%
4365             }%
4366             \edef\chronos@tempa{\chronos@tempyear}\edef\chronos@tempb{\i}%
4367             \ifx\chronos@tempa\chronos@tempb
4368                 \coordinate (chronos year \i) at (\chronos@tempb pt,0pt);
4369             \else
4370                 \coordinate (chronos date \i) at (\chronos@tempb pt,0pt);
4371             \fi
4372             }%
4373     \fi% END
4374     \ifchronos@eventyearsonline
4375         \pgfqkeys{/chronos}{%
4376             timeline years=on line,
4377         }%
4378     \fi
4379     \end{scope}% [/chronos/chronos@llinell amser@haenen] ?

```

phantom nodes - haws i gosodi pethau | easy to install things

```

4380     \begin{scope}[%^A <<< byw,every node etc.
4381         byw,every node/.append style={%
4382             /chronos/@testun=chronos@prifliw,/chronos/placeholder%
4383         }%
4384     ]%
4385     \ifnum\chronos@uchod>0
4386         \node (u1) [%
4387             anchor=south west, yshift=\chronos@borderheight+2pt, alias=level 1%
4388         ] at (chronos top -| \chronos@lefelau@at)
4389         {\phantom{Enw}u1 \textbar{} level 1\\\phantom{1234}};
4390     \ifnum\chronos@uchod>1
4391         \foreach \i [count=\ino] in {2,...,\chronos@uchod}
4392             \node (u\i) [anchor=south west, alias=level \i] at
4393             (u\ino.north west) {%
4394                 \phantom{Enw}u\i{} \textbar{} level \i\\\phantom{1234}%
4395             };
4396     \fi
4397     \fi
4398     \ifnum\chronos@isod>0
4399         \node (i1) [%
4400             anchor=north west, yshift=-\chronos@borderheight-2pt, alias=level -1%
4401         ] at (chronos base -| \chronos@lefelau@at)

```

```

4402         {\phantom{Enw}i1 \textbar{} level -1\\phantom{1234}};
4403     \ifnum\chronos@isod>1
4404         \foreach \i [count=\ino] in {2,...,\chronos@isod}
4405             \node (i\i) [anchor=north west, alias=level -\i] at
4406                 (i\ino.south west)
4407                 {\phantom{Enw}i\i{} \textbar{} level -\i\\phantom{1234}};
4408     \fi
4409 \fi
4410 \ifchronos@showcoords
4411 \begin{scope}[on chronos overlay layer]
4412     \ifnum\chronos@uchod>0
4413         \foreach \i in {1,...,\chronos@uchod}
4414             \draw [help lines, draw=chronos@lliw@node] (u\i.north east)
4415                 -| (u\i.south west) -| cycle;
4416     \fi
4417     \ifnum\chronos@isod>0
4418         \foreach \i in {1,...,\chronos@isod}
4419             \draw [help lines, draw=chronos@lliw@node]
4420                 (i\i.north east) -| (i\i.south west) -| cycle;
4421     \fi
4422 \end{scope}%[on chronos overlay layer]
4423 \fi
4424 \end{scope}%^^A >>> byw, every node etc.
4425 \let\ceyearlabel\chronos@yearce
4426 \let\bceyearlabel\chronos@yearbce
4427 \let\celabel\chronos@ce
4428 \let\bcelabel\chronos@bce
4429 \let\timelineborderht\chronos@borderheight
4430 \let\timelinewd\chronos@width
4431 \let\lineyshift\chronos@llinell@yshift

```

At the end of `chronos` ...

```

4432 }{%^^A oedd yn execute at end picture={...}
4433 \ifchronos@frame
4434     \ifchronos@headings\relax
4435     \else
4436         \ifchronos@framedefnyddiobb\relax
4437         \else
4438             \pgfqkeys{/chronos}{subheadings drops'=Opt:Opt}%
4439             \chronos@headingstrue
4440             \fi % \ifchronos@framedefnyddiobb
4441             \fi % \ifchronos@headings
4442         \fi % \ifchronos@frame
4443     \ifchronos@headings
4444         \ifdim\chronos@heading@drop=Opt
4445             \chronos@heading@drop=15pt
4446             \PackageWarning{chronos}{Setting headings drop to 15pt}%
4447         \fi
4448         \ifdim\chronos@subheading@drop@uchod=Opt
4449             \chronos@subheading@drop@uchod=12pt
4450             \PackageWarning{chronos}{Setting upper subheading drop to 12pt}%
4451         \fi
4452         \ifdim\chronos@subheading@drop@isod=Opt
4453             \chronos@subheading@drop@isod=10pt
4454             \PackageWarning{chronos}{Setting lower subheading drop to 10pt}%
4455         \fi
4456     \ifnum\chronos@uchod=0
4457         \coordinate (u0) at (current bounding box.north);
4458         \PackageWarning{chronos}{%
4459             Placing (u0) at (current bounding box.north) for headings placement.%
4460     }%

```



```

4461     \fi
4462     \ifdim\chronos@border@penawdau=\pi pt
4463         \IfIntCompareTF {\chronos@uchod > 0}
4464         {%
4465             \chronos@border@penawdau=15pt
4466             \PackageWarning{chronos}{%
4467                 Allowing 15pt plus headings and subheadings drops for headings.%
4468             }%
4469         }{%
4470             \chronos@border@penawdau=5pt
4471             \PackageWarning{chronos}{%
4472                 Allowing 5pt plus headings and subheadings drops for headings.%
4473             }%
4474         }%
4475         \advance \chronos@border@penawdau by \chronos@heading@drop
4476         \advance \chronos@border@penawdau by \chronos@subheading@drop@uchod
4477         \advance \chronos@border@penawdau by \chronos@subheading@drop@isod
4478     \fi
4479     \ifnum\chronos@isod=0
4480         \coordinate (i0) at (current bounding box.south);
4481         \PackageWarning{chronos}{%
4482             Placing (i0) at (current bounding box.south) for structural purposes.%
4483         }%
4484     \fi
4485     \chronos@templgtha=\chronos@border@penawdau
4486     \advance\chronos@templgtha by \chronos@border@pen
4487     \coordinate (chronos margin top) at
4488         ($(\u\chronos@uchod.north -| chronos post) + (Opt,\chronos@templgtha)$);
4489     \chronos@templgtha=\chronos@border@pen
4490     \advance\chronos@templgtha by \chronos@heading@drop
4491     \coordinate (chronos main headings) at
4492         ($(\chronos margin top) - (Opt,\chronos@templgtha)$);% oedd pen & gwahanol
4493     \coordinate (chronos bottom) at
4494         ($(\i\chronos@isod.south) + (Opt,-\chronos@border@gwaelod)$);% oedd gwaelod
4495     \coordinate (chronos upper subheadings) at
4496         ($(\chronos main headings) - (Opt,\chronos@subheading@drop@uchod)$);% oedd pwy1
4497     \coordinate (chronos lower subheadings) at
4498         ($(\chronos upper subheadings) - (Opt,\chronos@subheading@drop@isod)$);% oedd
4499     pwy2
4500     \coordinate (chronos@de) at ($(\chronos post) + (\chronos@border@de,Opt)$);% oedd
4501     de
4502     \coordinate (chronos@chwith) at
4503         ($(\chronos pre) + (-\chronos@border@chwith,Opt)$);% oedd chwith
4504
4502     \fi % \ifchronos@headings
4503     \pgfqkeys{/chronos}{@before@headings}%
4504     \chronos@at@end
4505     \pgfqkeys{/chronos}{@before@frame}%
4506     \ifchronos@frame
4507         \scoped[on chronos background layer]{%
4508             \ifchronos@framedefnyddiobb % if frame uses bb
4509                 \node (chronos frame) [%
4510                     fit=(current bounding box), /chronos/prif/@frame%
4511                 ] {};
4512             \else
4513                 \node (chronos frame) [fit=(chronos margin top -| chronos@de)
4514                     (chronos bottom -| chronos@chwith), /chronos/prif/@frame] {};
4515             \fi % \ifchronos@framedefnyddiobb
4516             \path (chronos frame.south west)
4517                 ++(-\chronos@border@allanol,-\chronos@border@allanol) |-
4518                 (chronos frame.north east) --

```

```

4519         ++(\chronos@border@allanol,\chronos@border@allanol);
4520     }%
4521     \fi % \ifchronos@frame
4522     \pgfqkeys{/chronos}{@tikz}%
4523     \end{scope}% [/chronos/@style]
4524     \pgf@relevantforpicturesizefalse
4525     \pgfqkeys{/chronos}{@tikz}%
4526     \ifchronos@showcoords
4527     \begin{scope}[on chronos overlay layer]
4528         \foreach \i/\j in {%
4529             chronos foot/-55,%
4530             chronos head/north,%
4531             chronos base/-25,%
4532             chronos top/120,%
4533             chronos start/85,%
4534             chronos end/85,%
4535             chronos pre/west,%
4536             chronos post/east,%
4537             chronos pre-top/175,%
4538             chronos post-top/15,%
4539             chronos pre-base/south west,%
4540             chronos post-base/south east,%
4541             chronos pre-head/155,%
4542             chronos post-head/north east,%
4543             chronos pre-foot/south,%
4544             chronos post-foot/south,%
4545             chronos origin/-85,%
4546             chronos mid/90,%
4547             chronos mid-time/-90%
4548         }
4549         \node [/chronos/show coord={\j}{\i}] at (\i) {};
4550     \ifchronos@timeline@showyears
4551         \node [/chronos/show coord={45}{chronos first marked year}] at
4552             (chronos first marked year) {};
4553     \fi
4554     \ifchronos@headings
4555         \foreach \i/\j in {%
4556             chronos main headings/east,%
4557             chronos bottom/north,%
4558             chronos upper subheadings/east,%
4559             chronos lower subheadings/east,%
4560             chronos margin top/north%
4561         }
4562         \node [/chronos/show coord={\j}{\i}] at (\i) {};
4563     \fi
4564     \node (chronos@gwybodaeth@coords) [%
4565         below=2.5pt of current bounding box.south west,%
4566         anchor=north west,%
4567         every pin,%
4568         text=chronos@lliw@coord%
4569     ] {\textbullet} coordinates};
4570     \end{scope}%
4571 \fi % \ifchronos@showcoords
4572 \ifchronos@shownodes
4573 \begin{scope}[on chronos overlay layer]
4574     \ifchronos@markeras
4575         \foreach \i/\j in {chronos bce/south, chronos ce/-95}
4576             {%
4577                 \draw [help lines, draw=chronos@lliw@node] (\i.north west) -|
4578                     (\i.south east) -| cycle;
4579                 \node [/chronos/show node coord={\j}{\i}] at (\i) {};

```

```

4580     }%
4581     \fi % \ifchronos@markeras
4582     \ifchronos@frame
4583         \draw [help lines, draw=chronos@lliw@node] (chronos frame.north west)
4584             -| (chronos frame.south east) -| cycle;
4585         \node [/chronos/show node coord={north}{chronos frame}] at
4586             (chronos frame.north) {};
4587     \fi % \ifchronos@frame
4588     \ifchronos@showcoords
4589         \node (chronos@gwybodaeth@nodes) [%
4590             right=of chronos@gwybodaeth@coords.base east,%
4591             anchor=base west,%
4592             every pin,%
4593             text=chronos@lliw@node%
4594         ] {\textbullet{} nodes};
4595     \else
4596         \node (chronos@gwybodaeth@nodes) [%
4597             below=2.5pt of current bounding box.south west,%
4598             anchor=north west,%
4599             every pin,%
4600             text=chronos@lliw@node%
4601         ] {\textbullet{} nodes};
4602     \fi % \ifchronos@showcoords
4603 \end{scope}%
4604 \fi % \ifchronos@shownodes
4605 \ifchronos@showbb
4606     \begin{scope}[on chronos overlay layer]
4607         \draw [help lines, draw=chronos@lliw@bb]
4608             (current bounding box.north east) -| (current bounding box.south west)
4609             -| cycle;
4610         \node [%
4611             /chronos/show coordinate={chronos@lliw@bb}{90}{bounding box}{15pt}{}%
4612         ] at (current bounding box.120) {};
4613     \ifchronos@shownodes
4614         \node (chronos@gwybodaeth@bb) [%
4615             right=of chronos@gwybodaeth@nodes.base east,%
4616             anchor=base west,%
4617             every pin,%
4618             text=chronos@lliw@bb%
4619         ] {\textbullet{} bounding box};
4620     \else
4621         \ifchronos@showcoords
4622             \node (chronos@gwybodaeth@bb) [%
4623                 right=of chronos@gwybodaeth@coords.base east,%
4624                 anchor=base west,%
4625                 every pin,%
4626                 text=chronos@lliw@bb%
4627             ] {\textbullet{} bounding box};
4628         \else
4629             \node (chronos@gwybodaeth@bb) [%
4630                 below=2.5pt of current bounding box.south west,%
4631                 anchor=north west,%
4632                 every pin,%
4633                 text=chronos@lliw@bb%
4634             ] {\textbullet{} bounding box};
4635         \fi % \ifchronos@showcoords
4636     \fi % \ifchronos@shownodes
4637 \end{scope}%
4638 \fi % \ifchronos@showbb
4639 \end{tikzpicture}%

```

```

ailosod pethau rhagosodedig sy'n gosod gyda \g neu \global
4640 \chronos@global@clear@to@clist{century_subheadings}%
4641 \chronos@lliwiau@clear
4642 \ifchronos@byw@isod@rhag
4643   \global\chronos@byw@isodtrue
4644 \else
4645   \global\chronos@byw@isodfalse
4646 \fi
4647 \ifchronos@digwyddiad@isod@rhag
4648   \global\chronos@digwyddiad@isodtrue
4649 \else
4650   \global\chronos@digwyddiad@isodfalse
4651 \fi
4652 \ifchronos@parhad@isod@rhag
4653   \global\chronos@parhad@isodtrue
4654 \else
4655   \global\chronos@parhad@isodfalse
4656 \fi
4657 \let\chronosset\@chronosset
4658 }

```

```

\chronosset This can't be the right way to do this, can it?
\@chronosset
\@chronosset 4659 \NewDocumentCommand \@chronosset { s m } {%
4660   \pgfqkeys{/chronos}{#2}%
4661   \IfBooleanF{#1}{%
4662     \ifchronos@byw@isod
4663       \chronos@byw@isod@rhagtrue
4664     \else
4665       \chronos@byw@isod@rhagfalse
4666     \fi
4667     \ifchronos@digwyddiad@isod
4668       \chronos@digwyddiad@isod@rhagtrue
4669     \else
4670       \chronos@digwyddiad@isod@rhagfalse
4671     \fi
4672     \ifchronos@parhad@isod
4673       \chronos@parhad@isod@rhagtrue
4674     \else
4675       \chronos@parhad@isod@rhagfalse
4676     \fi
4677     \chronos@lliwiau@cadw@rhag}}
4678 \NewDocumentCommand \@@chronosset { s m }
4679 {%
4680   \PackageWarning{chronos}{%
4681     \bs chronosset has no effect inside a chronos environment.
4682     Usage ignored %
4683   }%
4684 }
4685 \let\chronosset\@chronosset

```

`\byw` That is, `\chronoslif`.

```

4686 \NewDocumentCommand\byw { m }{%
4687   \beginngroup
4688     \Undefine\chronos@byw@labelgeni
4689     \Undefine\chronos@byw@labelmarw
4690     \Undefine\chronos@byw@angor
4691     \Undefine\chronos@byw@at
4692     \Undefine\chronos@byw@invanchor
4693     \Undefine\chronos@cynnwys@testun

```

```

4694 \Undefine\chronos@cynnwys@dyddiadau
4695 \Undefine\chronos@cynnwys@enw
4696 \Undefine\chronos@cysylltwyr
4697 \chronos@byw@cysylltiadtheorifalse %^^A rhag ofn
4698 \tikzset{byw={enw={??},marw={\year-\month-\day},bu farw=false,#1}}%
4699 \ifchronos@eventdatessplit
4700 \PackageInfo{chronos}{Setting split false for non-event.}%
4701 \chronos@eventdatessplitfalse
4702 \fi
4703 \pgfmathsetmacro\chronos@temph{%
4704 (\thechronos@genidate-\thechronos@startdate)*\chronos@unit
4705 }%
4706 \pgfmathsetmacro\chronos@tempk{%
4707 (\thechronos@marwdate-\thechronos@startdate)*\chronos@unit
4708 }%
4709 \pgfmathsetmacro\chronos@templ{%
4710 (\chronos@temph+\chronos@tempk)*\chronos@unit/2%
4711 }%

```

temporary coordinate accurate only for x

```

4712 \coordinate (\chronos@byw@tikzname) at (\chronos@templ pt,0pt);
4713 \chronos@troilliwiiau@tag{byw}%
4714 \chronos@gosodangor@tag{byw}%
4715 \chronos@gosodborder@tag{byw}%
4716 \IfExistTF \chronos@cynnwys@testun{%
4717 \let\chronos@cynnwys@dyddiadau\relax
4718 \let\chronos@cynnwys@enw\relax
4719 }%
4720 \IfExistF \chronos@cynnwys@enw {%
4721 \def \chronos@cynnwys@enw {\chronos@enw@priflythrennu{\chronos@byw@enw}}%
4722 }%
4723 \IfExistTF \chronos@cynnwys@dyddiadau {%
4724 \pretocmd \chronos@cynnwys@dyddiadau {\chronos@byw@ffontdyddiad}{-}{-}%
4725 }%
4726 \ifchronos@onlytext\let\chronos@cynnwys@dyddiadau\relax
4727 \else
4728 \ifchronos@bufarw\relax\else\def\chronos@byw@labelmarw{\fi
4729 \chronos@dyddiadau@tag{byw}{geni}{geni}{marw}{marw}%
4730 \ifchronos@temp
4731 \def \chronos@cynnwys@dyddiadau {%
4732 \chronos@byw@ffontdyddiad\chronos@byw@labelmarw
4733 }%
4734 \else
4735 \def \chronos@cynnwys@dyddiadau {%
4736 \chronos@byw@ffontdyddiad\chronos@byw@labelgeni
4737 --\chronos@byw@labelmarw
4738 }%
4739 \fi
4740 \fi
4741 }%
4742 \def \chronos@cynnwys@testun {%
4743 {\chronos@byw@ffonttestun\chronos@cynnwys@enw}\chronos@cynnwys@dyddiadau
4744 }%
4745 }%
4746 \chronos@creu@llinell {byw}{\chronos@temph pt}{\chronos@tempk pt}{geni}{marw}%

```

final coordinate accurate for x and y

```

4747 \coordinate (\chronos@byw@tikzname) at
4748 ($(\chronos@byw@tikzname{ } geni)!1/2!(\chronos@byw@tikzname{ } marw)$);

```

creu cylcu ar y lein ; testun - prif node ; testun cylch ; prif gysylltiad

```

4749 \chronos@creu@testun@tag{byw}{\chronos@cynnwys@testun}%
4750 \ifchronos@byw@cysylltiadtheori
4751 \chronos@angorau@theori{testun \chronos@byw@tikzname}%
4752 {cysylltwr \chronos@byw@tikzname}[connector \chronos@byw@tikzname]%
4753 {/chronos/@cysylltwr@testun=\chronos@byw@lliw}%

4754 \fi
4755 \ifchronos@every@byw@isod
4756 \global\chronos@byw@isodtrue
4757 \else\ifchronos@every@byw@uchod
4758 \global\chronos@byw@isodfalse
4759 \else
4760 \ifchronos@byw@isod
4761 \global\chronos@byw@isodfalse
4762 \else
4763 \global\chronos@byw@isodtrue
4764 \fi
4765 \fi
4766 \fi
4767 \chronos@ailosod@nodweddion
4768 \endgroup
4769 }

```

`\digwyddiad` That is, `\chronosevent`.

```

4770 \NewDocumentCommand\digwyddiad { m }{%
4771 \begingroup
4772 \Undefine\chronos@digwyddiad@angor
4773 \Undefine\chronos@digwyddiad@invanchor
4774 \Undefine\chronos@digwyddiad@at
4775 \Undefine\chronos@cynnwys@testun
4776 \Undefine\chronos@cynnwys@dyddiadau
4777 \Undefine\chronos@cynnwys@enw
4778 \Undefine\chronos@cysylltwyr
4779 \chronos@digwyddiad@cysylltiadtheorifalse %^^A rhag ofn

```

oedd problem yn pasio `every@digwyddiad` i `digwyddiad` pan iddo fe'n cynnwys `font=\unrhywbeth` | there was a problem passing `every@digwyddiad` to `digwyddiad` (event) when it included `font=\something`

```

4780 \tikzset{digwyddiad={enw={??},#1}}%
4781 \pgfmathsetmacro\chronos@temph{%
4782 (\thechronos@digdate-\thechronos@startdate)*\chronos@unit
4783 }%

```

temporary coordinate accurate only for x

```

4784 \coordinate (\chronos@digwyddiad@tikzname) at (\chronos@temph pt,0pt);
4785 \chronos@troilliwiiau@tag{digwyddiad}%
4786 \chronos@gosodangor@tag{digwyddiad}%
4787 \chronos@gosodborder@tag{digwyddiad}%
4788 \ifchronos@eventdatessplit
4789 \ifchronos@onlytext\relax
4790 \IfExistF \chronos@cynnwys@testun {%
4791 \IfExistTF \chronos@cynnwys@enw {%
4792 \def\chronos@cynnwys@testun {%
4793 \chronos@digwyddiad@ffonttestun
4794 \chronos@cynnwys@enw
4795 }
4796 }{%
4797 \def \chronos@cynnwys@testun {%

```

```

4798         \chronos@digwyddiad@ffonttestun
4799         \chronos@enw@priflythrennu{\chronos@digwyddiad@enw}%
4800     }%
4801 }%
4802 }%
4803 \else
4804 \IfExistF \chronos@cynnwys@testun {%
4805     \IfExistF \chronos@cynnwys@dyddiadau {%
4806         \def \chronos@cynnwys@dyddiadau {%
4807             \chronos@showdate@cs[chronos@digwyddiad@fformatdyddiad]{dig}%
4808         }%
4809     }%
4810     \IfExistTF \chronos@cynnwys@enw {%
4811         \def\chronos@cynnwys@testun {%
4812             \chronos@digwyddiad@ffonttestun
4813             \chronos@cynnwys@enw
4814         }
4815     }{%
4816         \def \chronos@cynnwys@testun {%
4817             \chronos@digwyddiad@ffonttestun
4818             \chronos@enw@priflythrennu{\chronos@digwyddiad@enw}%
4819         }%
4820     }%
4821 }%
4822 \fi
4823 \else % not event date split
4824 \IfExistTF \chronos@cynnwys@testun {%
4825     \let\chronos@cynnwys@dyddiadau\relax
4826     \let\chronos@cynnwys@enw\relax
4827 }{%
4828     \IfExistF {\chronos@cynnwys@enw}{%
4829         \def \chronos@cynnwys@enw {%
4830             \chronos@enw@priflythrennu{\chronos@digwyddiad@enw}%
4831         }%
4832     }%
4833     \IfExistTF \chronos@cynnwys@dyddiadau {%
4834         \apptocmd \chronos@cynnwys@dyddiadau {\}\{\}\%
4835         \pretocmd \chronos@cynnwys@dyddiadau
4836             {\chronos@digwyddiad@ffontdyddiad}\{\}\%
4837     }{%
4838         \ifchronos@onlytext\let\chronos@cynnwys@dyddiadau\relax
4839         \else
4840             \def \chronos@cynnwys@dyddiadau {%
4841                 \chronos@digwyddiad@ffontdyddiad
4842                 \chronos@showdate@cs[chronos@digwyddiad@fformatdyddiad]{dig}\%
4843             }%
4844         \fi
4845     }%
4846     \def \chronos@cynnwys@testun {%
4847         \chronos@cynnwys@dyddiadau
4848         \chronos@digwyddiad@ffonttestun
4849         \chronos@cynnwys@enw
4850     }%
4851 }%
4852 \fi

```

marcio digwyddiad ar y lein | mark event on line

```

4853 \begin{scope}[/chronos/chronos@llynell@haenen]% finalise coordinate placement
4854 \path [/chronos/@llynell=\chronos@digwyddiad@lliw] ({\chronos@temp pt,0}
4855     |- \chronos@border@coord) -- +(0pt,\chronos@digwyddiad@border)
4856     coordinate (\chronos@digwyddiad@tikzname);

```

```

4857     \ifchronos@eventdatessplit
4858     \path [/chronos/@llinell=\chronos@digwyddiad@lliw]
4859     ({\chronos@temph pt,0} |- \chronos@border@coord@inv) --
4860     +(Opt,\chronos@digwyddiad@border@inv) coordinate
4861     (\chronos@digwyddiad@tikzname-inv);
4862     \fi
4863 \end{scope}%

```

creu cylch ar y lein ; testun - prif node ; testun cylch ; prif gysylltiad | create circle (or other mark) on timeline ; text tag ; text tag circle (connector) ; main connection

```

4864     \ifchronos@eventdatessplit
4865     \chronos@creu@testun@tag*{digwyddiad}{\chronos@cynnwys@dyddiadau}%^^A angen defnyddio
/chronos/event date split
4866     \fi
4867     \chronos@creu@testun@tag{digwyddiad}{\chronos@cynnwys@testun}%

```

dyddiad arbennig | special date

```

4868     \ifchronos@eventyearsonline
4869     \edef\chronos@tempa{none}%
4870     \edef\chronos@tempb{\chronos@specialdate}%
4871     \ifx\chronos@tempa\chronos@tempb
4872     \def\chronos@tempbd{%
4873     \chronos@showdate@cs[chronos@digwyddiad@fformatdyddiad]{dig}%
4874     }%
4875     \else
4876     \let\chronos@tempbd\chronos@specialdate\gdef\chronos@specialdate{none}%
4877     \fi
4878     \scoped[/chronos/chronos@llinell amser@haenen]{%
4879     \node [/chronos/event year on line] at (\chronos@temph pt,0pt)
4880     {\chronos@tempbd};%
4881     }%
4882     \fi
4883     \ifchronos@digwyddiad@cysylltiadtheori
4884     \chronos@angorau@theori{testun \chronos@digwyddiad@tikzname}%
4885     {cysylltwr \chronos@digwyddiad@tikzname}%
4886     [connector \chronos@digwyddiad@tikzname]%
4887     {/chronos/@cysylltwr@testun=\chronos@digwyddiad@lliw}%
4888     \fi
4889     \ifchronos@every@digwyddiad@isod
4890     \global\chronos@digwyddiad@isodtrue
4891     \else\ifchronos@every@digwyddiad@uchod
4892     \global\chronos@digwyddiad@isodfalse
4893     \else
4894     \ifchronos@digwyddiad@isod
4895     \global\chronos@digwyddiad@isodfalse
4896     \else
4897     \global\chronos@digwyddiad@isodtrue
4898     \fi
4899     \fi
4900     \fi
4901     \chronos@ailosod@nodweddion
4902 \endgroup
4903 }

```

`\parhad` That is, `\chronosperiod`.

```

4904 \NewDocumentCommand\parhad { m }{%
4905 \begingroup
4906 \Undefine\chronos@parhad@labeldechrau
4907 \Undefine\chronos@parhad@labeldiwedd

```



```

4908 \Undefine\chronos@parhad@angor
4909 \Undefine\chronos@parhad@at
4910 \Undefine\chronos@parhad@invanchor
4911 \Undefine\chronos@cynnwys@testun
4912 \Undefine\chronos@cynnwys@dyddiadau
4913 \Undefine\chronos@cynnwys@enw
4914 \Undefine\chronos@cysylltwyr
4915 \chronos@parhad@cysylltiadtheorifalse %^A rhag ofn
4916 \tikzset{parhad={enw={??},diwedd={\year-\month-\day},gorffenedig=false,#1}}%
4917 \ifchronos@eventdatessplit
4918 \PackageInfo{chronos}{Setting split false for non-event.}%
4919 \chronos@eventdatessplitfalse
4920 \fi
4921 \pgfmathsetmacro\chronos@temph{%
4922 (\thechronos@thingdate-\thechronos@startdate)*\chronos@unit
4923 }%
4924 \pgfmathsetmacro\chronos@tempk{%
4925 (\thechronos@otherthingdate-\thechronos@startdate)*\chronos@unit
4926 }%
4927 \pgfmathsetmacro\chronos@templ{%
4928 (\chronos@temph+\chronos@tempk)*\chronos@unit/2%
4929 }%

```

temporary coordinate accurate only for x

```

4930 \coordinate (\chronos@parhad@tikzname) at (\chronos@templ pt,0pt);
4931 \chronos@troilliwiiau@tag{parhad}%
4932 \chronos@gosodangor@tag{parhad}%
4933 \chronos@gosodborder@tag{parhad}%
4934 \IfExistTF \chronos@cynnwys@testun{%
4935 \let\chronos@cynnwys@dyddiadau\relax
4936 \let\chronos@cynnwys@enw\relax
4937 }{%
4938 \IfExistF \chronos@cynnwys@enw {%
4939 \def \chronos@cynnwys@enw {\chronos@enw@priflythrennu{\chronos@parhad@enw}}%
4940 }%
4941 \IfExistTF \chronos@cynnwys@dyddiadau {%
4942 \apptocmd \chronos@cynnwys@dyddiadau {\}\{\}\%
4943 }{%
4944 \ifchronos@onlytext\let\chronos@cynnwys@dyddiadau\relax
4945 \else
4946 \ifchronos@gorffenedig\relax\else\def\chronos@parhad@labeldiwedd{\fi
4947 \chronos@dyddiadau@tag{parhad}{thing}{dechrau}{otherthing}{diwedd}%
4948 \ifchronos@temp
4949 \def \chronos@cynnwys@dyddiadau {\chronos@parhad@labeldechrau\}%
4950 \else
4951 \def \chronos@cynnwys@dyddiadau {%
4952 \chronos@parhad@labeldechrau--\chronos@parhad@labeldiwedd\}%
4953 \fi
4954 \fi
4955 }%
4956 \def \chronos@cynnwys@testun {%
4957 \chronos@parhad@ffontdyddiad
4958 \chronos@cynnwys@dyddiadau
4959 \chronos@parhad@ffonttestun
4960 \chronos@cynnwys@enw
4961 }%
4962 }%
4963 \chronos@creu@lline11 {parhad}{\chronos@temph pt}{\chronos@tempk pt}{dechrau}{diwedd}%

```

final coordinate placement

```

4964 \coordinate (\chronos@parhad@tikzname) at
4965     ($(\chronos@parhad@tikzname{} dechrau)!1/2!(\chronos@parhad@tikzname{} diwedd)$);

creu cylch ar y lein ; testun ; testun cylch ; prif gysylltiad | create circle (or other mark) on
timeline ; text tag ; text tag circle (connector) ; main connection

4966 \chronos@creu@testun@tag{parhad}{\chronos@cynnwys@testun}%
4967 \ifchronos@parhad@cysylltiadtheori
4968     \chronos@angorau@theori{testun \chronos@parhad@tikzname}%
4969     {cysylltwr \chronos@parhad@tikzname}[connector \chronos@parhad@tikzname]%
4970     {/chronos/@cysylltwr@testun=\chronos@parhad@lliw}%
4971 \fi
4972 \ifchronos@every@parhad@isod
4973     \global\chronos@parhad@isodtrue
4974 \else\ifchronos@every@parhad@uchod
4975     \global\chronos@parhad@isodfalse
4976 \else
4977     \ifchronos@parhad@isod
4978     \global\chronos@parhad@isodfalse
4979     \else
4980     \global\chronos@parhad@isodtrue
4981     \fi
4982 \fi
4983 \fi
4984 \chronos@ailosod@nodweddion
4985 \endgroup
4986 }

```

`\theori` That is, `\chronostheory`.

```

4987 \NewDocumentCommand\theori { m }{%
4988     \begingroup
4989     \Undefine\chronos@theori@angor
4990     \Undefine\chronos@theori@at
4991     \Undefine\chronos@theori@invanchor
4992     \Undefine\chronos@cynnwys@testun
4993     \Undefine\chronos@cynnwys@enw
4994     \Undefine\chronos@cynnwys@dyddiadau
4995     \Undefine\chronos@cysylltwyr
4996     \chronos@theori@cysylltiadtheorifalse %A rhag ofn
4997     \tikzset{theori={enw={??},#1}}%
4998     \chronos@troilliwiiau@tag{theori}%
4999     \IfExistTF \chronos@theori@angor{%
5000         \IfExistTF \chronos@cysylltwyr{%
5001             \pretocmd\chronos@cysylltwyr{\chronos@theori@angor,}{-}{-}%
5002         }{%
5003             \def\chronos@cysylltwyr{\chronos@theori@angor}%
5004         }%
5005     }{%
5006         \ifchronos@theori@isod
5007             \def\chronos@theori@angor{north}%
5008         \else
5009             \def\chronos@theori@angor{south}
5010         \fi
5011     }%
5012     \IfExistTF \chronos@cynnwys@testun {%
5013         \let\chronos@cynnwys@enw\relax
5014     }{%
5015         \IfExistF \chronos@cynnwys@enw {%
5016             \def \chronos@cynnwys@enw {\chronos@enw@priflythrennu{\chronos@theori@enw}}%
5017         }%
5018         \def \chronos@cynnwys@testun {\chronos@cynnwys@enw}%

```

```

5019     }%
creu testun | text tag
5020     \chronos@creu@testun@tag[alias=\chronos@theori@tikzname]{theori}{%
5021         \chronos@theori@ffonttestun\chronos@cynnwys@testun}%
5022         \IfExistT \chronos@cysylltwyr{%
5023             \chronos@angorau@theori{\chronos@theori@enw}{%
5024                 cysylltwr \chronos@theori@enw
5025             }[connector \chronos@theori@enw]{%
5026                 /chronos/@cysylltwr@testun=\chronos@theori@lliw
5027             }%
5028         }%
5029     \chronos@ailosod@nodweddion
5030 \endgroup
5031 }

```

`\chronos@angorau@theori` That is, anchors for `\chronostheory`. Should this be done this way?!

```

5032 \NewDocumentCommand \chronos@angorau@theori{mmO{connector }m}{%
5033     % #1 enw y prif node ;
5034     % #2 enw yr angor cyntaf ;
5035     % #4 style
5036     \ifchronos@phantom
5037         \PackageWarning{chronos}{Phantom tags cannot have connectors }%
5038     \else

```

ateb Symbol 1: <https://tex.stackexchange.com/a/385953/>

```

5039     \begin{scope}[/chronos/middle anchorborder]
5040         \setcounter{chronos@theori@countanchors}{0}%
5041         \@for \xx:=\chronos@cysylltwyr \do {%
5042             \stepcounter{chronos@theori@countanchors}%
5043             \ifnum\value{chronos@theori@countanchors}=1%
5044                 \node (#2) [%
5045                     #4,%
5046                     alias=#2\thechronos@theori@countanchors,%
5047                     alias=#3,%
5048                     alias=#3\thechronos@theori@countanchors
5049                 ] at (#1.middle \xx) {};
5050             \else
5051                 \node (#2\thechronos@theori@countanchors) [%
5052                     #4, alias=#3\thechronos@theori@countanchors
5053                 ] at (#1.middle \xx) {};
5054             \fi
5055         }%
5056     \end{scope}%
5057 \fi
5058 }

```

`\cylchtheori` That is, `\theorycircle`.

```

5059 \NewDocumentCommand \cylchtheori { m } {%
5060     \begingroup
5061         \Undefine\chronos@cylchtheori@at
5062         \Undefine\chronos@cynnwys@testun
5063         \Undefine\chronos@cynnwys@enw
5064         \Undefine\chronos@cynnwys@dyddiadau
5065         \tikzset{cylch theori={enw={??},#1}}%
5066         \coordinate [%
5067             /chronos/every@cylch cylch theori,%
5068             /utils/exec=\pgfkeysalsofrom{\chronos@cadw}%

```

```

5069 ] (\chronos@cylchtheori@tikzname1) at (chronos@cylchtheori@at);
5070 \path [/chronos/every@cylch cylch theori] (\chronos@cylchtheori@tikzname1)
5071   circle (\chronos@cylchtheori@bach) circle (\chronos@cylchtheori@mawr);
5072 \pgfmathsetlength\chronos@templgtha{\chronos@cylchtheori@bach+0.5pt}%
5073 \pgfmathsetlength\chronos@templgthc{\chronos@cylchtheori@mawr-0.5pt}%
5074 \pgfmathsetlength\chronos@templgthb{\chronos@cylchtheori@mawr+2pt}%
5075 \coordinate (\chronos@cylchtheori@tikzname2) at
5076   ($(\chronos@cylchtheori@tikzname1) - (\chronos@templgtha,0)$);
5077 \coordinate (\chronos@cylchtheori@tikzname3) at
5078   ($(\chronos@cylchtheori@tikzname1) - (\chronos@templgthc,0)$);
5079 \coordinate (\chronos@cylchtheori@tikzname4) at
5080   ($(\chronos@cylchtheori@tikzname1) + (0,\chronos@templgthb)$);
5081 \coordinate (\chronos@cylchtheori@tikzname5) at
5082   ($(\chronos@cylchtheori@tikzname1) - (0,\chronos@templgthb)$);
5083 \path [%
5084   /chronos/every@testun cylch theori/.expanded={%
5085     \ \chronos@cylchtheori@circletext@uchod\ %
5086   }%
5087 ] (\chronos@cylchtheori@tikzname2) arc (180:0:\chronos@templgtha);
5088 \path [%
5089   /chronos/every@testun cylch theori/.expanded={%
5090     \chronos@cylchtheori@circletext@isod
5091   }%
5092 ] (\chronos@cylchtheori@tikzname3) arc (180:360:\chronos@templgthc);
5093 \node (label above \chronos@cylchtheori@tikzname) [%
5094   anchor=south, /chronos/theori/cylchau/@label
5095 ] at (\chronos@cylchtheori@tikzname4) {\chronos@cylchtheori@label@uchod};
5096 \node (label below \chronos@cylchtheori@tikzname) [%
5097   anchor=north, /chronos/theori/cylchau/@label
5098 ] at (\chronos@cylchtheori@tikzname5) {\chronos@cylchtheori@label@isod};
5099 \node (\chronos@cylchtheori@tikzname) [%
5100   fit=(label below \chronos@cylchtheori@tikzname)
5101     (label above \chronos@cylchtheori@tikzname)
5102     (\chronos@cylchtheori@tikzname4)
5103     (\chronos@cylchtheori@tikzname5)%
5104 ] {};
5105 \chronos@aailosod@nodweddion
5106 \endgroup
5107 }

```

`\prideitl` That is, `\chronosmaintitle`.

```

5108 \NewDocumentCommand \prifdeitl { m }
5109 {%
5110   \begingroup
5111     \Undefine\chronos@prifdeitl@at
5112     \Undefine\chronos@prifdeitl@angor
5113     \tikzset{prif={#1}}%
5114     \IfExistF\chronos@prifdeitl@angor{\def\chronos@prifdeitl@angor{center}}%
5115     \IfExistTF\chronos@prifdeitl@tikzname{%
5116       \pgfqkeys{/chronos}{@tempd/.style={alias=prif deitl,alias=main title}}%
5117     }{%
5118       \def\chronos@prifdeitl@tikzname{prif deitl}%
5119       \pgfqkeys{/chronos}{@tempd/.style={alias=main title}}%
5120     }%
5121     \IfFreeT {\chronos@prifdeitl@cynnwys}{%
5122       \def\chronos@prifdeitl@cynnwys{%
5123         \chronos@enw@priflythrennu{\chronos@prifdeitl@enw}%
5124       }%
5125     }%
5126     \draw node (\chronos@prifdeitl@tikzname) [%

```

```

5127     draw=none,%
5128     /chronos/@tempd,%
5129     /chronos/prif/@teitl,%
5130     anchor=\chronos@prifdeitl@angor,%
5131     /utils/exec=\pgfkeysalsofrom{\chronos@cadw}%
5132 ] at (\chronos@prifdeitl@at) {\chronos@prifdeitl@cynnwys};
5133 \ifchronos@showcoords
5134   \begin{scope}[on chronos overlay layer]
5135     \draw [help lines, draw=chronos@lliw@node]
5136       (\chronos@prifdeitl@tikzname.north east) -|
5137       (\chronos@prifdeitl@tikzname.south west) -| cycle;
5138     \node [%
5139       /chronos/show coordinate={chronos show node colour}{0}{%
5140         \chronos@prifdeitl@tikzname
5141         }{10pt}{align=center}]%
5142     ] at (\chronos@prifdeitl@tikzname.east) {};
5143     \end{scope}%
5144   \fi
5145 \endgroup
5146 }

```

`\gwybodaeth` That is, `\chronosinfo`.

```

5147 \NewDocumentCommand \gwybodaeth { s m }{%
5148   \begingroup
5149     \Undefine\chronos@gwybodaeth@angor
5150     \Undefine\chronos@gwybodaeth@at
5151     \let\chronos@cynnwys@testun\@empty
5152     \Undefine\chronos@cynnwys@enw
5153     \Undefine\chronos@gwybodaeth@capsiw
5154     \tikzset{gwybodaeth={enw={??},#2}}%
5155     \IfExistF \chronos@gwybodaeth@angor{\def\chronos@gwybodaeth@angor{west}}%
5156     \IfExistF \chronos@gwybodaeth@capsiw {%
5157       \def \chronos@gwybodaeth@capsiw {%
5158         \chronos@enw@priflythrennu{\chronos@gwybodaeth@enw}%
5159       }%
5160     }%
5161     \IfExistF \chronos@gwybodaeth@lliw {%
5162       \let\chronos@gwybodaeth@lliw\chronos@gwybodaeth@lliw@rhagosodedig
5163     }%
5164     \node (testun \chronos@gwybodaeth@tikzname) [%
5165       /chronos/@testun=\chronos@gwybodaeth@lliw,%
5166       anchor=\chronos@gwybodaeth@angor,%
5167       /chronos/.cd,%
5168       /utils/exec=\pgfkeysalsofrom{\chronos@cadw},%
5169       alias=tag \chronos@gwybodaeth@tikzname,%
5170       alias=text tag \chronos@gwybodaeth@tikzname,%
5171       alias=\chronos@gwybodaeth@tikzname
5172     ] at (\chronos@gwybodaeth@at) {\chronos@cynnwys@testun};
5173     \IfBooleanF {#1}{%
5174       \node (capsiw \chronos@gwybodaeth@tikzname) [%
5175         /chronos/gwybodaeth/@label,%
5176         alias=enw \chronos@gwybodaeth@tikzname,%
5177         alias=name \chronos@gwybodaeth@tikzname,%
5178         alias=label \chronos@gwybodaeth@tikzname,%
5179         alias=caption \chronos@gwybodaeth@tikzname
5180       ] at (\chronos@gwybodaeth@tikzname.south) {\chronos@gwybodaeth@capsiw};
5181     }%
5182     \edef\chronos@tempa{lliw \chronos@gwybodaeth@tikzname}%
5183     \edef\chronos@tempc{colour \chronos@gwybodaeth@tikzname}%
5184     \edef\chronos@tempf{color \chronos@gwybodaeth@tikzname}%

```

```

5185 \edef\chronos@tempb{\chronos@gwybodaeth@lliw}%
5186 \xglobal\colorlet{\chronos@tempa}{\chronos@tempb}%
5187 \xglobal\colorlet{\chronos@tempe}{\chronos@tempb}%
5188 \xglobal\colorlet{\chronos@tempf}{\chronos@tempb}%
5189 \colorlet{chronos current tag colour}{\chronos@tempb}%
5190 \colorlet{chronos current tag color}{\chronos@tempb}%
5191 \chronos@ailosod@nodweddion
5192 \endgroup
5193 }

```

`\hawlfraint` That is, `\chronoscopyright`.

```

5194 \NewDocumentCommand \hawlfraint { m }
5195 {%
5196 \begingroup
5197 \undefine\chronos@hawlfraint@at
5198 \undefine\chronos@hawlfraint@enw
5199 \def\chronos@hawlfraint@angor{north west}%
5200 \def\chronos@hawlfraint@cylchdroi{90}%
5201 \tikzset{hawlfraint={#1}}%
5202 \ifexistf{\chronos@hawlfraint@notis}{%
5203 \ifchronos@copyleft
5204 \def\chronos@hawlfraint@notis##1##2{Copyleft \textcopyright{} ##1 ##2}%
5205 \else
5206 \def\chronos@hawlfraint@notis##1##2{Copyright \textcopyright{} ##1 ##2}%
5207 \fi
5208 }%
5209 \ifexistf{\chronos@hawlfraint@at}{%
5210 \def\chronos@hawlfraint@at{current bounding box.south west}%
5211 \PackageWarning{chronos}{Placing copyright notice at bottom left }%
5212 }%
5213 \ifexistf {\chronos@hawlfraint@cynnwys}{%
5214 \ifbooleanexprTF {
5215 \CSFreeBoolean \chronos@hawlfraint@enw
5216 || ! (\CSFreeBoolean \chronos@hawlfraint@awdur)
5217 || ! (\CSFreeBoolean \chronos@hawlfraint@blwyddyn)
5218 }{%
5219 \ifexistf {\chronos@hawlfraint@awdur}{%
5220 \ifexistTF {\svnauthor} {%
5221 \ifexistTF {\svnFullAuthor} {%
5222 \def\chronos@hawlfraint@awdur{\svnFullAuthor{\svnauthor}}%
5223 }{%
5224 \let\chronos@hawlfraint@awdur\svnauthor
5225 }%
5226 }{%
5227 \def\chronos@hawlfraint@awdur{Author}%
5228 }%
5229 }%
5230 \ifexistf {\chronos@hawlfraint@blwyddyn}{%
5231 \ifexistTF {\svnyear} {%
5232 \let\chronos@hawlfraint@blwyddyn\svnyear
5233 }{%
5234 \let\chronos@hawlfraint@blwyddyn\today
5235 }%
5236 }%
5237 \def\chronos@hawlfraint@cynnwys{%
5238 \chronos@hawlfraint@notis{%
5239 \chronos@hawlfraint@blwyddyn
5240 }{%
5241 \chronos@hawlfraint@awdur
5242 }%

```

```

5243     }%
5244   }{%
5245     \def\chronos@hawlfraint@cynnwys{%
5246       \chronos@hawlfraint@notis{\chronos@hawlfraint@blwyddyn}{%
5247         \chronos@enw@priflythrennu{\chronos@hawlfraint@enw}%
5248       }%
5249     }%
5250   }%
5251 }%
5252 \IfExistTF{\chronos@hawlfraint@tikzname}{%
5253   \pgfqkeys{/chronos}{@tempd/.style={%
5254     alias=hawlfraint,%
5255     alias=copyright,%
5256     alias=copyleft%
5257   }}%
5258 }{%
5259   \def\chronos@hawlfraint@tikzname{hawlfraint}%
5260   \pgfqkeys{/chronos}{@tempd/.style={alias=copyright,alias=copyleft}}%
5261 }%

5262 \draw node (\chronos@hawlfraint@tikzname) [%
5263   draw=none,%
5264   /chronos/@tempd,%
5265   /chronos/@hawlfraint,%
5266   anchor=\chronos@hawlfraint@angor,%
5267   rotate=\chronos@hawlfraint@cylchdroi,%
5268   /utils/exec=\pgfkeysalsofrom{\chronos@cadw}%
5269 ] at (chronos@hawlfraint@at) {\chronos@hawlfraint@cynnwys};
5270 \ifchronos@showcoords
5271   \begin{scope}[on chronos overlay layer]
5272     \draw [help lines, draw=chronos@lliw@node]
5273       (\chronos@hawlfraint@tikzname.north east) -|
5274       (\chronos@hawlfraint@tikzname.south west) -| cycle;
5275     \node [%
5276       /chronos/show coordinate={chronos show node colour}{0}{%
5277         \chronos@hawlfraint@tikzname
5278       }{10pt}{align=center}%
5279     ] at (\chronos@hawlfraint@tikzname.east) {};
5280   \end{scope}%
5281 \fi
5282 \endgroup
5283 }

```

`\chronoscopyleft` Variant of `\chronoscopyright`.

```

5284 \NewDocumentCommand \chronoscopyleft { m }{%
5285   \begingroup
5286     \chronos@copylefttrue
5287     \hawlfraint {#1}%
5288   \endgroup
5289 }

```

`\chronos@dyddiadau@tag` Internal macro to figure out date format for tags.

```

5290 \NewDocumentCommand \chronos@dyddiadau@tag{mmmm}{%
5291   %%A #1 : tag e.g. byw / parhad ;
5292   %%A #2 first date counter e.g. geni / thing ;
5293   %%A #3 first label e.g. geni / dechrau ;
5294   %%A #4 second date counter e.g. marw / otherthing ;
5295   %%A #5 second label e.g. marw / diwedd
5296   \IfCExistTF{chronos@#1@label#3}{%
5297     \IfCExistF{chronos@#1@label#5}{%

```

```

5298     \expandafter\def\csname chronos@#1@label#5\endcsname{%
5299     \chronos@showdate@cs[chronos@#1@fformat#5]{#4}%
5300     }%
5301   }%
5302 }-%
5303 \IfCSEExistF{chronos@#1@label#5}{% creu label yr ail ddyddiad
5304   \expandafter\def\csname chronos@#1@label#5\endcsname{%
5305     \chronos@showdate@cs[chronos@#1@fformat#5]{#4}%
5306     }%
5307   }%
5308 \edef\tempa{}\edef\tempb{\csname chronos@#1@label#5\endcsname}%
5309 \ifx\tempa\tempb
5310   \expandafter\def\csname chronos@#1@label#3\endcsname{%
5311     \chronos@showdate@cs[chronos@#1@fformat#3@cyfnodau]{#2}%
5312     }%
5313   \else
5314     \expandafter\ifnum\csname chronos@#2year\endcsname<0
5315     \expandafter\ifnum\csname chronos@#4year\endcsname<0
5316     \expandafter\def\csname chronos@#1@label#3\endcsname{%
5317       \chronos@showdate@cs[chronos@#1@fformat#3@cyfnod]{#2}%
5318       }%
5319     \else
5320     \expandafter\def\csname chronos@#1@label#3\endcsname{%
5321       \chronos@showdate@cs[chronos@#1@fformat#3@cyfnodau]{#2}%
5322       }%
5323     \fi
5324   \else
5325     \expandafter\def\csname chronos@#1@label#3\endcsname{%
5326       \chronos@showdate@cs[chronos@#1@fformat#3@cyfnod]{#2}%
5327       }%
5328     \fi
5329   \fi
5330 }%
5331 \ifchronos@dimondblynyddoedd
5332   \edef\chronos@temppp{\csname chronos@#2year\endcsname}%
5333   \edef\chronos@tempqq{\csname chronos@#4year\endcsname}%
5334   \ifnum\chronos@temppp=\chronos@tempqq\relax
5335     \chronos@temptrue
5336   \else
5337     \chronos@tempfalse
5338   \fi
5339 \else
5340   \ifnum\value{chronos@#2date}=\value{chronos@#4date}%^^A only catches identical blynyddoedd
- dal i edrych yn dwp pan dim ond blynyddoedd yn cael eu dangos & maen' nhw'n yr un peth
5341     \chronos@temptrue
5342   \else
5343     \chronos@tempfalse
5344   \fi
5345 \fi
5346 }

```

`\chronos@gosodborder@tag` Internal macro to install connection point on timeline border.

```

5347 \NewDocumentCommand \chronos@gosodborder@tag{m}{%
5348   \csname ifchronos@#1@isod\endcsname
5349   \ifchronos@yearsonline
5350     \def\chronos@border@coord{chronos base}%
5351     \def\chronos@border@coord@inv{chronos top}%
5352     \expandafter\setlength\csname chronos@#1@border\endcsname{%
5353       -\chronos@borderheight}%
5354     \expandafter\setlength\csname chronos@#1@border@inv\endcsname{%

```



```

5355     \chronos@borderheight}%
5356   \else
5357     \def\chronos@border@coord{chronos top}%
5358     \def\chronos@border@coord@inv{chronos base}%
5359     \expandafter\setlength\csname chronos@#1@border\endcsname{%
5360       -\chronos@height}%
5361     \expandafter\setlength\csname chronos@#1@border@inv\endcsname{%
5362       \chronos@height}%
5363   \fi
5364 \else
5365   \ifchronos@yearsonline
5366     \def\chronos@border@coord{chronos top}%
5367     \def\chronos@border@coord@inv{chronos base}%
5368     \expandafter\setlength\csname chronos@#1@border\endcsname{%
5369       \chronos@borderheight}%
5370     \expandafter\setlength\csname chronos@#1@border@inv\endcsname{%
5371       -\chronos@borderheight}%
5372   \else
5373     \def\chronos@border@coord{chronos base}%
5374     \def\chronos@border@coord@inv{chronos top}%
5375     \expandafter\setlength\csname chronos@#1@border\endcsname{%
5376       \chronos@height}%
5377     \expandafter\setlength\csname chronos@#1@border@inv\endcsname{%
5378       -\chronos@height}%
5379   \fi
5380 \fi
5381 }

```

`\chronos@troilliwiau@tag` Internal macro to rotate colours and configure below/above split, as applicable.

```

5382 \NewDocumentCommand \chronos@troilliwiau@tag{m}{%^^A <<<
5383   \IfCSExistTF {chronos@#1@at}{%
5384     \edef\chronos@tempj{\csname chronos@#1@at\endcsname}%
5385     \path (\chronos@tempj) ++(Opt,\chronos@yshift);
5386     \pgfgetlastxy{\chronos@templgtha}{\chronos@templgthb}%
5387     \ifdim\chronos@templgthb>Opt\relax
5388       \expandafter\global\csname chronos@#1@isodfalse\endcsname
5389     \else
5390       \ifdim\chronos@templgthb<Opt\relax
5391         \expandafter\global\csname chronos@#1@isodtrue\endcsname
5392       \fi
5393     \fi
5394     \def\chronos@yshift@inv{-\chronos@yshift}%
5395   }{%
5396     \ifchronos@tag@cysylltu
5397       \CSletCS {chronos@#1@at}{chronos@#1@tikzname}%^^A uses temporary coordinate at this
point but will be aligned horizontally
5398     \else
5399       \expandafter\def\csname chronos@#1@at\endcsname{chronos origin}%
5400       \PackageWarning{chronos}{Aligning #1 text tag with (chronos origin).
5401         Set at to avoid this}%
5402     \fi
5403     \ifdim\chronos@yshift>Opt\relax
5404       \expandafter\global\csname chronos@#1@isodfalse\endcsname
5405       \def\chronos@yshift@inv{-\chronos@yshift}%
5406     \else
5407       \ifdim\chronos@yshift<Opt\relax
5408         \expandafter\global\csname chronos@#1@isodtrue\endcsname
5409         \def\chronos@yshift@inv{-\chronos@yshift}%
5410       \else
5411         \ifdim\chronos@testun@yshift=Opt\relax

```

```

5412     \PackageWarning{chronos}{%
5413         Tag will be placed at the timeline's vertical centre.
5414         Set non-zero yshift or text tag yshift or set at to avoid this%
5415     }%
5416     \fi
5417     \chronos@legacy@if{chronos@#1@isod}{% cheat!
5418         \pretocmd\chronos@cadw{yshift=-\chronos@testun@yshift,}{-}{}%
5419         \def\chronos@yshift@inv{\chronos@testun@yshift}%
5420     }{%
5421         \pretocmd\chronos@cadw{yshift=\chronos@testun@yshift,}{-}{}%
5422         \def\chronos@yshift@inv{-\chronos@testun@yshift}%
5423     }% if chronos@#1isod
5424     \fi % if yshift<0pt
5425     \fi % if yshift>0pt
5426 }%
5427 \IfCSFreeT{chronos@#1@lliw}{%^^A \ifcsunef is T even if cs is \relax (unlike \ifcsdef
which is also T if cs is \relax)
5428     \expandafter\ifchronos@troilliwiaw
5429         \csname ifchronos@#1@isod\endcsname
5430         \chronos@troilliwiaw@isod[#1]
5431     \else
5432         \chronos@troilliwiaw@uchod[#1]%
5433     \fi
5434 \else
5435     \CSletCS{chronos@#1@lliw}{chronos@#1@lliw@rhagosodedig}%
5436 \fi
5437 }%
5438 \edef\chronos@tempa{lliw \csname chronos@#1@tikzname\endcsname}%
5439 \edef\chronos@tempb{\csname chronos@#1@lliw\endcsname}%
5440 \edef\chronos@tempc{colour \csname chronos@#1@tikzname\endcsname}%
5441 \edef\chronos@tempf{color \csname chronos@#1@tikzname\endcsname}%
5442 \xglobal\colorlet{\chronos@tempa}{\chronos@tempb}%
5443 \xglobal\colorlet{\chronos@tempc}{\chronos@tempb}%
5444 \xglobal\colorlet{\chronos@tempf}{\chronos@tempb}%
5445 \colorlet{chronos current tag colour}{\chronos@tempb}%
5446 \colorlet{chronos current tag color}{\chronos@tempb}%
5447 \ifchronos@enwaullisym
5448     \edef\chronos@tempg{\csname chronos@#1@tikzname\endcsname}%
5449     \xglobal\colorlet{\chronos@tempg}{\chronos@tempb}%
5450 \fi
5451 }%^^A >>>

```

`\chronos@gosod@angor@tag` Internal macro to add connector to tag anchors.

```

5452 \NewDocumentCommand\chronos@gosodangor@tag{m}{%i^^A <<<
5453     \IfCSExistTF{chronos@#1@angor}{%
5454         \expandafter\edef\expandafter\chronos@tempa\expandafter{%
5455             \csname chronos@#1@angor\endcsname
5456         }%
5457         \foreach \i/\j in {%
5458             north/south,%
5459             south/north,%
5460             east/west,%
5461             west/east,%
5462             north west/south east,%
5463             south east/north west,%
5464             north east/south west,%
5465             south west/north east%
5466         }{%
5467             \edef\chronos@tempb{\i}%
5468             \ifx\chronos@tempa\chronos@tempb

```

```

5469     \global\CSlet{chronos@#1@invanchor}\j\breakforeach
5470     \fi
5471   }%
5472 }{%
5473   \csname ifchronos@#1@isod\endcsname
5474   \expandafter\def\csname chronos@#1@angor\endcsname {north}%
5475   \expandafter\def\csname chronos@#1@invanchor\endcsname {south}%
5476   \else
5477   \expandafter\def\csname chronos@#1@angor\endcsname {south}%
5478   \expandafter\def\csname chronos@#1@invanchor\endcsname {north}%
5479   \fi
5480 }%
5481 }%^A >>>

```

`\chronos@creu@llinell` Internal macro to put new life or period on timeline.

```

5482 \NewDocumentCommand \chronos@creu@llinell {mmmm}{%^A <<< fill (fallai draw)} llinell
      ar y llinell amser am dymor estynedig

5483 \expandafter\let\expandafter\chronos@tempa\csname chronos@#1@tikzname\endcsname
5484 \edef\chronos@tempd{\csname chronos@#1@tikzname\endcsname-inv}%
5485 \expandafter\let\expandafter\chronos@tempb\csname chronos@#1@border\endcsname
5486 \expandafter\let\expandafter\chronos@tempc\csname chronos@#1@border@inv\endcsname
5487 \begin{scope}[/chronos/chronos@llinell@haenen]
5488   \ifchronos@yearsonline

5489     \path [/chronos/@llinell/.expand once=\csname chronos@#1@lliw\endcsname] %
5490       ({#2,0} |- \chronos@border@coord) -- +(Opt,\chronos@tempb) coordinate %
5491       (\chronos@tempa{ } #4) -| ({#3,0} |- \chronos@border@coord) coordinate %
5492       [midway] (\chronos@tempa{ } #5) -- cycle;
5493   \else
5494     \path [/chronos/@llinell/.expand once=\csname chronos@#1@lliw\endcsname] %
5495       ({#2,0} |- \chronos@border@coord) ++(Opt,\chronos@tempb) %
5496       ++(Opt,\chronos@llinell@yshift) coordinate (\chronos@tempa{ } #4) -- %
5497       ({#3,0} |- \chronos@tempa{ } #4) coordinate (\chronos@tempa{ } #5);
5498   \fi
5499   \ifchronos@eventdatessplit
5500     \ifchronos@yearsonline
5501       \path [/chronos/@llinell/.expand once=\csname chronos@#1@lliw\endcsname] %
5502         ({#2,0} |- \chronos@border@coord@inv) -- +(Opt,\chronos@tempc) %
5503         coordinate (\chronos@tempd{ } #4) -| ({#3,0} |- \chronos@border@coord@inv) %
5504         coordinate [midway] (\chronos@tempd{ } #5) %
5505         -- cycle;
5506     \else
5507       \path [/chronos/@llinell/.expand once=\csname chronos@#1@lliw\endcsname] %
5508         ({#2,0} |- \chronos@border@coord@inv) ++(Opt,\chronos@tempc) %
5509         ++(Opt,-\chronos@llinell@yshift) coordinate (\chronos@tempd{ } #4) -- %
5510         ({#3,0} |- \chronos@tempd{ } #4) coordinate [midway] %
5511         (\chronos@tempd{ } #5);
5512     \fi
5513   \fi
5514 \end{scope}%
5515 }%^A >>>

```

`\chronos@creu@testun@tag` Internal macro to create text tags.

```

5516 \NewDocumentCommand \chronos@creu@testun@tag{s 0 {} m +m}{%^A <<< make text tag
5517 % #1 : seren | star
5518 % #2 : allweddu ychwanegol | additional keys
5519 % #3 : tag e.g. byw
5520 % #4 : testun | text
5521 \ifchronos@phantom

```

```

5522 \relax
5523 \else
5524 \expandafter\let\expandafter\chronos@tempa\csname chronos@#3@tikzname\endcsname
5525 \expandafter\let\expandafter\chronos@tempb\csname chronos@#3@at\endcsname
5526 \IfBooleanTF{#1}{%
5527 \edef\chronos@tempa{\csname chronos@#3@tikzname\endcsname-inv}%
5528 \expandafter\let\expandafter\chronos@tempc\csname chronos@#3@inanchor\endcsname
5529 \pgfqkeys{/chronos}{%
5530 chronos@tempa@style/.style={/chronos/event date split},% oedd yshcale=-1,...
5531 chronos@tempb@style/.style={yshift=2*\chronos@yshift@inv}}%
5532 \path (\chronos@tempb);
5533 \pgfgetlastxy {\chronos@templgtha}{\chronos@templgthb}%
5534 \ifdim\chronos@templgthb>0pt
5535 \coordinate (chronos@temp@coord) at (\chronos@templgtha,-\chronos@templgthb);
5536 \else
5537 \coordinate (chronos@temp@coord) at (\chronos@templgtha,\chronos@templgthb);
5538 \fi
5539 }{%
5540 \expandafter\let\expandafter\chronos@tempc\csname chronos@#3@angor\endcsname
5541 \pgfqkeys{/chronos}{%
5542 chronos@tempa@style/.style={#2},
5543 chronos@tempb@style/.style={#2}}%
5544 \coordinate (chronos@temp@coord) at (\chronos@tempb);
5545 }%

```

ateb Symbol 1: <https://tex.stackexchange.com/a/385953/>

```

5546 \scoped[/chronos/middle anchorborder]{%

```

fill opacity=0 -> problem ; fill=none -> dim problem; beth sy'n digwydd?

for some reason fill opacity=0 causes a problem, whereas fill=none does not, but why?

```

5547 \node (testun \chronos@tempa) [%
5548 /chronos/@testun/.expand once=\csname chronos@#3@lliw\endcsname,%
5549 anchor=\chronos@tempc,%
5550 /chronos/.cd,/utils/exec=\pgfkeysalsofrom{\chronos@cadw},%
5551 /chronos/chronos@tempb@style,%
5552 /tikz/.cd,%
5553 alias=tag \chronos@tempa,%
5554 alias=text tag \chronos@tempa
5555 ] at (chronos@temp@coord) {#4};}%
5556 \ifchronos@tag@cysylltu

```

creu cylch ar y lein | make circle on timeline

```

5557 \scoped[/chronos/chronos@cysylltiad@haenen]{%
5558 \node (cysylltwr chronos \chronos@tempa) [%
5559 /chronos/@cysylltwr@chronos/.expand once=\csname chronos@#3@lliw\endcsname,%
5560 alias=chronos connector \chronos@tempa,%
5561 alias=circle \chronos@tempa,%
5562 alias=cylch \chronos@tempa
5563 ] at (\chronos@tempa) {};%
5564 }%

```

ateb Symbol 1: <https://tex.stackexchange.com/a/385953/>

```

5565 \begin{scope}[/chronos/middle anchorborder]%

```

creu cysylltwyr testun ar y node testun | make text connectors on the text node

```

5566 \node (cysylltwr testun \chronos@tempa) [%
5567 /chronos/@cysylltwr@testun/.expand once=\csname chronos@#3@lliw\endcsname,%
5568 /chronos/@cysylltwr@testun@prif/.expand once=\csname chronos@#3@lliw\endcsname,%

```

```

5569     alias=text tag connector \chronos@tempa,%
5570     alias=prif gysylltwr \chronos@tempa,%
5571     alias=main connector \chronos@tempa,%
5572     alias=cysylltwr \chronos@tempa0,%
5573     alias=testun cylch \chronos@tempa,%
5574     alias=connector \chronos@tempa0
5575     ] at (testun \chronos@tempa.middle \chronos@tempc) {};
5576     \end{scope}%
5577     \path (cysylltwr testun \chronos@tempa);
5578     \pgfgetlastxy{\chronos@templgtha}{\chronos@templgthb}%
5579     \path (cysylltwr chronos \chronos@tempa);
5580     \pgfgetlastxy{\chronos@templgthc}{\chronos@templgthb}%
5581     \ifdim\chronos@templgtha=\chronos@templgthc
5582         \def\chronos@tempe{--}
5583     \else
5584         \def\chronos@tempe{|-}
5585     \fi
5586     \ifbool{chronos@#3@cysylltiad}{%

```

cysylltu llinell amser i node testun | connect timeline to text node

```

5587     \scoped[/chronos/chronos@cysylltiad@haenen]{%
5588         \draw [%
5589             /chronos/@cysylltiad/.expand once=\csname chronos@#3@lliw\endcsname
5590         ] (cysylltwr chronos \chronos@tempa) \chronos@tempe
5591         (cysylltwr testun \chronos@tempa) ;%
5592         }%% oedd .\chronos@tempc
5593     }-}% ifchronos@#3@cysylltiad
5594     \fi % \ifchronos@tag@cysylltu
5595     \fi
5596 }%^^A >>>

```

`\chronosevent` Aliases and globalised defaults. Note these are the documented forms.

```

\chronoslife
\chronosperiod 5597 \AtEndPreamble{%
\chronosinfo 5598 \@ifpackageloaded{memoize}{%
\chronostheory 5599 \mmzset{%
\chronostheorycircle 5600 auto={chronos}{memoize},
\chronosmaintitle 5601 }%
\chronoscopyright 5602 }-}% nid yw hyn yn memoizable byth bynnag
\chronosshowpreset 5603 \pgfkeys{/handlers/.meaning to context/.code={}}%
\chronosshowcolour 5604 }%
\chronosshowcolor 5605 \ifchronos@byw@isod
\chronosshowfeatures 5606 \chronos@byw@isod@rhagtrue
5607 \else
5608 \chronos@byw@isod@rhagfalse
5609 \fi
5610 \ifchronos@digwyddiad@isod
5611 \chronos@digwyddiad@isod@rhagtrue
5612 \else
5613 \chronos@digwyddiad@isod@rhagfalse
5614 \fi
5615 \ifchronos@parhad@isod
5616 \chronos@parhad@isod@rhagtrue
5617 \else
5618 \chronos@parhad@isod@rhagfalse
5619 \fi
5620 \chronos@lliwiau@cadw@rhag
5621 \IfExistF \chronosevent{\let\chronosevent\digwyddiad}%
5622 \IfExistF \chronoslife{\let\chronoslife\byw}%
5623 \IfExistF \chronosperiod{\let\chronosperiod\parhad}%

```

```

5624 \IfExistF \chronosinfo{\let\chronosinfo\gwybodaeth}%
5625 \IfExistF \chronostheory{\let\chronostheory\theori}%
5626 \IfExistF \chronostheorycircle{\let\chronostheorycircle\cylchtheori}%
5627 \IfExistF \chronosmaintitle{\let\chronosmaintitle\prifdeitl}%
5628 \IfExistF \chronoscopyright{\let\chronoscopyright\hawlfraint}%
5629 \IfExistF \chronosshowpreset{\let\chronosshowpreset\chronos@dangos@gosod}%
5630 \IfExistF \chronosshowcolour{\let\chronosshowcolour\chronos@dangos@lliw}%
5631 \IfExistF \chronosshowcolor{\let\chronosshowcolor\chronos@dangos@lliw}%

```

`\chronosshowfeatures` Debugging.

```

5632 \ProvideDocumentCommand \chronosshowfeatures { o }{%
5633   \IfValueTF {#1} {%
5634     \chronos@dangos@nodweddion{#1}
5635   }{%
5636     \chronos@dangos@nodweddion@rhag
5637   }%
5638 }%

```

Required colours for `\chronosshowfeatures`.

```

5639 \providecolor{chronos show coordinate colour}{named}{chronos@lliw@coord}%
5640 \providecolor{chronos show node colour}{named}{chronos@lliw@node}%
5641 \providecolor{chronos show coordinate color}{named}{chronos@lliw@coord}%
5642 \providecolor{chronos show node color}{named}{chronos@lliw@node}%

```

`\ceyearlabel` Globalised defaults.

```

\ceyearlabel
\celabel 5643 \IfExistF \ceyearlabel {\let\ceyearlabel\chronos@yearce}%
\bcelabel 5644 \IfExistF \bcyearlabel {\let\bcyearlabel\chronos@yearbce}%
\tlstyle 5645 \IfExistF \celabel {\let\celabel\chronos@ce}%
\plstyle 5646 \IfExistF \bcelabel {\let\bcelabel\chronos@bce}%
\sisshape 5647 \IfExistF \tlstyle {\let\tlstyle\upshape}%
\textsi 5648 \IfExistF \plstyle {\let\plstyle\upshape}%
\uishape 5649 \IfExistF \sisshape {\DeclareRobustCommand\sisshape{\itshape\scshape}}%
\textui 5650 \IfExistF \textsi {\DeclareTextFontCommand{\textsi}{\sisshape}}%
5651 \IfExistF \uishape {\let\uishape\itshape}%
5652 \IfExistF \textui {\DeclareTextFontCommand{\textui}{\uishape}}%
5653 }

5654 \chronos@presetfalse

```

## 17 **chronos-lib-styles**

Styles.

```

5655 \RequirePackage{chronos}
5656 \ProvidesPackageSVN[chronos-lib-styles.sty]{$Id: chronos-code.dtx 10946 2025-03-15 07:57:17Z
  cfrees $}[v0.9.2 \revinfo]
5657 \pgfqkeys{/chronos}{%^^A BEGIN styles <<<

```

Styles come in three flavours: on-line, off-line and no-year.

### 17.0.1 On-line

`modern` Years are marked on the timeline itself.

```

lavender menace 5658 modern/.style={% <<<
serif on line 5659   /chronos/.cd,
rainbow serif 5660   modern/.meaning to context,
sober judge 5661   colour scheme=modern,
5662   no colour rotation,

```

```

5663     timeline={%
5664         dates=1500:1900,
5665         timeline years=on line,
5666         timeline line={chronos timeline background colour, opacity=1},
5667         timeline height'=5mm,
5668         timeline marks,
5669         timeline border height'=5pt,
5670         major step font=\sffamily\bfseries\small,
5671         minor step font=\sffamily\bfseries\footnotesize,
5672         eras font=\sffamily\bfseries,
5673         timeline mark={line width=.4pt, shorten <=-2pt, shorten >=0pt},
5674         timeline minor mark={line width=.2pt, shorten <=-2pt, shorten >=0pt},
5675     },
5676     every chronos connectors'=coordinate,
5677     every text tag connectors+={circle, anchor=center, draw=none,%
5678         fill=none, minimum size=\pgflinewidth},
5679     connections={draw=##1, {Triangle[width=0pt 3,reversed,length=0pt 1.5]}-%
5680         {Triangle[width=0pt 5,reversed,length=0pt 2.5]}},
5681     period/line={fill=chronos timeline foreground colour, blend mode=overlay},
5682     life/line={fill=chronos timeline foreground colour, blend mode=overlay},
5683     event/line={draw=chronos timeline foreground colour, thick, blend mode=overlay},
5684     every text tags={fill=chronos main background colour, text=###1,%
5685         fill opacity=.75, text opacity=1, draw=none, rounded corners,%
5686         align=center, font=\sffamily\footnotesize},
5687     only years,
5688     without eras,
5689     connections on=background,
5690     subheadings style={align=center, anchor=base, inner sep=0pt, outer sep=0pt,%
5691         text=chronos main colour!75!chronos main background colour, opacity=.8,%
5692         font=\sffamily\footnotesize},
5693     headings style={align=center, anchor=base, inner sep=0pt, outer sep=0pt,%
5694         text=chronos main colour!75!chronos main background colour, opacity=.8,%
5695         font=\sffamily\bfseries\small},
5696     main/frame={inner sep=5pt, ultra thick, draw=chronos main colour,%
5697         fill=none,}% oedd chronos@prifliw@cefndir
5698     main/title={/chronos/main/@frame, font=\sffamily\huge\bfseries, %
5699         text=chronos main colour, anchor=center, align=center,%
5700         draw=chronos main colour,ultra thick,drop shadow,%
5701         fill=chronos main background colour,fill opacity=1},
5702     headings drops'=10pt:10pt:7.5pt,
5703     bce year label=BCE,
5704     ce year label=CE,
5705     levels=3:3,
5706 },% >>>
5707 lavender menace/.style={% <<<
5708     /chronos/.cd,
5709     lavender menace/.meaning to context,
5710     modern,
5711     colour scheme=lavender,
5712     rotate all colours,
5713     every text tags+={draw=###1,sharp corners,text opacity=1,%
5714         fill opacity=1,draw opacity=1,drop shadow},
5715     period/line+={top color=chronosSilver,%
5716         bottom color=chronos timeline border outer colour,fill opacity=1},
5717     life/line+={top color=chronosSilver,%
5718         bottom color=chronos timeline border outer colour,fill opacity=1},
5719     main/title+={text=chronos main colour!75!chronosDarkGray},
5720 },% >>>
5721 serif on line/.style={% <<<
5722     /chronos/.cd,
5723     serif on line/.meaning to context,

```

```

5724     no colour rotation,
5725     colour scheme=default,
5726     text tag connectors'={fill=##1, opacity=1, circle, minimum size=2.5pt,%
5727       anchor=center, inner sep=0pt, outer sep=0pt},
5728     chronos connectors'={fill=##1, opacity=.75, circle, minimum size=2.5pt,%
5729       anchor=center, inner sep=0pt, outer sep=0pt},
5730     timeline ce label={CE},
5731     timeline bce label={BCE},
5732     special date=none,
5733     timeline={%
5734       start date={1800-01-01},
5735       end date={1900-01-01},
5736       timeline years=on line,
5737       timeline marks,
5738       timeline year={text=chronos timeline foreground colour, align=center},
5739       timeline mark={draw=chronos timeline foreground colour, thick, shorten >=2.5pt},
5740       timeline minor mark={draw=chronos timeline foreground colour,%
5741         thick, shorten >=3.5pt},
5742       timeline bare mark={draw=chronos timeline foreground colour,%
5743         semithick, shorten >=2pt, shorten <=2pt},
5744       minor years,
5745       step divisions=2,
5746       timeline line={chronos timeline background colour},
5747       major step font=\normalfont\bfseries,
5748       minor step font=\normalfont\bfseries\small,
5749       eras font=\normalfont\bfseries,
5750     },
5751     headings style={text=chronos main colour!75!chronos main background colour,%
5752       font=\footnotesize\uishape},
5753     subheadings style={font=\scriptsize\uishape,%
5754       text=chronos main colour!75!chronos main background colour},
5755     event/text tag+={font=\small\scshape},
5756     period/text tag+={font=\small\scshape},
5757     life/text tag+={font=\small\scshape},
5758     period/line+={fill=##1, fill opacity=.25},
5759     life/line+={fill=##1, fill opacity=.25},
5760     every text tags+={text=####1!75!black},%^A add global default o/w ignored (ond nid
eisiau inner sep=0pt)
5761     levels=3:3,
5762     main/title={font=\Large\bfseries,text=chronos main colour,draw=none},
5763     frame,
5764     main/frame={draw=chronos timeline background colour, ultra thick},
5765   },% >>>
5766   rainbow serif/.style={% <<<
5767     /utils/exec={\selectcolormodel{rgb}},
5768     /chronos/.cd,
5769     rainbow serif/.meaning to context,
5770     serif on line,
5771     colour scheme=xcolseries,
5772     rotate all colours,
5773     timeline={%
5774       dates=1500:2100,
5775       timeline mark eras,
5776       timeline bare marks=false,
5777     },
5778     only years,
5779     without eras,
5780   },% >>>
5781   sober judge/.style={% <<<
5782     /chronos/.cd,
5783     sober judge/.meaning to context,

```



```

5784 colour scheme=sobriety,
5785 timeline={%
5786   start date=1001-10-01,
5787   end date=1003-06-14,
5788   step years=1,
5789   step divisions=6,
5790   timeline minor marks,
5791   timeline bare marks,
5792 },
5793 ce year label=CE,
5794 levels=3:3,
5795 no colour rotation,
5796 every connections'={draw=####1,%
5797   -{Triangle[width=1.5pt, reversed, length=.75pt, fill=####1]}},
5798 every text tags'={fill opacity=.75,%
5799   fill=####1!25, draw=####1, rounded corners,%
5800   font=\footnotesize\sffamily, text=chronos timeline foreground colour},
5801 main/title={font=\sffamily\bfseries\LARGE, text=chronos main colour},
5802 main/frame={draw=chronos main colour, line width=1pt, rounded corners},
5803 headings style={font=\rmfamily\small\itshape,%
5804   text=chronos main colour!75!chronos main background colour},
5805 subheadings style={/chronos/@amseraumarw,font=\scriptsize\rmfamily\itshape},
5806 every lines+={fill=none,draw=none},
5807 },% >>>

```

### 17.0.2 Off-line

Years are marked somewhere off the timeline e.g. just above or below.

```

somewhat plain
contemporary 90
  blues below
  flipping blues
  rotated 90
off line colour
off line colour alt
off line simple
  simple arrow
  event splitter
5808 somewhat plain/.style={%^^A <<<
5809 /chronos/.cd,
5810 somewhat plain/.meaning to context,
5811 no colour rotation,
5812 colour scheme=default,
5813 timeline={%
5814   major step font=\normalfont\sffamily\small\bfseries,
5815   minor step font=\normalfont\sffamily\footnotesize,
5816   eras font=\normalfont\normalsize\sffamily,
5817   timeline width'=100mm,
5818   timeline years=above,
5819   timeline ce label={CE},
5820   timeline bce label={BCE},
5821   timeline margin'=12.5pt,
5822   minor years=false,
5823   start=-500,
5824   end=2050,
5825   timeline year={inner xsep=0pt},
5826 },
5827 special date=none,
5828 ce year label={CE},
5829 bce year label={BCE},
5830 text tag yshift'=-10pt,
5831 every text tags+={fill=chronos main background colour,fill opacity=.25,%
5832   text opacity=1,font=\sffamily\small},
5833 every connections+={draw=####1,%
5834   {Triangle[width=0pt 3,reversed,length=0pt 1.5]}-%
5835   {Triangle[width=0pt 3,reversed,length=0pt 1.5]}},
5836 every event below,
5837 every period below,

```

```

5838     every life below,
5839     levels=0:3,
5840     frame,
5841     headings style={font=\footnotesize\sffamily,%
5842       text=chronos main colour!75!chronos main background colour},
5843     subheadings style={/chronos/@amseraumawr,font=\scriptsize\sffamily},
5844     main/frame={draw=chronos main colour!75!chronos main background colour,semithick},
5845     main/title={/chronos/main/title lines={%
5846       draw=chronos main colour!50!chronos main background colour,%
5847       thick},%
5848       text=chronos main colour!75!chronos main background colour,%
5849       font=\Large\sffamily,},
5850     headings drops'=12pt:10pt:7.5pt,
5851     headings border'=30pt,
5852   },%^A >>>
5853   contemporary 90/.style={%^A <<<
5854     /chronos/.cd,
5855     contemporary 90/.meaning to context,
5856     colour scheme=contninety,
5857     every text tags+={text=###1,font=\sffamily},
5858     every lines+={line width=1pt},
5859     no colour rotation,
5860     timeline={%
5861       start date=2002-01-01,
5862       end date=2016-12-31,
5863       timeline arrow,
5864       conditional timeline arrow={%
5865         timeline/timeline width-=3pt+4.5\timelineht,
5866         timeline/timeline line+={shorten >={-3pt-4.5\timelineht}, -Stealth},
5867         before headings+={%
5868           \path (chronos post) -- +(3pt+4.5\timelineht,0pt);
5869         },
5870       }{},
5871     timeline marks,
5872     timeline minor marks,
5873     timeline mark={ultra thick},
5874     timeline minor mark={thick},
5875     step divisions=4,
5876     step major years=2,
5877     timeline year={fill=none},
5878     timeline margin'=5mm,
5879     timeline width'=90mm,
5880     timeline year={rotate=90},
5881     major step font=\sffamily\upshape\tlstyle\bfseries,
5882     minor step font=\sffamily\upshape\tlstyle,
5883     eras font=\sffamily\upshape\tlstyle\bfseries,
5884     timeline years=above,
5885     timeline years anchor=west,
5886   },
5887   without eras,
5888   every event below,
5889   every life below,
5890   every period below,
5891   levels=0:3,
5892   frame,
5893   headings style={font=\small\sffamily\plstyle,%
5894     text=chronos main colour!80!chronos main background colour},
5895   subheadings style={font=\footnotesize\sffamily\plstyle,%
5896     text=chronos main colour!60!chronos main background colour},
5897   main/frame={%
5898     double=chronos timeline foreground colour!25!chronos timeline background colour,%

```

```

5899     draw=chronos timeline foreground colour!75!chronos timeline background colour,%
5900     thin},
5901     main/title={font=\sffamily\upshape\plstyle\bfseries\huge,text=chronos main colour},
5902   },%^A >>>
5903   blues below/.style={%^A <<<
5904     /utils/exec={\selectcolormodel{rgb}},
5905     /chronos/.cd,
5906     blues below/.meaning to context,
5907     colour scheme=blues,
5908     rotate all colours,
5909     timeline={%
5910       timeline years=above,
5911       timeline marks,
5912       timeline minor marks,
5913       step minor year=50,
5914       step divisions=10,
5915       step major year=100,
5916       dates=1550:2050,
5917       timeline height'=3pt,
5918       timeline line={chronos timeline foreground colour,%
5919         double=chronos timeline background colour,%
5920         line width=\timelineht/3,double distance=\timelineht/3},
5921       timeline arrow,
5922       conditional timeline arrow={%
5923         timeline/timeline line+={Bar-Latex,shorten <=-\timelineht/3,%
5924           shorten >=-3pt-2.1\timelineht},
5925         timeline/timeline width-={3pt+2.43\timelineht},
5926         before headings+={\path (chronos post) -- ++(3pt+2.1\timelineht,0pt) %
5927           coordinate (chronos arrow tip) (chronos pre) -- %
5928             ++(-\timelineht/3,0pt) coordinate (chronos arrow tail);},
5929       }{,
5930       timeline mark={chronos timeline foreground colour,line width=.6pt,shorten >=-4pt},
5931       timeline minor mark={chronos timeline foreground colour,%
5932         line width=.5pt,shorten >=-3.5pt},
5933       timeline bare mark={%
5934         chronos timeline foreground colour,line width=.3pt,shorten >=-2.5pt},
5935       timeline year={fill=none,text=chronos timeline foreground colour,%
5936         rotate around={45:(chronos year \chronosyeari |- chronos top)}},
5937       major step font=\sffamily\footnotesize\tlstyle,
5938       timeline years anchor=south west,
5939       minor step font=\sffamily\scriptsize\tlstyle,
5940       timeline margin'=17.5pt,
5941     },
5942     minor year format={!Y},
5943     every event below,
5944     every life below,
5945     every period below,
5946     levels=0:3,
5947     headings style+={%
5948       text=chronos main colour!75!chronos main background colour,%
5949       font=\small\itshape\bfseries,%
5950     },
5951     subheadings style+={%
5952       text=chronos main colour!75!chronos main background colour,%
5953       font=\footnotesize\itshape,%
5954     },
5955     main/title+={%
5956       font=\LARGE,text=chronos timeline foreground colour,%
5957       draw=chronos timeline background colour,semithick,%
5958     },
5959     main/frame+={%

```

```

5960     thick,draw,chronos timeline foreground colour,%
5961     double=chronos timeline background colour,%
5962   },
5963   copyright={font=\footnotesize\sffamily, inner sep=0pt, outer sep=0pt,%
5964     text=chronos timeline foreground colour!50!chronos main background colour},
5965   copyright/rotate=90,
5966   copyright/tag anchor=north west,
5967 },%^A >>>
5968 timeline year rotate/.code={%
5969 },
5970 flipping blues/.style={%^A <<<
5971   /chronos/.cd,
5972   flipping blues/.meaning to context,
5973   blues below,
5974   timeline={%
5975     timeline years=below,
5976     timeline year={%
5977       fill=none,rotate around={-90:(chronos year \chronosyeari)},%
5978       text=chronos timeline foreground colour,%
5979     },
5980     timeline years anchor=north west,
5981   },
5982   every event above,
5983   every life above,
5984   every period above,
5985   levels=3:0,
5986 },%^A >>>
5987 rotated 45/.style={%^A <<<
5988   /chronos/.cd,
5989   rotated 45/.meaning to context,
5990   colour scheme=default,
5991   rotate all colours,
5992   timeline={%
5993     start date={{-25}-01-01},
5994     end date={20-01-01},
5995     step major years=5,
5996     timeline years=off line,
5997     timeline years=above,
5998     timeline marks,
5999     timeline font=\scriptsize,
6000     mark at era switch,
6001   },
6002   only text,
6003   year format={!Y !E},
6004   lines={draw=#1},
6005   every text tags+={rotate=-45},
6006   event/tag+={tag anchor=west},
6007   period/tag+={tag anchor=west},
6008   life/tag+={tag anchor=west},
6009   text tag yshift'=2.5pt,
6010   every event below,
6011   every period below,
6012   every life below,
6013   no connectors,
6014   no connections,
6015   lines on=foreground,
6016   frame,
6017   every text tags+={font=\sffamily},
6018   main/frame={draw=chronos main colour,rounded corners=10pt,thick},
6019   main/title={%
6020     draw=chronos main colour,rounded corners=3pt,%

```

```

6021     semithick,font=\sffamily\LARGE,%
6022   },
6023   headings style={%
6024     font=\itshape\small\bfseries,%
6025     text=chronos main colour!50!chronos main background colour,%
6026   },
6027   subheadings style={font=\itshape\small,%
6028     text=chronos timeline foreground colour!50!chronos timeline background colour},
6029 },%^A >>>
6030 off line colour/.style={%^A <<< ateb: https://tex.stackexchange.com/a/324106/
6031 /chronos/.cd,
6032 off line colour/.meaning to context,
6033 colour scheme=offlinebasic,
6034 rotate all colours,
6035 timeline={%
6036   timeline width'=120mm,
6037   timeline height'=3pt,
6038   start date={-3000}-01-01,
6039   end date={-2000}-01-01,
6040   timeline font=\sffamily\tiny,
6041   timeline year={text=chronos main colour},
6042   timeline arrow,
6043   conditional timeline arrow={%
6044     timeline/timeline width-=#1,
6045     timeline/timeline line+={%
6046       shorten >={-#1}, -{Triangle Cap[length=#1]},
6047     },
6048     before headings+={%
6049       \path (chronos post) -- +(#1,0pt);
6050     },
6051   }{ },
6052   timeline border height'=0pt,
6053   step major years=100,
6054   step minor years=0,
6055   step divisions=0,
6056   timeline years=below,
6057   timeline marks,
6058   timeline minor marks=false,
6059   minor years=false,
6060   timeline bare marks=false,
6061 },
6062 every text tags+={%
6063   text=####1!75!black,font=\sffamily\scriptsize,%
6064   fill=chronos main background colour,fill opacity=.75,%
6065 },
6066 every connections+={%
6067   draw=####1,%
6068   {Triangle[width=0pt 3,reversed,length=0pt 1.5]}-%
6069   {Triangle[width=0pt 3,reversed,length=0pt 1.5]},%
6070 },
6071 event/line'={},
6072 year format={!q!Y},
6073 event/date format={!q!Y},
6074 main/title={font=\sffamily\Large,text=chronos timeline foreground colour},
6075 chronos tikz+={%
6076   \ifchronos@timeline@showyears
6077   \scoped[on chronos middle ground layer]{%
6078     \fill [chronos main background colour, fill opacity=.75]
6079     (chronos pre) -| (chronos post |- chronos phantom year.south) -| cycle ;
6080   }
6081   \fi

```

```
6082   },
6083   },%^A >>>
6084   off line colour/.default=20mm,
6085   off line color/.forward to=/chronos/off line colour,
6086   off line colour alt/.style={%^A <<<
6087     /chronos/.cd,
6088     off line colour alt/.meaning to context,
6089     off line colour=#1,

use cronolog colours

6090     colour scheme=offlinealt,
6091     rotate all colours,
6092     event/colours below from clist={lliwiau_byw_isod},
6093     event/colours above from clist={lliwiau_byw_uchod},
6094   },%^A >>>
6095   off line colour alt/.default=20mm,
6096   off line color alt/.forward to=/chronos/off line colour alt,
6097   off line simple/.style={%^A <<< https://tex.stackexchange.com/a/324106/
6098     /chronos/.cd,
6099     off line simple/.meaning to context,
6100     off line colour=#1,
6101     rotate no colours,
6102   },%^A >>>
6103   off line simple/.default=20mm,
6104   simple arrow/.style={%^A <<< https://tex.stackexchange.com/a/342699/
6105     /chronos/.cd,
6106     simple arrow/.meaning to context,
6107     timeline={%
6108       start date={1-01-01},
6109       end date={2000-01-01},
6110       step major years=250,
6111       timeline height'=2.5mm,
6112       timeline years=off line,
6113       timeline width'=200mm,
6114       timeline arrow,
6115       conditional timeline arrow={%
6116         timeline/timeline width-=#1,
6117         timeline/timeline line+={shorten >={-#1}, -{Triangle Cap[length=#1]}},
6118         before headings+={%
6119           \path (chronos post) -- +(#1,0pt);
6120         },
6121       }{)},
6122     mark at era switch=false,
6123   },
6124   date format={!d/!m/!Y},
6125   every event below,
6126   every period below,
6127   every life below,
6128   no colour rotation,
6129   headings style={font=\footnotesize\itshape},
6130   subheadings style={font=\scriptsize\itshape},
6131   },%^A >>>
6132   simple arrow/.default=10mm,
6133   event splitter/.style={%^A <<< https://tex.stackexchange.com/a/325890/
6134     /chronos/.cd,
6135     event splitter/.meaning to context,
6136     no colour rotation,
6137     timeline={%
6138       start date=2014-01-13,
6139       end date=2014-02-22,
6140       timeline width'=150mm,
```

```

6141     timeline margin'=0pt,
6142     timeline era margin'=0pt,
6143     timeline years=none,
6144     timeline years=off line,
6145   },
6146   event/date format={!b !d \thinspace !Y},
6147   event dates split,
6148   text tag yshift'=3pt,
6149   event text tag={font=\sffamily\small},
6150   no connectors,
6151   every event below,
6152   main/title={font=\sffamily\Large},
6153   frame,
6154   main/frame={draw},
6155 },%^A >>>

```

### 17.0.3 No-year

Years are not marked.

```

date centric
lines on line
plain arrow
6156 date centric/.style={%^A <<<
6157   /chronos/.cd,
6158   date centric/.meaning to context,
6159   timeline={%
6160     timeline width'=150mm,
6161     timeline height'=5mm,
6162     start date=1935-01-01,
6163     end date=2010-12-31,
6164     timeline font=\sffamily\small,
6165     timeline border height'=5pt,
6166   },
6167   event/text tag+={font=\sffamily\scriptsize, fill=none},
6168   no colour rotation,
6169   event/default colour=chronos main colour,
6170   event years on line,
6171   main/title+={%
6172     font=\sffamily\LARGE,text=chronos main colour,%
6173     /chronos/main/title lines={%
6174       draw=chronos timeline background colour,line width=1.5pt,%
6175     }%
6176   },
6177 },%^A >>>
6178 lines on line/.style={%^A <<< https://tex.stackexchange.com/a/324453/
6179   /chronos/.cd,
6180   lines on line/.meaning to context,
6181   rotate all colours,
6182   timeline={%
6183     timeline width'=120mm,
6184     timeline height'=#1,
6185     start date=01-01-01,
6186     end date=2016-12-31,
6187     timeline years=none,
6188     timeline years=above,
6189     timeline arrow,
6190     conditional timeline arrow={%
6191       timeline/timeline width'--=20mm,
6192       timeline/timeline line+={shorten >=-20mm, -{Triangle Cap[length=20mm]}},
6193     before headings+={%
6194       \path (chronos post) -- +(20mm,0pt);

```

```

6195     },
6196     }{ },
6197   },
6198   only years,
6199   period/line+={line width=#1,draw=##1},
6200   life/line+={line width=#1,draw=##1},
6201   line yshift=.5*#1,
6202   event/line+={semithick},
6203   text tag yshift=2.5pt+.5*#1,
6204   every event above,
6205   every period below,
6206   every life below,
6207   headings style={font=\footnotesize\bfseries},
6208   subheadings style={font=\footnotesize},
6209 },%^A >>>
6210 lines on line/.default=5mm,
6211 plain arrow/.style={%^A <<< https://tex.stackexchange.com/a/324453/
6212 /chronos/.cd,
6213 plain arrow/.meaning to context,
6214 lines on line=#1,
6215 line yshift'=1pt,
6216 text tag yshift'=2.5pt,
6217 period/line+={line width=2pt,draw=##1},
6218 life/line+={line width=2pt,draw=##1},
6219 },%^A >>>
6220 plain arrow/.default=5mm,
6221 }%^A % END styles >>>

```

## 18 *chronos-lib-colschemes*

Colour schemes.

```

6222 \RequirePackage{chronos}
6223 \ProvidesPackageSVN[chronos-lib-colschemes.sty]{%Id: chronos-code.dtx 10946 2025-03-15
6224   07:57:17Z cfrees $}[v0.9.2 \revinfo]

```

**blues** *cylluniau lliwiau* | colour schemes

```

contninety 6224 \chronosnewcolourscheme[default]{blues}{%^A <<<
offlinealt 6225   timeline foreground=chronosDodgerBlue4,
xcolseries 6226   timeline background=chronosDodgerBlue2,
lavender   6227   default below={%
modern    6228     chronosCerulean!50!chronosDodgerBlue4,chronosCerulean!50!chronosDodgerBlue3,%
offlinebasic 6229     chronosCerulean!50!chronosDodgerBlue2,chronosCerulean!50!chronosDodgerBlue1,%
sobriety  6230     chronosCerulean},
6231   default above={chronosCerulean!50!chronosDodgerBlue4,%
6232     chronosCerulean!50!chronosDodgerBlue3,chronosCerulean!50!chronosDodgerBlue2,%
6233     chronosCerulean!50!chronosDodgerBlue1,chronosCerulean},
6234   foreground=chronosDodgerBlue4,
6235   background=white,
6236 }%^A >>>
6237 \chronosnewcolourscheme[default]{contninety}{%^A <<<
6238   foreground=chronosdarkgray,
6239   timeline foreground=chronosdarkgray,
6240 }%^A >>>
6241 \chronosnewcolourscheme[cronoleg]{offlinealt}{%^A <<<
6242   timeline foreground=blue!40,
6243 }%^A >>>

```

xcolor manual: 35



```

6244 \definecolorseries{xcolor g2}{hsb}{grad}[hsb]{.575,1,1}{.987,-.234,0}
6245 \definecolorseries{xcolor s2}{hsb}{step}[hsb]{.575,1,1}{.11,-.05,0}
6246 \resetcolorseries{xcolor g2}
6247 \resetcolorseries{xcolor s2}
6248 \chronosnewcolourscheme[default]{xcolseries}{%^^A <<<
6249   default above={%
6250     xcolor s2!![0],xcolor s2!![1],xcolor s2!![2],xcolor s2!![3],%
6251     xcolor s2!![4],xcolor s2!![5],xcolor s2!![6],xcolor s2!![7],%
6252     xcolor s2!![8],xcolor s2!![9],xcolor s2!![10],xcolor s2!![11],%
6253     xcolor s2!![12],xcolor s2!![13],xcolor s2!![14],xcolor s2!![15]},
6254   default below={%
6255     xcolor g2!![0],xcolor g2!![1],xcolor g2!![2],xcolor g2!![3],%
6256     xcolor g2!![4],xcolor g2!![5],xcolor g2!![6],xcolor g2!![7],%
6257     xcolor g2!![8],xcolor g2!![9],xcolor g2!![10],xcolor g2!![11],%
6258     xcolor g2!![12],xcolor g2!![13],xcolor g2!![14],xcolor g2!![15]},
6259   background=white,
6260   foreground=black,
6261   timeline foreground=white,
6262   timeline background=black,
6263   timeline border inner=white,
6264   timeline border outer=white,
6265   timeline border middle=black!80,
6266   life/default=chronosdarkgray,
6267   event/default=chronosdarkgray,
6268   period/default=chronosdarkgray,
6269   theory/default=chronosdarkgray,
6270   info/default=chronosdarkgray,
6271 }%^^A >>>
6272 \chronosnewcolourscheme[default]{lavender}{%^^A <<<
6273   timeline foreground=chronosLavenderBlush4,
6274   timeline background=chronosLavender,
6275   timeline border inner=chronosLavenderBlush3,
6276   timeline border middle=chronosLavenderBlush1,
6277   timeline border outer=chronosLavenderBlush4,
6278   foreground=chronosLavenderBlush4,
6279   background=chronosLavender,
6280   default above={%
6281     chronosLavenderBlush4!90!chronosMediumPurple!50!chronosDarkSlateGrey,%
6282     chronosLavenderBlush3!90!chronosMediumPurple!50!chronosDarkSlateGrey,%
6283     chronosLavenderBlush2!90!chronosMediumPurple!50!chronosDarkSlateGrey},
6284   default below={%
6285     chronosLavenderBlush2!90!chronosMediumPurple!50!chronosDarkSlateGrey,%
6286     chronosLavenderBlush3!90!chronosMediumPurple!50!chronosDarkSlateGrey,%
6287     chronosLavenderBlush4!90!chronosMediumPurple!50!chronosDarkSlateGrey},
6288 }%^^A >>>
6289 \chronosnewcolourscheme[default]{modern}{%^^A <<<
6290   timeline foreground=chronosSilver,
6291 }%^^A >>>
6292 \chronosnewcolourscheme[default]{offlinebasic}{%^^A <<<
6293   timeline foreground=blue!40,
6294   foreground=black,
6295   background=white,
6296 }%^^A >>>
6297 \chronosnewcolourscheme[default]{sobriety}{%^^A <<<
6298   foreground=gray,
6299   background=white,
6300   timeline background=gray!50,
6301   timeline foreground=black,
6302   life/default=gray,
6303   event/default=gray,
6304   period/default=gray,

```

```
6305 theory/default=gray,  
6306 info/default=gray,  
6307 }%^^A >>>
```

## Change History

v0.7?		v0.9.1	
General: First repo release. (Ish.) Earlier versions were published informally on <a href="#">TeX</a> <a href="#">StackExchange</a> . . . . .	104	General: Minimal code documentation. <code>docstrip</code> implementation. . . . .	104
v0.9		v0.9.2	
General: First <a href="#">CTAN</a> release. . . . .	104	General: Fix info reported for <code>chronos-lib-styles.sty</code> . . . . .	206, 216
First CTAN release. . . . .	104		

## Index

Features are sorted by kind. Numbers written in *bold italics* refer to the pages containing the main descriptions of the corresponding entries. Numbers *underlined* refer to the code lines where the entries are defined. Upright numbers refer to pages containing additional comments, discussion or examples of usage or to line numbers for usage in the code<sup>2</sup>. † indicates an example of usage.

<b>Symbols</b>	
' (prime)	33, 34
'+ (prime-plus)	34
'- (prime-minus)	34
+ (plus)	32
\-	119, 123, 126
- (minus)	8
/ (forward slash)	32
\\	123, 443, 457, 472, 485, 497, 4389, 4394, 4402, 4407, 4724, 4732, 4736, 4834, 4842, 4942, 4949, 4952
\{	125, 473, 498
\}	125, 444, 458, 486
\_	5085
-	63
# (hash)	92
--	63
<b>Numbers</b>	
\1	401, 405
\2	401, 405
\3	401
<b>A</b>	
arrow tips	101
<b>B</b>	
BOOLEAN KEYS:	
<tag>/copleft	75
as is	67
color rotation	59
colour rotation	59
connect	68
copleft/copleft	67
event dates split	78
event/as is	63
event/connect	63
event/place below	63
frame	
style	54
frame	53
frame uses bb	53
life/connect	61
no simple color names	10
no simple colour names	10
period/connect	64
phantom	71
place below	69
show bounding box	98
show coords	97
show nodes	98
simple color names	
Leslie Lamport†	63
simple color names	10, 60
simple colour names	
donald knuth†	58
Leslie Lamport†	63
simple colour names	10, 60
timeline/mark at era switch	40
timeline/minor years	47
timeline/timeline arrow	95
following chronos styles	93
use in blues below†	89
timeline/timeline arrow	53
timeline/timeline bare marks	49
timeline/timeline mark eras	
effect of enabling explicitly <i>vs.</i> implicitly on	
show nodes	98
timeline/timeline mark eras	38
timeline/timeline marks	48
timeline/timeline minor marks	48
timeline/timeline show years	49
timeline/year at era switch	40
timeline/year zero	39
<b>C</b>	
CHOICE KEYS:	
connections on	41
lines on	41
placeholders	
levels	54
style	97
placeholders	97
timeline/border on	41
timeline/timeline on	41
timeline/timeline years	91
above	46
below	46
none	46
off line	46, 99
on line	46
timeline/timeline years	46

<sup>2</sup>I am grateful to David Carlisle and Ulrike Fischer for help with indexing at [TeX StackExchange: 695555](https://tex.stackexchange.com/questions/695555).

- CHRONOS STYLES:
- blues below
    - example of ..... 1
    - features (summary) ..... 18
    - sample output† ..... 25
    - use of `timeline line†` ..... 53
    - use of blues colour scheme ..... 29
  - blues below ..... [19](#), [5808](#)
  - contemporary 90
    - features (summary) ..... 18
    - sample output† ..... 25
    - suitability for temporal ranges of ..... 89
    - use of `contninet` colour scheme ..... 29
  - contemporary 90 ..... [19](#), [5808](#)
  - cronoleg
    - colour rotation ..... 7
    - features (summary) ..... 18
    - in example `timeline†` ..... 5
    - sample output† ..... 20
    - use of `cronoleg` colour scheme ..... 29
  - cronoleg ..... [17](#)
  - date centric
    - development ..... 1
    - features (summary) ..... 18
    - sample output† ..... 21
    - use of `title lines` ..... 75
  - date centric ..... [17](#), [6156](#)
  - defining custom ..... 85, 88
  - event splitter
    - development ..... 1
    - features (summary) ..... 18
    - sample output† ..... 28
  - event splitter ..... [21](#), [5808](#)
  - flipping blues
    - features (summary) ..... 18
    - sample output† ..... 25
    - use of blues colour scheme ..... 29
  - flipping blues ..... [19](#), [5808](#)
  - lavender menace
    - features (summary) ..... 18
    - sample output† ..... 22
    - use of lavender colour scheme ..... 29
  - lavender menace ..... [17](#), [5658](#)
  - lines on line
    - development ..... 1
    - features (summary) ..... 18
    - sample output† ..... 28
    - use of `conditional timeline arrow†` .. 94
  - lines on line ..... [21](#), [6156](#)
  - list of ..... 18
  - loading a colour scheme ..... 91
  - modern
    - features (summary) ..... 18
    - quadrupling of hashes in ..... 92
    - sample output† ..... 22
    - use of `modern` colour scheme ..... 29
    - use of custom colour scheme in ..... 91
    - use of public colour names in ..... 91
  - modern ..... [17](#), [5658](#)
  - modifying ..... 54
  - no-year ..... 21
    - event splitter† ..... 21
    - lines on line† ..... 21
    - plain arrow† ..... 24
  - off line ..... 19
    - blues below† ..... 19
    - contemporary 90† ..... 19
    - flipping blues† ..... 19
    - off line colour† ..... 19
    - off line colour alt† ..... 19
    - off line simple† ..... 21
    - rotated 45† ..... 21
    - simple arrow† ..... 21
    - somewhat plain† ..... 21
  - off line colour
    - features (summary) ..... 18
    - sample output† ..... 26
    - use of `offlinebasic` colour scheme .... 29
  - off line colour ..... [19](#), [5808](#)
  - off line colour alt
    - features (summary) ..... 18
    - sample output† ..... 26
    - use of `offlinealt` colour scheme ..... 29
  - off line colour alt ..... [19](#), [5808](#)
  - off line simple
    - development ..... 1
    - features (summary) ..... 18
    - sample output† ..... 27
    - use of `offlinebasic` colour scheme .... 29
  - off line simple ..... [21](#), [5808](#)
  - on line ..... 17
    - `cronoleg†` ..... 17
    - `date centric†` ..... 17
    - `lavender menace†` ..... 17
    - `modern†` ..... 17
    - `rainbow serif†` ..... 17
    - `serif on line†` ..... 17
    - `sober judge†` ..... 17
  - plain arrow
    - doubling of hashes in ..... 92
    - features (summary) ..... 18
    - sample output† ..... 28
  - plain arrow ..... [24](#), [6156](#)
  - rainbow serif
    - features (summary) ..... 18
    - sample output† ..... 23
    - use of `xcolseries` colour scheme ..... 29
  - rainbow serif ..... [17](#), [5658](#)
  - rotated 45
    - features (summary) ..... 18
    - sample output† ..... 27
    - use of `default` colour scheme ..... 29

- rotated 45 ..... [21](#)  
rotated 90 ..... [5808](#)  
serif on line  
  features (summary) ..... [18](#)  
  sample output† ..... [23](#)  
  use of default colour scheme ..... [29](#)  
serif on line ..... [17, 5658](#)  
simple arrow  
  features (summary) ..... [18](#)  
  sample output† ..... [27](#)  
simple arrow ..... [21, 5808](#)  
sober judge  
  features (summary) ..... [18](#)  
  sample output† ..... [24](#)  
  use of sobriety colour scheme ..... [29](#)  
sober judge ..... [17, 5658](#)  
somewhat plain  
  features (summary) ..... [18](#)  
  sample output† ..... [28](#)  
  use of default colour scheme ..... [29](#)  
  use of title lines ..... [75](#)  
somewhat plain ..... [21, 5808](#)  
using ..... [29](#)
- CLASSES:  
  happyholidays.cls ..... [1](#)
- COLOUR KEYS:  
  <tag>/default color ..... [77](#)  
  <tag>/default colour ..... [77](#)  
  background ..... [52](#)  
  background ..... [40, 143](#)  
  color ..... [68](#)  
  colour ..... [69, 76](#)  
  in assignment of colour names ..... [58](#)  
  colour ..... [68](#)  
  event ..... [143](#)  
  event/default color ..... [57](#)  
  event/default colour ..... [57](#)  
  foreground ..... [52, 57](#)  
  foreground ..... [40, 143](#)  
  info ..... [143](#)  
  info/default color ..... [57](#)  
  info/default colour ..... [57](#)  
  life ..... [143](#)  
  life/default color ..... [57](#)  
  life/default colour ..... [57](#)  
  period ..... [143](#)  
  period/default color ..... [57](#)  
  period/default colour ..... [57](#)  
  should not be set by ..... [90](#)  
  show bb color ..... [98](#)  
  show bb colour ..... [98](#)  
  show coordinate color ..... [98](#)  
  show coordinate colour ..... [98](#)  
  show node color ..... [98](#)  
  show node colour ..... [98](#)
- <tag>/default colour  
  applying to elements ..... [68](#)  
  in assignment of colour names ..... [58](#)  
  setting *vs.* using ..... [76](#)  
theory ..... [143](#)  
theory/default color ..... [57](#)  
theory/default colour ..... [57](#)  
timeline background ..... [143](#)  
timeline border inner ..... [143](#)  
timeline border middle ..... [143](#)  
timeline border outer ..... [143](#)  
timeline foreground ..... [143](#)  
timeline/timeline background ..... [52](#)  
timeline/timeline border inner color ..... [51](#)  
timeline/timeline border inner colour ..... [51](#)  
timeline/timeline border middle color ..... [51](#)  
timeline/timeline border middle colour  
  illegitimacy of definition in chronos style† ..... [91](#)  
timeline/timeline border middle colour  
  ..... [51](#)  
timeline/timeline border outer color ..... [51](#)  
timeline/timeline border outer colour ..... [51](#)  
timeline/timeline foreground ..... [52](#)
- COLOUR LIST KEYS:  
  colors above ..... [59](#)  
  colors below ..... [59](#)  
  colours above ..... [59](#)  
  colours below ..... [59](#)  
  default above ..... [177](#)  
  default below ..... [177](#)  
  event above ..... [177](#)  
  event below ..... [177](#)  
  event/colors above ..... [60](#)  
  event/colors below ..... [60](#)  
  event/colours above ..... [60](#)  
  event/colours below ..... [60](#)  
  life above ..... [177](#)  
  life below ..... [177](#)  
  life/colors above ..... [60](#)  
  life/colors below ..... [60](#)  
  life/colours above ..... [60](#)  
  life/colours below ..... [60](#)  
  period above ..... [177](#)  
  period below ..... [177](#)  
  period/colors above ..... [60](#)  
  period/colors below ..... [60](#)  
  period/colours above ..... [60](#)  
  period/colours below ..... [60](#)  
  theory above ..... [177](#)  
  theory below ..... [177](#)
- COLOUR LISTS:  
  should not be set by ..... [90](#)  
  when to configure ..... [30](#)
- COLOUR SCHEME KEYS:  
  background ..... [90](#)  
  default above ..... [90](#)

- default below . . . . . 90
  - event/above . . . . . 90
  - event/below . . . . . 90
  - event/default . . . . . 90
    - colour derivation . . . . . 88
  - foreground . . . . . 90
  - info/default . . . . . 90
    - colour derivation . . . . . 88
  - life/above . . . . . 90
  - life/below . . . . . 90
  - life/default . . . . . 90
    - colour derivation . . . . . 88
  - period/above . . . . . 90
  - period/below . . . . . 90
  - period/default . . . . . 90
    - colour derivation . . . . . 88
  - processing
    - background . . . . . 86
    - event/default . . . . . 88
    - foreground . . . . . 86
    - life/default . . . . . 88
    - period/default . . . . . 88
    - theory/default . . . . . 88
    - timeline background . . . . . 86
    - timeline border inner . . . . . 86
    - timeline border middle . . . . . 86
    - timeline border outer . . . . . 86
    - timeline foreground . . . . . 86
  - processing (delayed)
    - timeline background . . . . . 88
    - timeline foreground . . . . . 88
  - theory/above . . . . . 90
  - theory/below . . . . . 90
  - theory/default . . . . . 90
    - colour derivation . . . . . 88
  - timeline background . . . . . 90
    - colour derivation . . . . . 86
  - timeline border inner . . . . . 90
    - colour derivation . . . . . 86
  - timeline border middle . . . . . 90
    - colour derivation . . . . . 86
  - timeline border outer . . . . . 90
    - colour derivation . . . . . 86
  - timeline foreground . . . . . 90
    - colour derivation . . . . . 86
- COLOUR SCHEMES:
- blues . . . . . 29
    - as instance of custom† . . . . . 85
    - definition . . . . . 86
    - use by blues below . . . . . 18
    - use by flipping blues . . . . . 18
  - blues . . . . . [6224](#)
  - colour names . . . . . 90
  - continety . . . . . 29
    - as example of minimal modification to support  
chronos styles . . . . . 85
    - as instance of custom† . . . . . 85
    - use by contemporary 90 . . . . . 18
  - creating
    - options (summary) . . . . . 87
  - cronoleg . . . . . 29
    - as instance of custom† . . . . . 85
    - implementation internal . . . . . 86
    - use by cronoleg . . . . . 18
  - default
    - modification will not cause memoize recompila-  
tion . . . . . 84
  - defining custom . . . . . 85
  - lavender . . . . . 29
    - as instance of custom† . . . . . 85
    - use by lavender menace . . . . . 18
  - lavender . . . . . [6224](#)
  - list of . . . . . 29
  - modern . . . . . 29
    - as example of minimal modification to support  
chronos styles . . . . . 85
    - as instance of custom† . . . . . 85
    - use by modern . . . . . 18
  - modern . . . . . [6224](#)
  - offlinealt . . . . . 29
    - as example of minimal modification to support  
chronos styles . . . . . 85
    - as instance of custom† . . . . . 85
    - sufficient to define deviations from *(existing  
scheme)* . . . . . 86
    - use by off line colour alt . . . . . 18
  - offlinealt . . . . . [6224](#)
  - offlinebasic . . . . . 29
    - as example of minimal modification to support  
chronos styles . . . . . 85
    - as instance of custom† . . . . . 85
    - use by off line colour . . . . . 18
    - use by off line simple . . . . . 18
  - offlinebasic . . . . . [6224](#)
  - sobriety . . . . . 29
    - as instance of custom† . . . . . 85
  - sobriety . . . . . [6224](#)
  - xcolseries . . . . . 29
    - as instance of custom† . . . . . 85
    - use by rainbow serif . . . . . 18
    - use of colour series . . . . . 85
  - xcolseries . . . . . [6224](#)
- COLOURS:
- (name)* . . . . . [59](#)
  - accessing . . . . . 58
  - assigned to johannes gutenber† . . . . . 82
  - assignment by chronos . . . . . 58
  - Blue . . . . . [1304](#)
  - Blue3 . . . . . [1304](#)
  - chronos current tag color
    - outside tag contexts . . . . . 59

- chronos current tag color ..... [59](#)
  - chronos current tag colour
    - outside tag contexts ..... [59](#)
  - chronos current tag colour ..... [59](#)
  - chronos main background color ..... [40](#)
  - chronos main background colour ..... [40](#)
    - use in chronos styles ..... [40](#)
  - chronos main color ..... [40](#)
  - chronos main colour ..... [40](#)
    - as tag default ..... [57](#)
    - chronos current tag colour as equivalent to
      - outside tag contexts ..... [59](#)
      - use in chronos styles ..... [40](#)
  - chronos timeline background colour .. [90](#)
  - chronos timeline border inner colour .. [91](#)
  - chronos timeline border outer colour .. [91](#)
  - chronos timeline foreground colour .. [90](#)
  - chronosCerulean ..... [1352](#)
  - chronosPeriwinkle ..... [1352](#)
  - chronosWildStrawberry ..... [1352](#)
  - color *<name>* ..... [58](#)
  - color leslie lamport† ..... [63](#)
  - colour *<name>* ..... [58](#)
  - colour leslie lamport† ..... [63](#)
  - colour name ..... [58](#)
  - configuration ..... [57](#)
  - core ..... [90](#)
  - core border ..... [90](#)
  - core derivative ..... [90](#)
  - current tag ..... [59](#)
  - DarkGoldenrod1 ..... [1304](#)
  - DarkGray ..... [1304](#)
  - darkgray ..... [1304](#)
  - DarkOrange1 ..... [1304](#)
  - DarkOrchid3 ..... [1304](#)
  - DarkSlateGrey ..... [1304](#)
  - DeepPink2 ..... [1304](#)
  - DeepSkyBlue2 ..... [1304](#)
  - default ..... [30](#)
  - DodgerBlue1 ..... [1304](#)
  - DodgerBlue2 ..... [1304](#)
  - DodgerBlue3 ..... [1304](#)
  - DodgerBlue4 ..... [1304](#)
  - elemental ..... [90](#)
  - Firebrick1 ..... [1304](#)
  - ForestGreen ..... [1304](#)
  - Green ..... [1304](#)
  - Green3 ..... [1304](#)
  - in tag context ..... [59](#)
  - Ivory2 ..... [1304](#)
  - Ivory3 ..... [1304](#)
  - Ivory4 ..... [1304](#)
  - Lavender ..... [1304](#)
  - LavenderBlush1 ..... [1304](#)
  - LavenderBlush2 ..... [1304](#)
  - LavenderBlush3 ..... [1304](#)
  - LavenderBlush4 ..... [1304](#)
  - leslie lamport† ..... [63](#)
  - MediumPurple ..... [1304](#)
  - MidnightBlue ..... [1304](#)
  - MistyRose2 ..... [1304](#)
  - MistyRose3 ..... [1304](#)
  - MistyRose4 ..... [1304](#)
  - names
    - assigned ..... [58](#)
  - Orange ..... [1304](#)
  - OrangeRed1 ..... [1304](#)
  - Purple0 ..... [1304](#)
  - Red ..... [1304](#)
  - SeaGreen3 ..... [1304](#)
  - Seashell2 ..... [1304](#)
  - Seashell3 ..... [1304](#)
  - Seashell4 ..... [1304](#)
  - Silver ..... [1304](#)
  - simple colour names
    - disabling ..... [10](#)
  - SpringGreen4 ..... [1304](#)
  - Thistle2 ..... [1304](#)
  - Thistle3 ..... [1304](#)
  - Thistle4 ..... [1304](#)
  - use in chronos connect ..... [82](#)
  - use in chronos create chronos connector ..... [82](#)
  - use in chronos create text tag connector .
    - ..... [82](#)
  - use in chronos mark line ..... [83](#)
  - use in chronos text tag ..... [83](#)
  - use in keys ..... [78](#)
  - using ..... [58](#)
  - using directly ..... [83](#)
  - Violet ..... [1304](#)
  - white ..... [90](#)
  - with simple colour names ..... [10](#)
  - Yellow ..... [1304](#)
- COMMA-SEPARATED LIST KEYS:
- century subheadings ..... [56](#)
  - century subheadings+ ..... [56](#)
  - century subheadings' ..... [56](#)
  - chronos coords
    - to add coordinates for headings, subheadings and
      - century subheadings ..... [57](#)
  - chronos coords ..... [55](#)
  - headings ..... [55](#)
  - headings+ ..... [55](#)
  - headings' ..... [55](#)
  - subheadings ..... [55](#)
  - subheadings+ ..... [55](#)
  - subheadings' ..... [55](#)
- CONCEPTS:
- <chronos preamble>* ..... [11](#), [43](#)
  - setting normally local keys in ..... [67](#)
  - chronos style ..... [17](#)



- authors should never use `timeline config'`  
 ..... 84
- colour list ..... 59
- colour assignment from ..... 58
  - rotation ..... 58
- colour rotation ..... 58
- breaking ..... 93
  - Donald Knuth† ..... 7
  - effect of colour rotation key ..... 59
  - hashes essential ..... 93
  - in assignment of colour names ..... 58
- colour scheme ..... 29
- as customisation ..... 57
  - load existing ..... 24
  - using ..... 24
- element ..... 12
- additional ..... 10, 12
  - capitalisation, preventing ..... 67
  - colour to assign ..... 68
  - colour assignment to ..... 58
  - components of life and period ..... 63
  - components of event ..... 64
  - components of theory ..... 65
  - components of copleft and copyright ... 67
  - components of info ..... 66
  - components of main ..... 66
  - components of theory circle ..... 65
  - connectable ..... 14
  - connection points ..... 68
  - global colour configuration ..... 76
  - names of colours assigned to ..... 58
  - non-connectable ..... 14
  - placement of coordinate `jikji†` ..... 6
  - specified in `<chronos preamble>` ..... 12
  - timeline-connectable ..... 14
- tag ..... 12, 59
- colour assignment to elements ..... 58
  - coordinate names ..... 15
  - custom styles ..... 95
  - effect on `\chronosshowfeatures` ..... 99
  - fallback colour, problems ..... 91
  - global defaults for all ..... 80
  - hashes essential ..... 93
  - in key specifications ..... 32
  - node names ..... 15
  - prefix required ..... 73
  - prefix, influence on configuration ..... 73
  - support for connectors ..... 9
  - theory circle ..... 80
  - use default colour assigned to elements be-  
 longing to ..... 68
- timeline ..... 11
- combining package and T<sub>E</sub>X SE code in single  
 document ..... 103
  - combining package and T<sub>E</sub>X SE code in single  
 document with legacy names ..... 103
  - combining package and T<sub>E</sub>X SE code in single  
 document with minimal changes .... 103
  - completed using T<sub>E</sub>X SE code ..... 102
  - connectors ..... 14
  - elements, additional, connectable ..... 14
  - elements, additional, non-timeline-connectable  
 ..... 14, 14
  - elements, additional, timeline-connectable 14, 14
  - updating from T<sub>E</sub>X SE code ..... 102
  - updating with retained T<sub>E</sub>X SE code .. 102
  - `<timeline additions specification>` ..... 12
  - `<timeline specification>` ..... 11, 43, 44, 44, 74
- COORDINATES:
- `(chronos origin)` ..... 67
  - chronos origin ..... 48
  - default placement of theory ..... 65
  - chronos origin ..... 48
  - chronos year `-<YYYY>` ..... 48
  - chronos year 0 ..... 48
  - chronos year `<YYYY>` ..... 48
  - leslie lamport† ..... 61
  - `<name>`
    - as component of life and period ..... 63  - `<name>1`
    - as component of theory circle ..... 65
- D**
- DATE FORMAT KEYS:
- `<tag>/date format` ..... 72
  - `<tag>/date formats` ..... 72
  - date format ..... 35
  - event/date format ..... 35
  - event/show eras/full ..... 36
  - event/show eras/only years ..... 36
  - event/without eras/full ..... 36
  - event/without eras/only years ..... 36
  - every date format ..... 37
  - life/date formats ..... 36
  - life/show eras/full ..... 36
  - life/show eras/only years ..... 37
  - life/without eras/full ..... 37
  - life/without eras/only years ..... 37
  - minor year format ..... 38
  - period/date formats ..... 36
  - period/show eras/full ..... 36
  - period/show eras/only years ..... 37
  - period/without eras/full ..... 37
  - period/without eras/only years ..... 37
  - year format ..... 37
- DATE KEYS:
- birth ..... 70
  - date
    - effect of event dates split on use of .. 78  - date ..... 70
  - dates
    - whether to define in chronos styles ..... 89

- dates ..... 69  
 death  
   omission for living ..... 7  
 death ..... 70  
 end ..... 70  
 event/date ..... 63, 64  
 life/birth ..... 61  
 life/death ..... 61  
 period/dates  
   as mandatory for completed ..... 64  
 period/end  
   as mandatory for completed ..... 64  
 period/start  
   as mandatory for completed ..... 64  
   as mandatory for ongoing ..... 64  
 start ..... 70  
 timeline/dates ..... 41  
 timeline/end ..... 42  
 timeline/end date ..... 57  
 timeline/end date ..... 42  
 timeline/start ..... 42  
 timeline/start date ..... 42
- DIMENSION KEYS:**
- $\langle$ dimension key $\rangle$  ..... 33  
 $\langle$ dimension key $\rangle$ + ..... 33  
 $\langle$ dimension key $\rangle$ - ..... 33  
 $\langle$ dimension key $\rangle$ ' + ..... 33  
 $\langle$ dimension key $\rangle$ ' - ..... 34  
 $\langle$ dimension key $\rangle$ ' ..... 33  
 $\langle$ tag $\rangle$ /line yshift ..... 74  
 borders' ..... 45  
 borders'+ ..... 45  
 borders'- ..... 45  
 bottom border ..... 45  
 headings border ..... 44  
 headings drop ..... 44  
 headings drops' ..... 45  
 headings'+ ..... 45  
 headings'- ..... 45  
 left border ..... 45  
 outer border ..... 45  
 right border ..... 45  
 sizes ..... 72  
 subheadings drops ..... 45  
 text tag yshift ..... 67  
 text tag yshift ..... 81  
 timeline  
   timeline width ..... 53  
 timeline  
   timeline era margin ..... 93  
   timeline margin ..... 93  
 timeline width  
   as total width ..... 42  
 timeline/height ..... 43  
 timeline/timeline border height ..... 43  
 timeline/timeline era margin ..... 44  
 timeline/timeline height ..... 99  
   finalised before timeline/do timeline arrow  
   ..... 94  
 timeline/timeline height ..... 43  
 timeline/timeline margin ..... 44  
 timeline/timeline width ..... 95  
   adjustments for arrow tips and line caps . 93  
 timeline/timeline width ..... 44  
 timeline/width ..... 44  
 top border ..... 45  
 dimensions ..... 33
- E**
- ELEMENTS:**
- additional  
   and colour rotation ..... 58  
   connectable ..... 12  
   non-connectable ..... 12  
   phantoms ..... 71  
   primary ..... 14  
   secondary (sub-) ..... 15  
   timeline-connectable ..... 12  
 bare marks ..... 49  
   placement ..... 12  
   setting ..... 48  
 border ..... 9  
   using to change appearance of connectors . 41  
 capitalisation of name ..... 67  
 caption ..... 14  
   style ..... 75  
 century subheadings  
   ensuring required coordinates exist .... 57  
 chronos connector ..... 14, 41, 63, 74  
   as component of life ..... 63  
   as component of period ..... 63  
   as component of event ..... 64  
   configuring global defaults ..... 79  
   style, using directly ..... 82  
   use of colour `leslie lampport int` .... 63  
 chronos coordinates  
   cf. levels ..... 55  
   help with placement ..... 54  
 chronos tikz  
   outer border $\uparrow$  ..... 85  
 chronos tikz outside bb  
   outer border $\uparrow$  ..... 85  
 colour  
   cf. every  $\langle$ tag $\rangle$  ..... 81  
 connected element ..... 21  
 connection ..... 64, 74  
   chronos support for ..... 9  
   absent in phantoms ..... 71  
   adding between text tags ..... 84  
   adding with `chronos connect` for `johannes`  
   `gutenberg $\uparrow$`  ..... 82  
   and colour rotation ..... 58

- as component of life . . . . . 63
- as component of period . . . . . 63
- as component of event . . . . . 64
- between chronos connectors and text tag connectors . . . . . 14
- between johannes gutenberg and other elements† . . . . . 82
- cf. `every`  $\langle tag \rangle$  . . . . . 81
- configuring global defaults . . . . . 79
- connectors as facilitating connections to theories . . . . . 64
- crossing nodes . . . . . 7
- default use of `chronos main colour` in . . . . . 40
- documentation† . . . . . 32
- Donald Knuth† . . . . . 58
- effect of drawing on different layers . . . . . 41
- on `chronos middle ground layer` . . . . . 19
- reducing visual clutter . . . . . 19
- style, using directly . . . . . 82
- up and left in `jikji†` . . . . . 6
- use of `|-` . . . . . 63
- use of colour `leslie lampport in†` . . . . . 63
- connector
  - `chronos` support for . . . . . 9
  - cf. `every`  $\langle tag \rangle$  . . . . . 81
  - `chronos connector jikji†` . . . . . 6
  - connecting Knuth and  $\text{\TeX}$ † . . . . . 9
  - connection . . . . . 74
  - created for Knuth† . . . . . 9
  - elements which support . . . . . 9
  - main connector `jikji†` . . . . . 6
  - main, identifying . . . . . 75
  - required keys for theory . . . . . 65
  - style in `cronoleg` . . . . . 9
  - tags lacking support for . . . . . 9
- connectors
  - use of name in . . . . . 67
- copyleft
  - `copyleft` . . . . . 14
  - `copyright` . . . . . 14
  - style . . . . . 78
- copyright
  - `copyleft` . . . . . 14
  - `copyright` . . . . . 14
  - style . . . . . 78
- date format
  - cf. `every`  $\langle tag \rangle$  . . . . . 81
- default colour
  - setting . . . . . 68
- documentation
  - timeline . . . . . 5
- era label
  - location . . . . . 12
- event
  - connectionconditions for drawing . . . . . 63
  - event years on line . . . . . 46
- introduction to . . . . . 5
- line . . . . . 14
- text tag† . . . . . 6
- frame
  - adding code after . . . . . 85
  - adding code after outside bounding box . . . . . 85
  - adding code before . . . . . 85
  - and `outer border` . . . . . 45
  - and bounding box . . . . . 45
  - as secondary† . . . . . 14
  - `cronoleg` as not using bounding box for† . . . . . 17
  - determinants of configuration . . . . . 12
  - if not using bounding box . . . . . 45
  - introduction to . . . . . 5
- heading . . . . . 55
- headings
  - adding code after . . . . . 85, 85
  - adding code after outside bounding box . . . . . 85
  - adding code before . . . . . 85
  - determinants of configuration . . . . . 12
  - ensuring required coordinates exist . . . . . 57
  - introduction to . . . . . 5
  - location . . . . . 12
  - placement . . . . . 44
  - placement relative to subheadings . . . . . 45
  - purpose . . . . . 9
  - style configuration . . . . . 57
  - use of keys to create† . . . . . 56
  - vertical lines corresponding to . . . . . 97
  - without upper/lower subheadings . . . . . 45
- info . . . . . 14
- introduction to . . . . . 5
- johannes gutenberg† . . . . . 82
- label
  - common style for upper and lower . . . . . 75
- labels . . . . . 14
- style . . . . . 75
- layer
  - effect of placing elements on different . . . . . 41
- levels . . . . . 54
- cf. `chronos coordinates` . . . . . 55
- `cronoleg†` . . . . . 17
- help with placement . . . . . 54
- placement . . . . . 44
- life . . . . . 14
- connection . . . . . 61
- connectors . . . . . 61
- introduction to . . . . . 5
- representation of temporal extension . . . . . 74
- text tag . . . . . 7, 9
- line
  - and colour rotation . . . . . 58
  - as component of life . . . . . 63
  - as component of period . . . . . 63
  - as component of event . . . . . 64
  - as representation of time . . . . . 14

blues below†	19	marks	
cf. every ( <i>tag</i> )	81	adjusting chronos style defaults	17
configuring global defaults	79	effect of non-modulo year	48
default use of chronos main colour in	40	in simple arrow†	21
effect of drawing on different layers	41	in example timeline†	6
Fall of the Roman Empire†	64	placement	12
lines on line†	21	style for minor years	47
phantoms	71	using different styles for	47
plain arrow†	24	minor marks	
representation of time in life/period	14	placement	12
rotated 45†	21	minor steps	46
style	74	marks at	49
style, using directly	83	minor year	49
use of colour leslie lamport in†	63	half millennium†	47
lower subheadings		name	48
as only subheadings	45	minor years	
placement	45	common configuration	50
placement relative to upper subheadings	12	dividing with bare marks	48
main		font	50
frame	12, 14	frequency of labelling	47
main title	14	labelled year modulo†	47
main title as lacking connectors	9	labelled year non-modulo†	47
main connector		labelled only if labelling major years	47
anchor	68	non-modulo start date†	47
as component of life	63	placement	12
as component of period	63	setting minor marks	49
as component of event	64	style differentiated from	48
connection	74	style in common with	48
main connector always created	68	whether to label	47
main title		years modulo <i>vs.</i> non-modulo†	47
as secondary†	14	naming	67
introduction to	5	period	14
somewhat plain†	21	introduction to	5
style	75	representation of temporal extension	74
title lines	75	text tag connector	64
major steps	46, 49	period/text tag	8
major year		placement	67
at era switch†	47	step divisions	
marks	49	common configuration	50
name	48	step minor year	
major years		attempted correction if specified without major	
common configuration	50	years	47
dependent on modulo year	48	subheading	56
dividing with bare marks	48	century subheadings	56
font	50	subheadings	33
frequency of labelling	47	adding code after	85, 85
labelled year modulo†	47	adding code after outside bounding box	85
labelled year non-modulo†	47	determinants of configuration	12
labelling as prerequisite for minor year labels	47	ensuring required coordinates exist	57
millennium†	47	introduction to	5
non-modulo start date†	47	placement	45
recommended when using step minor year	47	placement relative to headings	12
setting marks	48	purpose	9
style differentiated from	48	style configuration	57
style in common with	48	use of keys to create†	56
years modulo <i>vs.</i> non-modulo†	47	without headings	45

<code>&lt;tag&gt;/connection</code> .....	15	as component of life .....	63
<code>&lt;tag&gt;/connector</code> .....	15	as component of period .....	63
<code>&lt;tag&gt;/line</code> .....	15	as component of event .....	64
<code>&lt;tag&gt;/text tag</code> .....	15	configuration .....	74
assigned colour passed to .....	58	configuring global defaults .....	79, 79
<b>chronos connect</b> .....	82	creation for theories .....	64
date content in event .....	70	<b>johannes gutenbergt</b> .....	82
date content in life/period .....	70	not feature of non-connectable elements ..	14
in <b>timeline†</b> .....	6	potential invisibility .....	65
rotated .....	21	style, using directly .....	82
rotated† .....	21	use of colour <b>leslie lamport in†</b> ....	63
text		text tag connectors .....	63
date content in life/period .....	70	theory	
text tag .....	15	connecting individual to multiple .....	9
absent in phantoms .....	71	introduction to .....	5
addition of connectors in Donald Knuth† .	9	theory .....	14
and colour rotation .....	58	theory circle .....	14
apply arbitrary TikZ to .....	74	create element of type .....	65
as component of info .....	66	introduction to .....	5
as component of life .....	63	lack of text tag .....	15
as component of period .....	63	timeline .....	1
as component of theory .....	65	<i>&lt;timeline additions specification&gt;</i> .....	12
as component of event .....	64	BCE label .....	38
cf. <b>every &lt;tag&gt;</b> .....	81	CE label .....	38
configuration specific to main connector .	75	absence of borders in off-line .....	86
configuring global defaults .....	78	additional elements .....	61
connection .....	74	additional elements, connectable .....	64
connection points .....	68	additional elements, non-connectable ....	65
custom style using <b>chronos keys†</b> .....	96	additional elements, timeline-connectable .	61
date content in event .....	70	additional configuration .....	84
default use of <b>chronos main colour</b> in .	40	anatomy .....	12
Donald Knuth† .....	8	as location of line .....	61
<b>event dates split</b> .....	78	as location of <b>leslie lamport†</b> .....	61
font, date(s) .....	76	bare marks .....	49
font, text .....	76	borders .....	12
holistic treatment of configuration .....	79	<b>chronos origin</b> dependant on era switch	48
introduction .....	14	<b>chronos year \chronosyeari</b> .....	92
<b>lines on line†</b> .....	21	<b>chronos</b> does not draw vertical .....	5
main connector, identifying .....	75	<b>chronos</b> draws horizontal .....	5
no style .....	79	colours .....	40, 52, 52
<b>plain arrow†</b> .....	24	colours for, derivation of .....	91
purpose .....	9	colours, further processing changes .....	90
shifted right† .....	63	colours, reason not to set in <b>chronos style</b>	91
<b>sober judge†</b> .....	17	colours, reason to avoid hard-coding ....	93
stacking .....	54	compatibility .....	101
style, using directly .....	83	complementary elements† .....	8
tag <b>johannes gutenbergt</b> .....	82	components of .....	12
tag <b>johannes gutenbergt</b> .....	82	configuration keys .....	41
tag movable type† .....	82	configuration, <b>timeline line</b> .....	53
tag printing press† .....	82	configuration, further processing .....	90
text tag date formatting .....	37, 37	configuration, main key .....	41
title lines .....	75	connections .....	14
use of name in .....	67	connections .....	15
use of colour <b>leslie lamport in†</b> ....	63	connections and lines .....	41
text tag connector .....	14	connections, complex .....	63
additional configuration for main .....	75	connectors .....	15, 63

- construction . . . . . 4
- coordinates . . . . . 55
- coordinates for unrepresented year . . . . . 57
- coordinates, creating additional . . . . . 55
- creation of complex . . . . . 97
- customisation . . . . . 17, 29, 35
- date, first . . . . . 42
- date, last . . . . . 42
- dates . . . . . 41
- densely packed . . . . . 54
- densely packed, non-standard paths . . . . . 82
- densely packed, use of space in . . . . . 69
- dimensions . . . . . 42, 44, 45
- dimensions responsible for total size . . . . . 12
- Donald Knuth† . . . . . 7
- effect of borders on dimensions . . . . . 12
- era labels . . . . . 35, 38
- era margins . . . . . 44
- era switch . . . . . 40
- event year on line . . . . . 50
- font . . . . . 51
- height . . . . . 43
- history of writing and printing† . . . . . 5
- identifying explicit choices . . . . . 99
- if no year zero . . . . . 39
- independent of earlier . . . . . 30
- introduction to . . . . . 5
- key-value interface . . . . . 104
- levels . . . . . 54
- levels, creating . . . . . 54
- levels, rendering visible . . . . . 55
- limitations of chronos . . . . . 4
- lines . . . . . 14, 15
- major years . . . . . 47
- margins . . . . . 44
- marks . . . . . 48
- marks and years, invisible . . . . . 45
- marks, adding to style . . . . . 49
- minor marks . . . . . 49
- minor years . . . . . 47
- placement of event† . . . . . 7
- placement of `bi sheng†` . . . . . 7
- placement of `jikji`'s connector relative to† . . . . . 6
- problem of non-existent year . . . . . 38
- representation of time on . . . . . 46
- short (temporal duration) . . . . . 47
- `show nodes` . . . . . 98
- skip event year on line . . . . . 50
- spanning eras . . . . . 38
- split and unsplit events, combining in same timeline unsupported . . . . . 78
- split and unsplit events, combining in same document . . . . . 78
- step divisions . . . . . 48
- style . . . . . 52
- styles, event years on line . . . . . 46
- styles, marks and years . . . . . 46
- styles, marks and years, none . . . . . 46
- styles, marks and years, on line . . . . . 46
- styles, off line . . . . . 45
- styles, on line . . . . . 45
- styles, on line *vs.* off line . . . . . 45
- timeline border . . . . . 53
- timeline line . . . . . 52
- total height as function of `timeline height` and `timeline border height` . . . . . 42
- total width . . . . . 44
- types drawn by chronos . . . . . 3
- updating from T<sub>E</sub>X SE code . . . . . 102
- weird `\chronosyeari` in chronos style . . . . . 91
- width . . . . . 42
- years . . . . . 47, 49
- years, modulo . . . . . 47, 48
- years, not modulo . . . . . 47
- years, style . . . . . 48
- years, anchor . . . . . 48
- years, major, format . . . . . 38
- timeline border . . . . . 86, 91
  - as location of line . . . . . 63
  - colour configuration . . . . . 51, 51
  - introduction to . . . . . 12
- timeline line . . . . . 12
- timeline marks
  - in off line colour† . . . . . 19
- upper subheadings
  - as only subheadings . . . . . 45
  - placement . . . . . 45
  - placement relative to headings . . . . . 12
- use by chronos . . . . . 67
- using assigned colour during creation . . . . . 59
- whether to connect to timeline . . . . . 68
- year . . . . . 46, 92
  - `blues below†` . . . . . 19
  - effects of configuration . . . . . 99
  - event year on line . . . . . 50
  - first *vs.* first labelled . . . . . 47
  - frequency of labelling . . . . . 47
  - labels, rotated† . . . . . 19, 19
  - marked at start . . . . . 48
  - non-modulo configuration . . . . . 47
  - rotate labels . . . . . 48
  - test for major . . . . . 48
  - unmarked . . . . . 50
- years
  - adjusting chronos style defaults . . . . . 17
  - at minor steps . . . . . 49
  - cf. bare marks . . . . . 48
  - chronos origin dependant on configuration modulo . . . . . 48
  - in simple arrow† . . . . . 21
  - in example timeline† . . . . . 6
  - marks for major . . . . . 49

modulo step major year and step minor year ..... 47	<code>&lt;tag&gt;/rotate</code> .....	76
placement .....	<code>&lt;tag&gt;/show eras</code> .....	73
set TikZ anchor .....	<code>&lt;tag&gt;/text font</code> .....	76
ENVIRONMENTS:	<code>&lt;tag&gt;/text tag</code> .....	74
<b>chronos</b>	<code>&lt;tag&gt;/text tag connector</code> .....	74
as constructing timeline .....	<code>&lt;tag&gt;/text tag connector+</code> .....	74
cannot be externalised with external .....	<code>&lt;tag&gt;/text tag connector'</code> .....	74
cf. code posted on T <sub>E</sub> X SE .....	<code>&lt;tag&gt;/text tag+</code> .....	74
enable automemoization .....	<code>&lt;tag&gt;/text tag'</code> .....	74
externalisation with memoize .....	<code>&lt;tag&gt;/title</code> .....	75
introduction to .....	<code>&lt;tag&gt;/title+</code> .....	75
<b>chronos</b> .....	<code>&lt;tag&gt;/title'</code> .....	75
<b>figure</b> .....	<code>&lt;tag&gt;/without eras</code> .....	73
<b>scope</b> .....	<code>&lt;tag&gt;/year</code> .....	76
<b>tikzpicture</b> .....	<b>anchor</b> .....	96
<code>\chronosbaselineskip</code> .....	for years .....	48
adding to .....	used as TikZ .....	68
bounding box .....	will be overridden .....	48
content of <i>&lt;timeline additions specification&gt;</i> 12	<b>at</b>	
	as required for <code>\chronosmaintitle</code> ....	66
	if unset .....	81
	in custom style† .....	96
	trouble in custom styles .....	96
	<b>at</b> .....	67
	<b>bce year label</b> .....	37
	<b>before drawing frame</b> .....	85
	<b>before drawing frame+</b> .....	85
	<b>before drawing frame'</b> .....	85
	<b>before headings</b> .....	85
	<b>before headings+</b> .....	95
	<b>before headings+</b> .....	85
	<b>before headings'</b> .....	85
	<b>caption</b> .....	71
	<b>ce year label</b> .....	37
	<b>century subheading</b> .....	56
	<b>century subheading+</b> .....	56
	<b>century subheading'</b> .....	56
	<b>chronos connectors</b>	
	set by every chronos connectors ....	80
	<b>chronos connectors</b> .....	79
	<b>chronos connectors+</b> .....	79
	<b>chronos connectors'</b> .....	79
	<b>chronos tikz</b> .....	85
	<b>chronos tikz outside bb</b> .....	85
	<b>chronos tikz outside bb+</b> .....	85
	<b>chronos tikz outside bb'</b> .....	85
	<b>chronos tikz+</b> .....	85
	<b>chronos tikz'</b> .....	85
	<b>circle texts</b> .....	71
	<b>color scheme</b> .....	29
	<b>colour scheme</b> .....	29
	<b>connections</b>	
	set by every connections .....	80
	<b>connections</b> .....	79
	<b>connections+</b> .....	79
	<b>connections'</b> .....	79
	<code>&lt;tag&gt;/author</code> .....	75
	<code>&lt;tag&gt;/chronos connector</code> .....	74
	<code>&lt;tag&gt;/chronos connector+</code> .....	74
	<code>&lt;tag&gt;/chronos connector'</code> .....	74
	<code>&lt;tag&gt;/connection</code> .....	74
	<code>&lt;tag&gt;/connection+</code> .....	74
	<code>&lt;tag&gt;/connection'</code> .....	74
	<code>&lt;tag&gt;/date font</code> .....	76
	<code>&lt;tag&gt;/full dates</code> .....	72
	<code>&lt;tag&gt;/label</code> .....	75
	<code>&lt;tag&gt;/label+</code> .....	75
	<code>&lt;tag&gt;/label'</code> .....	75
	<code>&lt;tag&gt;/line</code> .....	74
	<code>&lt;tag&gt;/line+</code> .....	74
	<code>&lt;tag&gt;/line'</code> .....	74
	<code>&lt;tag&gt;/main text tag connector</code> .....	74
	<code>&lt;tag&gt;/main text tag connector+</code> .....	74
	<code>&lt;tag&gt;/main text tag connector'</code> .....	74
	<code>&lt;tag&gt;/notice</code> .....	75
	<code>&lt;tag&gt;/only text</code> .....	73
	<code>&lt;tag&gt;/only years</code> .....	72
	<code>&lt;tag&gt;/rotated</code> .....	76
	<code>&lt;tag&gt;/show eras</code> .....	73
	<code>&lt;tag&gt;/text font</code> .....	76
	<code>&lt;tag&gt;/text tag</code> .....	74
	<code>&lt;tag&gt;/text tag connector</code> .....	74
	<code>&lt;tag&gt;/text tag connector+</code> .....	74
	<code>&lt;tag&gt;/text tag connector'</code> .....	74
	<code>&lt;tag&gt;/text tag+</code> .....	74
	<code>&lt;tag&gt;/text tag'</code> .....	74
	<code>&lt;tag&gt;/title</code> .....	75
	<code>&lt;tag&gt;/title+</code> .....	75
	<code>&lt;tag&gt;/title'</code> .....	75
	<code>&lt;tag&gt;/without eras</code> .....	73
	<code>&lt;tag&gt;/year</code> .....	76
	<b>anchor</b> .....	96
	for years .....	48
	used as TikZ .....	68
	will be overridden .....	48
	<b>at</b>	
	as required for <code>\chronosmaintitle</code> ....	66
	if unset .....	81
	in custom style† .....	96
	trouble in custom styles .....	96
	<b>at</b> .....	67
	<b>bce year label</b> .....	37
	<b>before drawing frame</b> .....	85
	<b>before drawing frame+</b> .....	85
	<b>before drawing frame'</b> .....	85
	<b>before headings</b> .....	85
	<b>before headings+</b> .....	95
	<b>before headings+</b> .....	85
	<b>before headings'</b> .....	85
	<b>caption</b> .....	71
	<b>ce year label</b> .....	37
	<b>century subheading</b> .....	56
	<b>century subheading+</b> .....	56
	<b>century subheading'</b> .....	56
	<b>chronos connectors</b>	
	set by every chronos connectors ....	80
	<b>chronos connectors</b> .....	79
	<b>chronos connectors+</b> .....	79
	<b>chronos connectors'</b> .....	79
	<b>chronos tikz</b> .....	85
	<b>chronos tikz outside bb</b> .....	85
	<b>chronos tikz outside bb+</b> .....	85
	<b>chronos tikz outside bb'</b> .....	85
	<b>chronos tikz+</b> .....	85
	<b>chronos tikz'</b> .....	85
	<b>circle texts</b> .....	71
	<b>color scheme</b> .....	29
	<b>colour scheme</b> .....	29
	<b>connections</b>	
	set by every connections .....	80
	<b>connections</b> .....	79
	<b>connections+</b> .....	79
	<b>connections'</b> .....	79

connectors	68	every main text tag connectors+	80
connectors+	68	every main text tag connectors'	80
connectors'	68	every period	82
copyleft	78	every period+	82
copyleft+	78	every period'	82
copyleft/author	75	every text tag connectors	80
copyleft'	78	every text tag connectors+	80
copyright	78	every text tag connectors'	80
copyright+	78	every text tags	80
copyright/at	66	every text tags+	80
copyright/author	67	every text tags'	80
copyright'	78	every theory	82
dates content		every theory circle circle	80
effect of event dates split on use of	78	every theory circle circle+	80
dates content	70	every theory circle circle'	80
debug	98	every theory circle text	80
default color	68	every theory circle text+	80
default colour	68	every theory circle text'	80
documentation	31	every theory+	82
event	77	every theory'	82
event year on line skip	50, 70	font	
event years on line	46, 70	will be overridden	48
event years on line	46	full dates	72
event/chronos connector		heading	55
set by every chronos connectors	80	heading+	55
event/connection		heading'	55
set by every connections	80	headings style	57
event/connectors	63	headings style+	57
event/line		headings style'	57
set by every lines	80	info/at	
event/main text tag connector		as required	66
set by every main text tag connectors	80	info/caption	66
event/name	63	info/name	66
event/text tag		as required	66
set by every text tags	80	info/text tag	
event/text tag connector		set by every text tags	80
set by every text tag connectors	80	key	31
every chronos connectors	80	labels	71
every chronos connectors+	80	levels	
every chronos connectors'	80	level 1†	61
every connections	80	making visible	97
every connections+	80	placement	44
every connections'	80	placement if frame not using bounding box	45
every event	81	u1†	61
every event+	81	levels	54
every event'	81	levels at	54
every info	82	life	77
every info+	82	life/chronos connector	
every info'	82	set by every chronos connectors	80
every life	81	life/connection	
every life+	81	set by every connections	80
every life'	81	life/connectors	61
every lines	80	life/line	
every lines+	80	set by every lines	80
every lines'	80	life/main text tag connector	
every main text tag connectors	80	set by every main text tag connectors	80



- life/name ..... 61  
 life/text tag  
   set by every text tags ..... 80  
 life/text tag connector  
   set by every text tag connectors ... 80  
 lines  
   set by every lines ..... 80  
 lines ..... 79  
 lines+ ..... 79  
 lines' ..... 79  
 main text tag connectors  
   set by every main text tag connectors 80  
 main text tag connectors ..... 79  
 main text tag connectors+ ..... 79  
 main text tag connectors' ..... 79  
 main/frame ..... 54  
 main/frame+ ..... 54  
 main/frame' ..... 54  
 main/title ..... 75  
 main/title+ ..... 75  
 main/title' ..... 75  
 major step font ..... 50  
 name  
   as required for \chronosmaintitle .... 66  
   as supporting chronos connect† ..... 58  
   capitalisation ..... 75  
   effect of event dates split on use of .. 78  
   override for text tag content ..... 70  
   prevent capitalisation ..... 67  
   required for phantoms ..... 71  
   use in assigned colour names ..... 58  
   whether to capitalise ..... 67  
 name ..... 67  
 name content ..... 75  
   effect of event dates split on use of .. 78  
   if unset ..... 75  
   problematic markup ..... 67  
 name content ..... 70  
 no color rotation ..... 59  
 no colour rotation ..... 59  
 no simple color names ..... 22, 60  
 no simple colour names ..... 22, 60  
 only text ..... 73  
 only years ..... 72  
 period ..... 77  
 period/chronos connector  
   set by every chronos connectors .... 80  
 period/connection  
   set by every connections ..... 80  
 period/connectors ..... 64  
 period/dates content ..... 8  
 period/line  
   set by every lines ..... 80  
 period/line+ ..... 64  
 period/main text tag connector  
   set by every main text tag connectors 80  
 period/name  
   as mandatory for ongoing ..... 64  
 period/text tag  
   set by every text tags ..... 80  
 period/text tag connector  
   set by every text tag connectors ... 80  
 place above ..... 69  
 redefinition in tag-specific contexts ..... 96  
 rotate all colors ..... 59  
 rotate all colours ..... 59  
 rotate no colors ..... 59  
 rotate no colours ..... 59  
 show eras ..... 73  
 simple color names ..... 22  
 simple colour names ..... 22  
 special date ..... 70  
 specification ..... 31  
 step major year  
   years, modulo ..... 47  
 step minor year  
   years, modulo ..... 47  
 subheading ..... 56  
 subheading+ ..... 56  
 subheading' ..... 56  
 subheadings style ..... 57  
 subheadings style+ ..... 57  
 subheadings style' ..... 57  
 tag anchor  
   as anchor ..... 68  
   in custom style† ..... 96  
   trouble in custom styles ..... 96  
 tag anchor ..... 68  
 <tag>/chronos connector ..... 74, 79  
 <tag>/chronos connector+ ..... 79  
 <tag>/chronos connector' ..... 79  
 <tag>/connection ..... 74, 79  
 <tag>/connection+ ..... 74, 79  
 <tag>/connection' ..... 74, 79  
 <tag>/line ..... 74, 79  
 <tag>/line+ ..... 74, 79  
 <tag>/line' ..... 74, 79  
 <tag>/main text tag connector .. 75, 75, 80  
 <tag>/main text tag connector+ ... 75, 80  
 <tag>/main text tag connector' ... 75, 80  
 <tag>/tag ..... 73, 73  
 <tag>/tag+ ..... 73, 73  
 <tag>/tag' ..... 73, 73  
 <tag>/text tag ..... 74, 81  
 <tag>/text tag connector ..... 74, 79  
 <tag>/text tag connector+ ..... 79  
 <tag>/text tag connector' ..... 79  
 <tag>/text tag+ ..... 74  
 <tag>/text tag' ..... 74  
 text content  
   problematic markup ..... 67  
 text content ..... 71

- text tag connectors  
  set by every text tag connectors ... 80
- text tag connectors ..... 79
- text tag connectors+ ..... 79
- text tag connectors' ..... 79
- text tags  
  set by every text tags ..... 80
- text tags ..... 78
- text tags+ ..... 78
- text tags' ..... 78
- theory ..... 77
- theory circle/at ..... 65
- theory circle/name  
  as mandatory ..... 65
- theory/at ..... 65
- theory/chronos connector  
  set by every chronos connectors ..... 80
- theory/connection  
  set by every connections ..... 80
- theory/connectors ..... 65
- theory/main text tag connector  
  set by every main text tag connectors 80
- theory/name ..... 65
- theory/tag anchor ..... 65
- theory/text tag  
  set by every text tags ..... 80
- theory/text tag connector  
  set by every text tag connectors ... 80
- KeyFont timeline  
  line caps ..... 101
- timeline  
  arrow tips ..... 101
- timeline ..... 41
- timeline bce label ..... 38
- timeline ce label ..... 38
- timeline config ..... 84
- timeline config ..... 84
- timeline config+ ..... 84
- timeline config+ ..... 84
- timeline config' ..... 84
- destructiveness ..... 84
- timeline config' ..... 84
- timeline/conditional timeline arrow . 95  
  use in blues below† ..... 89
- timeline/conditional timeline arrow . 93
- timeline/do timeline arrow ..... 94
- timeline/do timeline arrow ..... 94
- timeline/eras font ..... 50
- timeline/minor step font ..... 50
- timeline/no timeline arrow  
  following chronos styles ..... 93
- timeline/no timeline arrow ..... 53
- timeline/step divisions ..... 48
- timeline/step from year  
  and non-modulo years† ..... 47
- timeline/step from year ..... 47
- timeline/step major year ..... 47, 47
- timeline/step major year ..... 47
- timeline/step major years ..... 47
- timeline/step minor year ..... 47, 47
- timeline/step minor year ..... 47
- timeline/step minor years ..... 47
- timeline/step year ..... 47
- timeline/step year ..... 47
- timeline/step years ..... 47
- timeline/timeline all marks ..... 49
- timeline/timeline bare mark ..... 49
- timeline/timeline border ..... 53
- timeline/timeline border+ ..... 53
- timeline/timeline border' ..... 53
- timeline/timeline line ..... 52
- timeline/timeline line+ ..... 52
- timeline/timeline line' ..... 52
- timeline/timeline mark ..... 49
- timeline/timeline minor mark ..... 49
- timeline/timeline year ..... 89
- timeline/timeline year ..... 48
- timeline/timeline years anchor ..... 92
- timeline/timeline years anchor ..... 48
- without eras ..... 73
- xshift ..... 96
- yshift ..... 67

## L

## LAYERS:

- adding to appropriate ..... 5
- background ..... 15, 83  
  *vs.* chronos background ..... 41
- choosing appropriate ..... 12
- chronos background ..... 15, 83  
  *vs.* background ..... 41
- chronos foreground ..... 15, 83
- chronos middle ground ..... 15, 83
- chronos middle ground layer ..... 19
- chronos overlay ..... 15, 83, 83
- connections on ..... 41
- control over ..... 4
- lines on ..... 41
- main ..... 15, 41
- timeline/border on ..... 41
- timeline/timeline on ..... 41
- line caps ..... 101

## M

## MACROS:

- \@chronosset ..... 413, 4659
- \@chronosset ..... 4657, 4659
- \@empty .. 944, 1281, 2924, 2925, 4359, 5151
- \@for ..... 5041
- \@ifl@t@r ..... 9, 44
- \@ifpackageloaded ..... 1093, 3280, 5598
- \@ifundefined ..... 6
- \@settodim ..... 1292, 1293, 1299, 1302

- \@tempboxa . . . . . 1294, 1296
- \\_\_chronos\_ailosod\_nodweddion: . 513, 834
- \\_\_chronos\_at\_begin: . . . . . 411, 741
- \\_\_chronos\_at\_end: . . . . . 569, 956
- \\_\_chronos\_cadw\_nodweddion:nnn 422, 666, 813
- \\_\_chronos\_cadw\_nodweddion\_rhag:nn . 426, 624, 634, 812, 829
- \\_\_chronos\_cadw\_nodweddion\_rhestr:nnn . . . . . 431, 633, 828
- \\_\_chronos\_color\_set\_from\_existing:nn . . . . . 145, 148, 151, 155, 158, 161, 164, 167, 169, 171, 173, 175, 376, 1069, 1071, 1074, 1076, 1078, 1081, 1083, 1085, 1087, 1089
- \\_\_chronos\_creu\_tikzname:n . . . . . 377, 807
- \\_\_chronos\_dangos\_nodweddion:n . 518, 835
- \\_\_chronos\_dangos\_nodweddion\_rhag: . 531, 836
- \\_\_chronos\_dateformat\_era:n 272, 300, 311
- \\_\_chronos\_dateformat\_era:v . . . . . 253
- \\_\_chronos\_dateformat\_sign:n 274, 283, 287
- \\_\_chronos\_dateformat\_sign:v . . . . . 257
- \\_\_chronos\_dateformat\_signs:n . 276, 288, 299
- \\_\_chronos\_dateformat\_signs:v . . . . . 259
- \\_\_chronos\_enw\_priflythrennu:V . . . . . 810
- \\_\_chronos\_enw\_priflythrennu:n 394, 410, 811
- \\_\_chronos\_enw\_priflythrennu\_erail:n . . . . . 387
- \\_\_chronos\_gosod\_nodweddion:V . . . . . 833
- \\_\_chronos\_gosod\_nodweddion:n . 505, 512, 832
- \\_\_chronos\_kexforwarder:nn . . . . . 710
- \\_\_chronos\_kexforwarder:nnn . . . 718, 2689, 2691, 2693, 2695, 2697, 2698, 2700, 2702, 2704, 2706, 2708, 2710
- \\_\_chronos\_kexforwardtriple:nn 693, 708, 2420
- \\_\_chronos\_kexkeymaker:nnn . . . . . 727, 965
- \\_\_chronos\_kexpander:nnnn . . . . . 616, 650
- \\_\_chronos\_kexpander:nnnnn . . . 644, 2996, 2998, 3000, 3002, 3005, 3007, 3009
- \\_\_chronos\_kexpandtotags:nnn . 660, 2395, 2396, 2397, 2398, 2399
- \\_\_chronos\_kextripler:nnnn 677, 707, 2421, 2422, 2424, 2425
- \\_\_chronos\_kextripler:nnnnn . . . . . 701, 2400, 2403, 2406, 2408, 2410, 2412, 2414, 2416, 2418
- \\_\_chronos\_keys\_set\_exclude\_groups:nnn . . . . . 735, 736, 738, 1091
- \\_\_chronos\_lliwiau\_cadw\_rhag: . 539, 805
- \\_\_chronos\_lliwiau\_clirio: . . . . . 554, 804
- \\_\_chronos\_set\_date:nnnn . . 342, 359, 363, 958
- \\_\_chronos\_set\_date\_aux:n . . . . . 331, 957
- \\_\_chronos\_set\_date\_aux\_bce:w . . 337, 357
- \\_\_chronos\_set\_date\_aux\_ce:w . . . 339, 361
- \\_\_chronos\_set\_dateformat:n 312, 317, 742, 750
- \\_\_chronos\_set\_dateformat:v . . . . . 761
- \\_\_chronos\_set\_minoryearformat:n 324, 329, 744
- \\_\_chronos\_set\_yearformat:V . . . . . 775
- \\_\_chronos\_set\_yearformat:n 318, 323, 743
- \\_\_chronos\_show\_date:n . . . . . 237, 753, 764
- \\_\_chronos\_show\_year:n . . . . . 266, 778
- \\_\_chronos\_tikzset:nn . . . . . 510, 516, 535
- \\_\_chronos\_troilliwiau:nn . . 365, 783, 787
- \\_\_chronos\_ychwanegu\_nodweddion:nnn 438, 669, 814
- \\_\_chronos\_ychwanegu\_nodweddion\_rhag:nn . . . . . 480, 628, 639, 823, 831
- \\_\_chronos\_ychwanegu\_nodweddion\_rhag\_pre:nn . . . . . 492, 820
- \\_\_chronos\_ychwanegu\_nodweddion\_rhestr:nnn . . . . . 450, 638, 822
- \\_\_chronos\_ychwanegu\_nodweddion\_rhestr\_pre:nnn . . . . . 465, 819
- \\_\_chronos\_year\_semi\_shorten:n . 216, 234
- \\_\_chronos\_year\_semi\_shorten:x . 249, 270
- \\_\_chronos\_year\_semi\_shorten\_aux:w . 227, 230
- \\_\_chronos\_year\_shorten:n . . . . . 188, 215
- \\_\_chronos\_year\_shorten:x . . . . . 261, 278
- \\_\_chronos\_year\_shorten\_aux:w . 204, 207, 211
- \addtocounter . 350, 3737, 3939, 3945, 3974
- \addtolength . 3623, 3629, 3640, 3641, 4216, 4243, 4316, 4341
- \advance . . . . . 1530, 1535, 1536, 1538, 1543, 1544, 1549, 1554, 1556, 1558, 1564, 1565, 1577, 1583, 1590, 1597, 1612, 1613, 1615, 1616, 1621, 1773, 1774, 1777, 1781, 1796, 1797, 1800, 1801, 1804, 1805, 1808, 1809, 2376, 2377, 2378, 2381, 2382, 2383, 2905, 2909, 3254, 3255, 3256, 3257, 3258, 3259, 3262, 3263, 3264, 3265, 3266, 3267, 4475, 4476, 4477, 4486, 4490
- \appto . . . . . 1298, 1301
- \apptocmd . . . . . 4834, 4942
- \AtEndPreamble . . . . . 5597
- \b . . . . . 123, 124, 4032, 4033, 4034, 4037, 4041, 4042, 4043, 4048, 4051, 4056, 4087, 4097, 4099, 4113, 4114, 4121, 4165, 4202, 4223, 4225, 4276, 4302, 4321, 4323, 4348, 4354, 4356
- \baselineskip . . . . . 55, 415
- \bcelabel . . . . . 38, 101, 101, 4428, 5643
- \bceyearlabel . . . . . 37, 101, 101, 4426, 5643
- \begin . . . . . 1474, 3407, 3459, 3660, 3676,

- 4380, 4411, 4527, 4573, 4606, 4853, 5039,  
5134, 5271, 5487, 5565
- \beginngroup .. 4687, 4771, 4905, 4988, 5060,  
5110, 5148, 5196, 5285
- \bfseries 1287, 1289, 3306, 3307, 3308, 3357,  
3382, 3384, 3387, 3391, 5670, 5671, 5672,  
5695, 5698, 5747, 5748, 5749, 5762, 5801,  
5814, 5881, 5883, 5901, 5949, 6024, 6207
- \bool\_if:nF ..... 1037
- \bool\_if:nT ..... 1033
- \bool\_if:nTF ..... 1029
- \bool\_new:N ..... 69, 70, 71, 72, 73, 74
- \box ..... 2919
- \breakforeach 3985, 4009, 4218, 4245, 4317,  
4343, 5469
- \bs ..... 4681
- \byw ..... 4686, 5622
- \c ..... 123, 401, 405
- \c@chronos@date ..... 344
- \c@chronos@weekday ..... 752, 763
- \c\_\_chronos\_curly\_bracket ..... 125, 334
- \c\_\_chronos\_enw\_diogelu\_regex .. 121, 399
- \c\_\_chronos\_enw\_priflythren\_cyntaf\_regex  
..... 120, 403
- \c\_\_chronos\_enw\_regex ..... 119, 385
- \c\_\_chronos\_initial\_minus ..... 126, 335
- \c\_space\_token ..... 315, 321, 327
- \cB ..... 401
- \cE ..... 401
- \celabel ..... 38, 101, 101, 4427, 5643
- \ceyearlabel ..... 37, 101, 101, 4425, 5643
- \chronos@ailosod@nodweddion ... 834, 4767,  
4901, 4984, 5029, 5105, 5191
- \chronos@amser@diwedd .. 3638, 3643, 3656
- \chronos@angorau@theori 4751, 4884, 4968,  
5023, 5032
- \chronos@at@end ..... 956, 4504
- \chronos@baselineskip ..... 415, 418, 1134
- \chronos@bce . 1283, 2717, 3628, 3631, 3701,  
3710, 3718, 4428, 5646
- \chronos@blynyddoeddisodfalse 1270, 2561,  
2571, 2593
- \chronos@blynyddoeddisodtrue ..... 2582
- \chronos@blynyddoedduchodfalse 1268, 2560,  
2581, 2592
- \chronos@blynyddoedduchodtrue .... 2570
- \chronos@border@allanol . 1128, 1145, 3032,  
3038, 3251, 3259, 3267, 4517, 4519
- \chronos@border@chwith .. 1124, 1150, 3031,  
3037, 3250, 3258, 3266, 4501
- \chronos@border@coord .. 4855, 5350, 5357,  
5366, 5373, 5490, 5491, 5495
- \chronos@border@coord@inv .... 4859, 5351,  
5358, 5367, 5374, 5502, 5503, 5508
- \chronos@border@de . 1123, 1148, 3030, 3036,  
3248, 3256, 3264, 4499
- \chronos@border@gwaelod . 1127, 1149, 3029,  
3035, 3249, 3257, 3265, 4494
- \chronos@border@open 1126, 1147, 3028, 3247,  
3255, 3263, 4486, 4489
- \chronos@border@openawdau . 1125, 1146, 3027,  
3033, 3034, 3246, 3254, 3262, 4462, 4465,  
4470, 4475, 4476, 4477, 4485
- \chronos@border@height 1114, 1141, 3016, 3023,  
3538, 3541, 3544, 3548, 3550, 3554, 3558,  
3560, 3568, 3578, 3581, 3584, 3646, 3661,  
4387, 4400, 4429, 5353, 5355, 5369, 5371
- \chronos@bufarwtrue ..... 1262
- \chronos@byw@angor ..... 4690
- \chronos@byw@at ..... 4691
- \chronos@byw@border ..... 1105
- \chronos@byw@border@inv ..... 1108
- \chronos@byw@cysylltiadfalse ..... 3042
- \chronos@byw@cysylltiadtheorifalse 1208,  
4697
- \chronos@byw@cysylltiadtrue ..... 1206
- \chronos@byw@enw ..... 4721
- \chronos@byw@ffontdyddiad 4724, 4732, 4736
- \chronos@byw@ffonttestun ..... 4743
- \chronos@byw@fformatgeni@cyfnod .. 2863
- \chronos@byw@fformatgeni@cyfnodau . 2864
- \chronos@byw@fformatmarw ..... 2865
- \chronos@byw@invanchor ..... 4692
- \chronos@byw@isod@rhagfalse .. 1200, 4665,  
5608
- \chronos@byw@isod@rhagtrue ... 4663, 5606
- \chronos@byw@isodfalse . 1198, 2453, 4645,  
4758, 4761
- \chronos@byw@isodtrue .. 2438, 4643, 4756,  
4763
- \chronos@byw@labelgeni ..... 4688, 4736
- \chronos@byw@labelmarw . 4689, 4728, 4732,  
4737
- \chronos@byw@lliw ..... 4753
- \chronos@byw@tikzname 4712, 4747, 4748, 4751,  
4752
- \chronos@cadw . 1735, 1741, 5068, 5131, 5168,  
5268, 5418, 5421, 5550
- \chronos@cadw@nodweddion ..... 813, 1629,  
1868, 1885, 1889, 1894, 1902, 1906, 1909,  
3171, 3177
- \chronos@cadw@nodweddion@rhag . 812, 1630,  
2977
- \chronos@cadw@nodweddion@rhestr ... 826
- \chronos@cam@blwyddyn@fach ..... 2527,  
2532, 3739, 3740, 3741, 3745, 3753, 3756,  
3758, 3759, 3760, 3774, 3777, 3780, 3783,  
3786, 3789, 3792, 3795, 3797, 3809, 3819,  
3822, 3909, 3917, 3919, 4122, 4139
- \chronos@cam@blwyddyn@fawr .. 2526, 3738,  
3740, 3759, 3773, 3776, 3779, 3782, 3785,  
3788, 3791, 3794, 3796, 3807, 3812, 3820,

- 3911, 3913, 4125, 4133  
 \chronos@cam@modtrue . . . . 4123, 4127, 4135  
 \chronos@camrhaniadau . . . . . 2528,  
 3605, 3606, 3824, 3831, 3834, 3836, 3848,  
 3850, 3854, 3855, 3923, 3924, 3947, 3949,  
 3957, 3960, 3973, 4024, 4029, 4117, 4191,  
 4193, 4251, 4293, 4295, 4349  
 \chronos@ce . . 1282, 2716, 3622, 3625, 3708,  
 3719, 3727, 4427, 5645  
 \chronos@coords . . . 1281, 4358, 4359, 4361  
 \chronos@copyleftfalse . . . . . 1276  
 \chronos@copylefttrue . . . . . 5286  
 \chronos@creu@llinell . . 4746, 4963, 5482  
 \chronos@creu@testun@tag 4749, 4865, 4867,  
 4966, 5020, 5516  
 \chronos@creu@tikzname . . 806, 1864, 3134,  
 3161, 3202, 3222  
 \chronos@cyd@destun@init 1626, 2190, 2192,  
 2194, 2196, 2199, 2203, 2205, 2207  
 \chronos@cylchtheori@at . . . . . 5061  
 \chronos@cylchtheori@bach 1136, 1152, 3138,  
 3140, 3155, 5071, 5072  
 \chronos@cylchtheori@circlertext@isod . . .  
 . . . . . 3152, 5090  
 \chronos@cylchtheori@circlertext@uchod . .  
 . . . . . 3151, 5085  
 \chronos@cylchtheori@enw . . . . . 3132  
 \chronos@cylchtheori@label@isod . . 3146,  
 5098  
 \chronos@cylchtheori@label@uchod . . 3145,  
 5095  
 \chronos@cylchtheori@mawr 1135, 1151, 3138,  
 3139, 3155, 5071, 5073, 5074  
 \chronos@cylchtheori@tikzname 5069, 5070,  
 5075, 5076, 5077, 5078, 5079, 5080, 5081,  
 5082, 5087, 5092, 5093, 5095, 5096, 5098,  
 5099, 5100, 5101, 5102, 5103  
 \chronos@cynnwys@dyddiadau . . . . . 1934,  
 4694, 4717, 4723, 4724, 4726, 4731, 4735,  
 4743, 4776, 4805, 4806, 4825, 4833, 4834,  
 4835, 4838, 4840, 4847, 4865, 4912, 4935,  
 4941, 4942, 4944, 4949, 4951, 4958, 4994,  
 5064  
 \chronos@cynnwys@enw . . . . . 1933,  
 3185, 4695, 4718, 4720, 4721, 4743, 4777,  
 4791, 4794, 4810, 4813, 4826, 4828, 4829,  
 4849, 4913, 4936, 4938, 4939, 4960, 4993,  
 5013, 5015, 5016, 5018, 5063, 5152  
 \chronos@cynnwys@testun . . . . . 1932, 3184,  
 4693, 4716, 4742, 4749, 4775, 4790, 4792,  
 4797, 4804, 4811, 4816, 4824, 4846, 4867,  
 4911, 4934, 4956, 4966, 4992, 5012, 5018,  
 5021, 5062, 5151, 5172  
 \chronos@cysylltwyr . 1914, 1915, 1916, 1917,  
 1921, 4696, 4778, 4914, 4995, 5000, 5001,  
 5003, 5022, 5041  
 \chronos@dangos@clist . . . . . 955  
 \chronos@dangos@fformatiaudyddiadau 903,  
 908  
 \chronos@dangos@gosod . . . . . 846, 5629  
 \chronos@dangos@lliwiau . . . . . 860, 901  
 \chronos@dangos@lliwiau@rhag . . 880, 902  
 \chronos@dangos@nodweddion . . . 835, 5634  
 \chronos@dangos@nodweddion@rhag 836, 5636  
 \chronos@dangos@scyfnodaufalse . 1658, 2837  
 \chronos@dangos@scyfnodaufalse . . 1242, 1650,  
 2820  
 \chronos@dangos@lliw . . . . . 962, 5630, 5631  
 \chronos@datetojulian@extractyear . . 961  
 \chronos@dechrau@dechrau 1104, 3612, 3628,  
 3629, 3635, 3640, 3642  
 \chronos@digwyddiad@angor . . . . . 4772  
 \chronos@digwyddiad@at . . . . . 4774  
 \chronos@digwyddiad@border . . . 1107, 4855  
 \chronos@digwyddiad@border@inv 1110, 4860  
 \chronos@digwyddiad@cysylltiadfalse 3043  
 \chronos@digwyddiad@cysylltiadtheorifalse  
 . . . . . 1220, 4779  
 \chronos@digwyddiad@cysylltiadtrue . 1218  
 \chronos@digwyddiad@enw 4799, 4818, 4830  
 \chronos@digwyddiad@ffontdyddiad . . 3076,  
 4836, 4841  
 \chronos@digwyddiad@ffonttestun . . 4793,  
 4798, 4812, 4817, 4848  
 \chronos@digwyddiad@fformatdyddiad 2859,  
 3079, 3086, 3088, 3091, 3094, 3095, 3096,  
 3099, 3102  
 \chronos@digwyddiad@invanchor . . . . . 4773  
 \chronos@digwyddiad@isod@rhagfalse . 1212,  
 4670, 5613  
 \chronos@digwyddiad@isod@rhagtrue . 4668,  
 5611  
 \chronos@digwyddiad@isodfalse 1210, 2458,  
 4650, 4892, 4895  
 \chronos@digwyddiad@isodtrue . 2443, 4648,  
 4890, 4897  
 \chronos@digwyddiad@lliw 4854, 4858, 4887  
 \chronos@digwyddiad@tikzname . 4784, 4856,  
 4861, 4884, 4885, 4886  
 \chronos@dimondblynnyddoeddfalse . . 1272,  
 1642, 2803  
 \chronos@dimondblynnyddoeddtrue 1634, 2786  
 \chronos@diwedd@diwedd . . 1103, 3611, 3622,  
 3623, 3636, 3641, 3643  
 \chronos@dyddiadau@tag . 4729, 4947, 5290  
 \chronos@endday . . . . . 3454, 3457  
 \chronos@endmonth . 3453, 3456, 3968, 4000,  
 4001, 4005, 4021  
 \chronos@endyear . . 3426, 3439, 3452, 3455,  
 3601, 3615, 3621, 3733  
 \chronos@env@begin . . . . . 741, 3406  
 \chronos@enw@priflythrennu 810, 4721, 4799,

- 4818, 4830, 4939, 5016, 5123, 5158, 5247
- \chronos@enwaulliwsymfalse ..... 2974
- \chronos@eramargin .. 1118, 1144, 3017, 3623, 3629, 3699, 3706, 3717, 3726
- \chronos@eventdatessplitfalse 1194, 4701, 4919
- \chronos@eventyearsonlinefalse .... 1182
- \chronos@eventyearsonlinetrue .... 2880
- \chronos@every@byw@isodfalse . 1202, 2452
- \chronos@every@byw@isodtrue ..... 2436
- \chronos@every@byw@uchodfalse 1204, 2437
- \chronos@every@byw@uchodtrue ..... 2451
- \chronos@every@digwyddiad@isodfalse 1214, 2457
- \chronos@every@digwyddiad@isodtrue . 2441
- \chronos@every@digwyddiad@uchodfalse 1216, 2442
- \chronos@every@digwyddiad@uchodtrue 2456
- \chronos@every@parhad@isodfalse .. 1226, 2462
- \chronos@every@parhad@isodtrue ... 2446
- \chronos@every@parhad@uchodfalse .. 1228, 2447
- \chronos@every@parhad@uchodtrue ... 2461
- \chronos@felymaefalse ..... 1244
- \chronos@ffont@camaubach 1288, 2498, 4066, 4156
- \chronos@ffont@camaumawr 1287, 2497, 2888, 4147, 4267
- \chronos@ffont@cyfnodau 1289, 2499, 3622, 3628, 3697, 3704, 3710, 3715, 3719, 3724
- \chronos@firstmarkedyeardate .. 4100, 4117
- \chronos@framedefnyddiobbtrue ..... 1252
- \chronos@framefalse ..... 1250
- \chronos@frametrue ..... 3412, 3413, 3414
- \chronos@from@clist ..... 940, 4358
- \chronos@global@clear@to@clist 937, 2358, 3922, 4640
- \chronos@global@eq@clist . 952, 1876, 1877, 2992, 2993
- \chronos@global@from@clist .... 949, 4055
- \chronos@global@to@clist . 918, 2346, 2350, 2354, 2359, 3988, 3992, 4012, 4016, 4025, 4037, 4048
- \chronos@gorffenedigtrue ..... 1264
- \chronos@gosod@angor@tag ..... 5452
- \chronos@gosod@nodweddion ..... 832, 1737
- \chronos@gosod@nodweddion@var ..... 833
- \chronos@gosodangor@tag 4714, 4786, 4932, 5452
- \chronos@gosodborder@tag 4715, 4787, 4933, 5347
- \chronos@gwybodaeth@angor 3164, 5149, 5155, 5166
- \chronos@gwybodaeth@at .. 3165, 5150, 5172
- \chronos@gwybodaeth@capsiw n .. 3166, 5153, 5156, 5157, 5180
- \chronos@gwybodaeth@enw ..... 3159, 5158
- \chronos@gwybodaeth@lliw . 3167, 5161, 5162, 5165, 5185
- \chronos@gwybodaeth@lliw@rhagosodedig .. ..... 3168, 5162
- \chronos@gwybodaeth@tikzname ..... 5164, 5169, 5170, 5171, 5174, 5176, 5177, 5178, 5179, 5180, 5182, 5183, 5184
- \chronos@hawlfraint@angor 3225, 5199, 5266
- \chronos@hawlfraint@at . 5197, 5209, 5210
- \chronos@hawlfraint@awdur 3228, 5216, 5219, 5222, 5224, 5227, 5241
- \chronos@hawlfraint@blwyddyn . 3229, 5217, 5230, 5232, 5234, 5239, 5246
- \chronos@hawlfraint@cylchdroi 3231, 5200, 5267
- \chronos@hawlfraint@cynnwys .. 3230, 5213, 5237, 5245, 5269
- \chronos@hawlfraint@enw 3220, 5198, 5215, 5247
- \chronos@hawlfraint@notis ... 3232, 5202, 5204, 5206, 5238, 5246
- \chronos@hawlfraint@tikzname 5252, 5259, 5262, 5273, 5274, 5277, 5279
- \chronos@heading@drop ... 1131, 2369, 2371, 2376, 2381, 4444, 4445, 4475, 4490
- \chronos@headingsfalse ..... 1248
- \chronos@headingstrue .. 2313, 2317, 2321, 2325, 2329, 2333, 2337, 2341, 2345, 2349, 2353, 2357, 4439
- \chronos@height 1115, 1140, 2282, 2574, 2585, 3015, 3021, 3022, 3533, 3537, 3547, 3550, 3553, 3558, 3567, 3593, 3645, 3659, 3685, 4278, 4287, 4297, 4312, 4336, 5360, 5362, 5376, 5378
- \chronos@if@gosodF .. 854, 1749, 2257, 2259, 2261, 2263, 2265, 2267, 2269, 3466, 3467, 3468, 3469, 3479, 3480, 3481, 3483, 3605, 3613, 3619, 3808
- \chronos@if@gosodTF ..... 850
- \chronos@inner@halfheight 1120, 3645, 3646, 3647, 3648
- \chronos@isod 1291, 2752, 4398, 4403, 4404, 4417, 4418, 4479, 4494
- \chronos@keymaker ..... 965, 2185
- \chronos@layers ..... 414, 1491, 1501
- \chronos@lefelau@at ..... 2749, 4388, 4401
- \chronos@legacy@if ..... 959, 5417
- \chronos@legacy@if@set .. 960, 2621, 2724
- \chronos@llinell@yshift . 1132, 1142, 3025, 3026, 3470, 3471, 3566, 3570, 3573, 3578, 3581, 3587, 3590, 3594, 4431, 5496, 5509
- \chronos@lliwiau@cadw@rhag 805, 4677, 5620
- \chronos@lliwiau@clear ..... 804, 4641
- \chronos@lliwiau@cronoleg .... 1356, 3279

- \chronos@lliwiau@default ..... 1465
- \chronos@lliwiau@isod 797, 1357, 1375, 1395, 1409, 1433, 1875, 2991
- \chronos@lliwiau@rhagosedig ..... 1465
- \chronos@lliwiau@rhagosodedig 1432, 1464, 3284
- \chronos@lliwiau@uchod .. 790, 1366, 1385, 1402, 1416, 1442, 1874, 2990
- \chronos@markateraswitchfalse 1186, 2623, 3810, 3813
- \chronos@markateraswitchtrue . 2625, 3815
- \chronos@markerasfalse ..... 1190
- \chronos@markerastrue ..... 3616
- \chronos@marks@barefalse 1178, 3842, 4030
- \chronos@marks@baretrue 3607, 3824, 3826
- \chronos@marks@minortrue ..... 1176
- \chronos@marksfalse ..... 4161
- \chronos@markstrue ..... 1174, 4159
- \chronos@minorsteps ..... 2528
- \chronos@minoryearformat .. 781, 4084, 4157
- \chronos@minoryearstrue ..... 1196
- \chronos@nextstep ..... 3910, 3916, 3931, 3932, 3933, 3943, 4045, 4050, 4114, 4121, 4202, 4223, 4302, 4321
- \chronos@onlytextfalse ..... 1188
- \chronos@onlytexttrue ..... 2876, 2883
- \chronos@outer@halfheight 1121, 3646, 3649, 3650
- \chronos@parhad@angor ..... 4908
- \chronos@parhad@at ..... 4909
- \chronos@parhad@border ..... 1106
- \chronos@parhad@border@inv ..... 1109
- \chronos@parhad@cysylltiadfalse .. 3044
- \chronos@parhad@cysylltiadtheorifalse .. 1232, 4915
- \chronos@parhad@cysylltiadtrue .... 1230
- \chronos@parhad@enw ..... 4939
- \chronos@parhad@ffontdyddiad ..... 4957
- \chronos@parhad@ffontttestun ..... 4959
- \chronos@parhad@fformatdechrau@cyfnod .. 2860
- \chronos@parhad@fformatdechrau@cyfnodau ..... 2861
- \chronos@parhad@fformatdiwedd .... 2862
- \chronos@parhad@invanchor ..... 4910
- \chronos@parhad@isod@rhagfalse 1224, 4675, 5618
- \chronos@parhad@isod@rhagtrue 4673, 5616
- \chronos@parhad@isodfalse 1222, 2463, 4655, 4975, 4978
- \chronos@parhad@isodtrue 2448, 4653, 4973, 4980
- \chronos@parhad@labeldechrau 4906, 4949, 4952
- \chronos@parhad@labeldiwedd .. 4907, 4946, 4952
- \chronos@parhad@lliw ..... 4970
- \chronos@parhad@tikzname 4930, 4964, 4965, 4968, 4969
- \chronos@pgflinewidth@saved ..... 1122
- \chronos@phantomfalse ..... 1278
- \chronos@placeholdersfalse ... 1254, 2928
- \chronos@presetfalse .... 858, 2307, 5654
- \chronos@presettrue 856, 1266, 2290, 2307
- \chronos@prifdeitl@angor . 3205, 5112, 5114, 5130
- \chronos@prifdeitl@at ..... 5111
- \chronos@prifdeitl@cynnwys ... 3208, 5121, 5122, 5132
- \chronos@prifdeitl@enw ..... 3200, 5123
- \chronos@prifdeitl@tikzname .. 5115, 5118, 5126, 5136, 5137, 5140, 5142
- \chronos@set@date .. 958, 3438, 3439, 3983, 4007, 4036, 4047, 4362
- \chronos@set@date@aux ..... 957, 2310
- \chronos@setdateformat ..... 742, 2753, 2758, 2760, 2763, 2768, 2771, 2772, 2774, 2778, 2858, 2875
- \chronos@setminoryearformat ... 744, 2756, 3906
- \chronos@settodim ..... 1293, 1294, 1299
- \chronos@setyearformat ..... 743, 2755
- \chronos@showbbfalse ..... 1258
- \chronos@showcoordsfalse ..... 1256
- \chronos@showdate ..... 745
- \chronos@showdate@cs 756, 4807, 4842, 4873, 5299, 5305, 5311, 5317, 5321, 5326
- \chronos@shownodesfalse ..... 1260
- \chronos@showyear 767, 4084, 4181, 4262, 4271
- \chronos@specialdate 2890, 2915, 4870, 4876
- \chronos@startday . 3451, 3454, 3862, 3865, 3965
- \chronos@startmonth 3450, 3453, 3861, 3868, 3964
- \chronos@startyear 3426, 3438, 3449, 3452, 3598, 3614, 3627, 3731, 3732
- \chronos@stepfrom . 2529, 3857, 3896, 3908
- \chronos@subheading@drop@isod 1130, 2368, 2373, 2378, 2383, 4452, 4453, 4477, 4498
- \chronos@subheading@drop@uchod 1129, 2367, 2372, 2377, 2382, 4448, 4449, 4476, 4496
- \chronos@tag@cysylltufalse ... 2196, 2200, 2203
- \chronos@tag@cysylltuttrue ..... 1274
- \chronos@temp@lliw ..... 963
- \chronos@tempa 1469, 1470, 1472, 4059, 4060, 4098, 4103, 4109, 4281, 4288, 4299, 4366, 4367, 4869, 4871, 5182, 5186, 5438, 5442, 5454, 5468, 5483, 5491, 5492, 5496, 5497, 5524, 5527, 5547, 5553, 5554, 5558, 5560, 5561, 5562, 5563, 5566, 5569, 5570, 5571, 5572, 5573, 5574, 5575, 5577, 5579, 5590,

- 5591
- \chronos@tempyear . . . . . 4366
  - \chronos@tempb 4366, 4367, 4870, 4871, 5185, 5186, 5187, 5188, 5189, 5190, 5439, 5442, 5443, 5444, 5445, 5446, 5449, 5467, 5468, 5485, 5490, 5495, 5525, 5532, 5544
  - \chronos@tempbd . . . . . 4872, 4876, 4880
  - \chronos@tempc 5486, 5502, 5508, 5528, 5540, 5549, 5575, 5592
  - \chronos@tempd 5484, 5503, 5504, 5509, 5510, 5511
  - \chronos@tempe 5183, 5187, 5440, 5443, 5582, 5584, 5590
  - \chronos@temp ey . . . . . 4224, 4322
  - \chronos@tempf . . . . 5184, 5188, 5441, 5444
  - \chronos@tempfalse . 2289, 4166, 4170, 5337, 5343
  - \chronos@tempff 4066, 4073, 4081, 4147, 4156, 4179, 4260
  - \chronos@tempg 4116, 4119, 4197, 4199, 4206, 4216, 4230, 4243, 4299, 4306, 4316, 4328, 4341, 5448, 5449
  - \chronos@tempgx . . 4204, 4206, 4228, 4230, 4232, 4233, 4244, 4304, 4306, 4326, 4328, 4330, 4331, 4342
  - \chronos@tempgy . . 4204, 4228, 4232, 4304, 4326, 4330
  - \chronos@temp h 4148, 4157, 4181, 4262, 4271, 4363, 4368, 4370, 4703, 4710, 4746, 4781, 4784, 4854, 4859, 4879, 4921, 4928, 4963
  - \chronos@tempj . . . . . 5384, 5385
  - \chronos@tempk 4706, 4710, 4746, 4924, 4928, 4963
  - \chronos@templ . . . . 4709, 4712, 4927, 4930
  - \chronos@templgtha . . 1111, 4205, 4207, 4211, 4216, 4217, 4220, 4222, 4229, 4233, 4237, 4243, 4244, 4247, 4249, 4305, 4307, 4314, 4316, 4317, 4318, 4320, 4327, 4331, 4339, 4341, 4342, 4345, 4347, 4485, 4486, 4488, 4489, 4490, 4492, 5072, 5076, 5087, 5386, 5533, 5535, 5537, 5578, 5581
  - \chronos@templgthb . 1112, 5074, 5080, 5082, 5386, 5387, 5390, 5533, 5534, 5535, 5537, 5578, 5580
  - \chronos@templgthc . . 1113, 3710, 3717, 3719, 3726, 5073, 5078, 5092, 5580, 5581
  - \chronos@templlll . . . . . 3460, 3485, 3486
  - \chronos@templlllc . . . . . 3461
  - \chronos@templllpl . . . . . 3463, 3596
  - \chronos@templllplc . . . . 3464, 3485, 3596
  - \chronos@templllw . . . . . 3462, 3486
  - \chronos@tempml . . 3924, 4209, 4235, 4309, 4333
  - \chronos@tempny 4225, 4226, 4250, 4323, 4324
  - \chronos@temp p . . . . . 5332, 5334
  - \chronos@temppgfpath . . . . . 1813, 1816
  - \chronos@tempq . . . . . 5333, 5334
  - \chronos@tempremainder . 3870, 3872, 3880, 3882, 3885
  - \chronos@temptrue . . 1246, 2289, 4168, 4172, 4284, 5335, 5341
  - \chronos@tempu 3976, 3978, 3981, 4001, 4003, 4005
  - \chronos@tempv 3820, 3822, 3871, 3885, 3897, 4225, 4323
  - \chronos@testun@yshift . . . . . 1133, 1139, 1692, 1728, 2896, 2900, 2905, 2909, 5411, 5418, 5419, 5421, 5422
  - \chronos@testunteitl@priflythrennu . 811, 1470
  - \chronos@theori@angor . . 4989, 4999, 5001, 5003, 5007, 5009
  - \chronos@theori@at . . . . . 4990
  - \chronos@theori@cysylltiadtheorifalse . . . . . 1236, 4996
  - \chronos@theori@enw 5016, 5023, 5024, 5025
  - \chronos@theori@ffonttestun . . . . . 5021
  - \chronos@theori@invanchor . . . . . 4991
  - \chronos@theori@isodfalse . . . . . 1234
  - \chronos@theori@lliw . . . . . 5026
  - \chronos@theori@tikzname . . . . . 5020
  - \chronos@tikz@setbox . . . . . 1294, 1295
  - \chronos@tikz@prefix . . . . . 740, 3424
  - \chronos@timeline@showyearsfalse . . 2559, 2881
  - \chronos@timeline@showyearstrue . . . 1180
  - \chronos@timelinemargin . 1119, 1143, 3018, 3635, 3640, 3641
  - \chronos@timelineyears . . . . . 2554
  - \chronos@timelineyearsanchor . . . . 2574, 2585, 2595, 2611, 2647, 4094, 4289, 4301, 4315, 4340
  - \chronos@tmpdimena . . . . . 1137
  - \chronos@tmpdimenb . . . . . 1138
  - \chronos@tmpstartday . . . . . 3451, 3457
  - \chronos@tmpstartmonth . 3450, 3456, 3966, 3968, 3976, 3979, 3997
  - \chronos@tmpstartyear . . . . . 3449, 3455
  - \chronos@to@clist . . 909, 2314, 2318, 2322, 2326, 2330, 2334, 2338, 2342, 2386, 2387
  - \chronos@troilliwiiau@isod . . . . . 786, 5430
  - \chronos@troilliwiiau@tag 4713, 4785, 4931, 4998, 5382
  - \chronos@troilliwiiau@uchod . . . . 782, 5432
  - \chronos@troilliwiaufalse . . . . . 2731
  - \chronos@troilliwiautru e . . . . . 1240
  - \chronos@uchod 1290, 2751, 4385, 4390, 4391, 4412, 4413, 4456, 4463, 4488
  - \chronos@unit 3634, 3639, 4059, 4117, 4364, 4704, 4707, 4710, 4782, 4922, 4925, 4928
  - \chronos@width 1116, 1117, 3014, 3019, 3020, 3635, 4430



- `\chronos@ychwanegu@gosod` . 837, 1819, 1823, 1827, 1831, 1835, 1844, 2550, 2618, 2627
- `\chronos@ychwanegu@nodweddion` . 814, 1627, 1869, 1886, 1891, 1896, 1904, 1907, 1910, 1925, 1927, 1930, 1938, 1940, 1942, 1944, 1946, 1948, 2068, 2072, 2079, 2149, 2151, 2153, 2155, 2783, 2784, 2785, 2800, 2801, 2802, 2817, 2818, 2819, 2834, 2835, 2836, 3080, 3104, 3106, 3108, 3110, 3174, 3180
- `\chronos@ychwanegu@nodweddion@rhag` . 831, 1628, 2723, 2730, 2782, 2799, 2816, 2833, 2874, 2895, 2899, 2904, 2908, 2980
- `\chronos@ychwanegu@nodweddion@rhestr` 815, 2272, 2274, 2277, 2279
- `\chronos@yearbce` 303, 1285, 2715, 4426, 5644
- `\chronos@yearce` 307, 1284, 2714, 4425, 5643
- `\chronos@yearonlinefalse` 1192, 2569, 2580, 2607
- `\chronos@yearonlinetrue` . . . . . 2591
- `\chronos@yearzerofalse` . . . . . 1184
- `\chronos@yearzerotrue` . . . . . 3599, 3602
- `\chronos@yshift` .. 1286, 1935, 5385, 5394, 5403, 5405, 5407, 5409
- `\chronos@yshift@inv` 5394, 5405, 5409, 5419, 5422, 5531
- `\chronosbaselineskip` . . . . . 55, 416, 418
- `\chronos@bce` . . . . . 101, 101
- `\chronos@borderheight` . . . . . 101
- `\chronos@ce` . . . . . 101, 101
- `\chronoscopyleft` . . . . . 66, 75, 5284
  - configuration, local . . . . . 67
  - name optional for . . . . . 67
- `\chronoscopyright` . . . . . 66, 75, 5597
  - configuration, local . . . . . 67
  - invoked by `\chronoscopyleft` . . . . . 67
  - name optional for . . . . . 67
- `\chronosdangosfformatiau` . . . . . 908
- `\chronosdangoslliwiau` . . . . . 901
- `\chronosdangoslliwiaurhag` . . . . . 902
- `\chronosevent` . . . . . 63, 5597
  - configuration, local . . . . . 67
  - method allowing use of key-value interface in . . . . . 104
  - method incompatible with key-value version of . . . . . 103
  - renaming T<sub>E</sub>X SE version . . . . . 104
  - using assigned colour in . . . . . 59
- `\chronos@height` . . . . . 101
- `\chronosinfo` . . . . . 66, 5597
  - configuration, local . . . . . 67
- `\chronoslegacyevent` . . . . . 104
- `\chronoslegacyperiod` . . . . . 104
- `\chronoslife` . . . . . 14, 61, 5597
  - configuration, local . . . . . 67
  - in example timeline† . . . . . 6
  - using assigned colour in . . . . . 59
- `\chronos@llinell@yshift` . . . . . 101
- `\chronosmaintitle` . . . . . 66, 5597
  - configuration, local . . . . . 67
  - name optional for . . . . . 67
- `\chronosnewcolorscheme` . . . . . 86, 1062
- `\chronosnewcolourscheme` 86, 86, 1062, 6224, 6237, 6241, 6248, 6272, 6289, 6292, 6297
- `\chronosperiod` . . . . . 64, 5597
  - configuration, local . . . . . 67
  - method allowing use of key-value interface in . . . . . 104
  - method incompatible with key-value version of . . . . . 103
  - renaming T<sub>E</sub>X SE version . . . . . 104
  - using assigned colour in . . . . . 59
- `\chronosset` . . . . . 29, 413, 4657, 4659
  - effect on `\chronoscopyright` . . . . . 75
  - effect on timeline . . . . . 12
  - not used† . . . . . 99
  - purpose . . . . . 29
  - setting normally local keys in . . . . . 67
  - showing options . . . . . 99
  - when (not) to use in document body . . . . . 30
- `\chronosset*` . . . . . 30
- `\chronosshowcolor` . . . . . 98, 5597
- `\chronosshowcolor*` . . . . . 99
- `\chronosshowcolour` . . . . . 98, 5597
- `\chronosshowcolour*` . . . . . 98
- `\chronosshowfeatures` . 99, 100, 5597, 5632
- `\chronosshowpreset` . . . . . 99, 99, 5597
- `\chronostheory` . . . . . 64, 5597
  - configuration, local . . . . . 67
  - using assigned colour in . . . . . 59
- `\chronostheorycircle` . . . . . 65, 5597
  - configuration, local . . . . . 67
- `\chronostimelinearrowfalse` . . . 1280, 2479, 3474
- `\chronos@width` . . . . . 101
- `\chronos@yearbce` . . . . . 101, 101
- `\chronos@yearce` . . . . . 101, 101
- `\chronosyeari` .. 92, 4051, 4053, 4098, 4101, 4102, 4106, 4112, 4125, 4131, 4133, 4176, 4180, 4181, 4184, 4185, 4186, 4187, 4198, 4200, 4227, 4257, 4261, 4262, 4264, 4270, 4271, 4282, 4289, 4300, 4301, 4315, 4325, 4340, 5936, 5977
  - use in blues below . . . . . 89
- `\clist_gclear:c` . . . . . 938
- `\clist_gpop:cN` . . . . . 369, 372
- `\clist_gput_right:co` . . . . . 926
- `\clist_gput_right:cV` . . . . . 370, 373
- `\clist_gput_right:cx` . . . . . 924
- `\clist_gset:cn` . . . . . 795, 802
- `\clist_gset:co` . . . . . 933
- `\clist_gset:cx` . . . . . 931
- `\clist_gset_eq:cc` . . . . . 545, 560, 953

- \clist\_gset\_eq:NN . . . . . 551, 552, 566, 567
- \clist\_if\_empty:cTF . . . . . 367, 942
- \clist\_if\_empty:NF . . . . . 571, 590, 598
- \clist\_if\_in:NnTF . . . . . 389
- \clist\_map\_inline:Nn . . 574, 593, 601, 865, 867, 874, 886, 888, 895
- \clist\_map\_inline:nn 433, 452, 467, 541, 543, 556, 558, 713, 722, 729, 840, 904
- \clist\_new:N 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 100, 101, 102, 103, 104, 105, 106, 107
- \clist\_put\_right:co . . . . . 913
- \clist\_remove\_duplicates:c . . . . . 941
- \clist\_remove\_duplicates:N . 573, 592, 600
- \clist\_set:co . . . . . 915
- \clist\_set:Nn . . . . . 96, 863, 864, 884, 885
- \clist\_show:c . . . . . 869, 876, 890, 897, 955
- \clist\_use:cn . . . . . 950
- \colorlet . . . . . 376, 1423, 1424, 1425, 1426, 1427, 1428, 1429, 1430, 1451, 1452, 1453, 1454, 1455, 1456, 1457, 1459, 1460, 1461, 1462, 1840, 3487, 3488, 3531, 3532, 5186, 5187, 5188, 5189, 5190, 5442, 5443, 5444, 5445, 5446, 5449
- conditionally defined
  - \celabel† . . . . . 101
- conditionally used
  - \uishape† . . . . . 101
- \coordinate . . . . . 1468, 3137, 3207, 3227, 3647, 3648, 3649, 3650, 3653, 3654, 3655, 3656, 3657, 3658, 3688, 3689, 4060, 4098, 4101, 4103, 4109, 4110, 4211, 4237, 4368, 4370, 4457, 4480, 4487, 4491, 4493, 4495, 4497, 4499, 4500, 4712, 4747, 4784, 4930, 4964, 5066, 5075, 5077, 5079, 5081, 5535, 5537, 5544
- \cs:w . . . . . 960, 1067
- \cs\_end: . . . . . 960, 1067
- \cs\_generate\_variant:Nn 215, 234, 235, 236, 287, 299, 311, 317, 323, 329, 330, 410, 430, 504, 512, 734
- \cs\_if\_exist:cF . . . . . 1013
- \cs\_if\_exist:cT . . . . . 1009
- \cs\_if\_exist:cTF . . . . . 1005
- \cs\_if\_exist:NF . . . . . 736, 989
- \cs\_if\_exist:NT . . . . . 985
- \cs\_if\_exist:NTF 966, 970, 974, 978, 981, 982, 986, 990, 994, 998, 1002, 1006, 1010, 1014, 1018, 1022, 1026, 1030, 1034, 1038, 1042, 1046, 1050, 1054, 1058
- \cs\_if\_exist\_use:c . . . . . 56
- \cs\_if\_free:cF . . . . . 1001
- \cs\_if\_free:cT . . . . . 997
- \cs\_if\_free:cTF . . . . . 993
- \cs\_if\_free:NF . . . . . 977
- \cs\_if\_free:NT . . . . . 416, 973
- \cs\_if\_free:NTF . . . . . 969
- \cs\_if\_free\_p:N . . . . . 1045
- \cs\_new\_eq:cc . . . . . 1098
- \cs\_new\_eq:NN 418, 735, 738, 741, 742, 743, 744, 804, 805, 810, 811, 812, 813, 814, 831, 832, 833, 834, 835, 836, 901, 902, 908, 956, 957, 958, 959, 965, 969, 973, 977, 981, 985, 989, 993, 997, 1001, 1005, 1009, 1013, 1017, 1021, 1025, 1029, 1033, 1037, 1041, 1045, 1049, 1053, 1057, 1061, 1101
- \cs\_new\_nopar:cn . . . . . 1065
- \cs\_new\_nopar:Nn . . . . . 376
- \cs\_new\_protected\_nopar:Nn . 331, 342, 365, 377, 387, 394, 411, 422, 426, 431, 438, 450, 465, 480, 492, 505, 513, 518, 531, 535, 539, 554, 569, 616, 644, 660, 677, 693, 701, 710, 718, 727
- \cs\_new\_protected\_nopar:Npn 188, 211, 216, 230, 237, 266, 283, 288, 300, 312, 318, 324, 357, 361
- \cs\_set\_eq:cc . . . . . 1021
- \cs\_set\_eq:cN . . . . . 1025
- \cs\_set\_eq:NN . . . . . 413
- \cs\_undefine:N . . . . . 1017
- \CSFreeBoolean 102, 1042, 3426, 5215, 5216, 5217
- \CSlet . . . . . 102, 1022, 5469
- \cslet . . . . . 102
- \CSletCS . . . . . 102, 1018, 5397, 5435
- \csletcs . . . . . 102
- \csname . . . . . 245, 247, 251, 255, 353, 354, 355, 752, 763, 784, 788, 808, 946, 1730, 1731, 1863, 1871, 1872, 1879, 1880, 1881, 1882, 1899, 1913, 1920, 2058, 2059, 2067, 2071, 2078, 2090, 2091, 2093, 2096, 2097, 2099, 2105, 2106, 2107, 2114, 2115, 2116, 2121, 2122, 2123, 2126, 2127, 2128, 2133, 2134, 2135, 2142, 2143, 2144, 2161, 2923, 3275, 5298, 5304, 5308, 5310, 5314, 5315, 5316, 5320, 5325, 5332, 5333, 5348, 5352, 5354, 5359, 5361, 5368, 5370, 5375, 5377, 5384, 5388, 5391, 5399, 5404, 5408, 5429, 5438, 5439, 5440, 5441, 5448, 5455, 5473, 5474, 5475, 5477, 5478, 5483, 5484, 5485, 5486, 5489, 5494, 5501, 5507, 5524, 5525, 5527, 5528, 5540, 5548, 5559, 5567, 5568, 5589
- \cylchtheori . . . . . 5059, 5626
- \d . 4051, 4054, 4057, 4059, 4060, 4090, 4091, 4093, 4094, 4100, 4117, 4355
- \day . . . . . 2057, 4698, 4916
- \DeclareDocumentCommand . . . . . 1485
- \DeclareRobustCommand . . . . . 5649
- \DeclareTextFontCommand . . . . . 5650, 5652
- \def . . . . . 353, 354, 355, 784, 788, 961, 1282, 1283, 1284, 1285, 1286,

- 1287, 1288, 1289, 1290, 1291, 1295, 1469,  
1491, 1501, 1526, 1735, 1899, 1915, 1917, 1921,  
2067, 2071, 2078, 2090, 2091, 2093, 2096,  
2097, 2099, 2105, 2106, 2107, 2114, 2115,  
2116, 2121, 2122, 2123, 2126, 2127, 2128,  
2133, 2134, 2135, 2142, 2143, 2144, 2161,  
2859, 2860, 2861, 2862, 2863, 2864, 2865,  
2920, 3076, 3079, 3086, 3088, 3091, 3094,  
3095, 3096, 3099, 3102, 3232, 3734, 3741,  
3753, 3756, 3760, 3773, 3774, 3776, 3777,  
3779, 3780, 3782, 3783, 3785, 3786, 3788,  
3789, 3791, 3792, 3794, 3795, 3796, 3797,  
3831, 3834, 3836, 3854, 3860, 3957, 3960,  
4148, 4721, 4728, 4731, 4735, 4742, 4792,  
4797, 4806, 4811, 4816, 4829, 4840, 4846,  
4872, 4939, 4946, 4949, 4951, 4956, 5003,  
5007, 5009, 5016, 5018, 5114, 5118, 5122,  
5155, 5157, 5199, 5200, 5204, 5206, 5210,  
5222, 5227, 5237, 5245, 5259, 5298, 5304,  
5310, 5316, 5320, 5325, 5350, 5351, 5357,  
5358, 5366, 5367, 5373, 5374, 5394, 5399,  
5405, 5409, 5419, 5422, 5474, 5475, 5477,  
5478, 5582, 5584
- `\definecolor` . . . . . 1353, 1354, 1355  
`\definecolorseries` . . . . . 6244, 6245  
`\definecolorset` . . . . . 1304  
`\DefineFileInfoSVN` . . . . . 3  
`\digwyddiad` . . . . . 103, 4770, 5621  
`\dimexpr` . . . . . 3645, 3646  
`\dlast` . 4054, 4057, 4065, 4086, 4189, 4252,  
4290, 4351, 4355  
`\do` . . . . . 5041  
`\dp` . . . . . 1536, 1543, 1556, 1564  
`\draw` 582, 1475, 3683, 4414, 4419, 4577, 4583,  
4607, 5126, 5135, 5262, 5272, 5588  
`\edef` . . . . . 1470, 1617, 1730, 1731, 1813,  
2048, 3966, 3976, 3978, 4001, 4003, 4224,  
4322, 4366, 4869, 4870, 5182, 5183, 5184,  
5185, 5308, 5332, 5333, 5384, 5438, 5439,  
5440, 5441, 5448, 5454, 5467, 5484, 5527  
`\else` 1603, 1609, 1637, 1645, 1653, 1661, 1753,  
1756, 1759, 2050, 2276, 2289, 2307, 2491,  
2624, 2791, 2808, 2825, 2842, 3478, 3543,  
3549, 3559, 3564, 3571, 3576, 3579, 3585,  
3588, 3600, 3624, 3630, 3682, 3709, 3743,  
3775, 3778, 3781, 3784, 3787, 3790, 3793,  
3796, 3811, 3814, 3821, 3832, 3835, 3839,  
3841, 3859, 3863, 3866, 3873, 3883, 3889,  
3899, 3915, 3927, 3951, 3958, 3977, 3986,  
3991, 4002, 4010, 4015, 4031, 4058, 4075,  
4092, 4097, 4105, 4108, 4124, 4128, 4149,  
4160, 4167, 4170, 4171, 4190, 4208, 4234,  
4255, 4263, 4275, 4291, 4308, 4332, 4360,  
4369, 4435, 4437, 4512, 4595, 4620, 4628,  
4644, 4649, 4654, 4664, 4669, 4674, 4727,  
4728, 4734, 4757, 4759, 4762, 4803, 4823,  
4839, 4875, 4891, 4893, 4896, 4945, 4946,  
4950, 4974, 4976, 4979, 5008, 5038, 5050,  
5205, 5313, 5319, 5324, 5336, 5339, 5342,  
5356, 5364, 5372, 5389, 5398, 5406, 5410,  
5431, 5434, 5476, 5493, 5506, 5523, 5536,  
5583, 5607, 5612, 5617  
`\end` 1477, 3675, 4379, 4422, 4424, 4523, 4570,  
4603, 4637, 4639, 4863, 5056, 5143, 5280,  
5514, 5576  
`\endcsname` . . . . . 245,  
247, 251, 255, 353, 354, 355, 752, 763, 784,  
788, 808, 946, 1730, 1731, 1863, 1871, 1872,  
1879, 1880, 1881, 1882, 1899, 1913, 1920,  
2058, 2059, 2067, 2071, 2078, 2090, 2091,  
2093, 2096, 2097, 2099, 2105, 2106, 2107,  
2114, 2115, 2116, 2121, 2122, 2123, 2126, 2127,  
2128, 2133, 2134, 2135, 2142, 2143, 2144,  
2161, 2923, 3275, 5298, 5304, 5308, 5310,  
5314, 5315, 5316, 5320, 5325, 5332, 5333,  
5348, 5352, 5354, 5359, 5361, 5368, 5370,  
5375, 5377, 5384, 5388, 5391, 5399, 5404,  
5408, 5429, 5438, 5439, 5440, 5441, 5448,  
5455, 5473, 5474, 5475, 5477, 5478, 5483,  
5484, 5485, 5486, 5489, 5494, 5501, 5507,  
5524, 5525, 5527, 5528, 5540, 5548, 5559,  
5567, 5568, 5589  
`\endgroup` 4768, 4902, 4985, 5030, 5106, 5145,  
5192, 5282, 5288  
`\endinput` . . . . . 17  
`\endpgfinterruptpicture` . . . . . 1296  
`\endpgfonlayer` . . . . . 1520  
`\exp_last_unbraced:NV` . . . . . 337, 339  
`\expandafter` . . . . . 353, 354, 355, 784, 788,  
808, 944, 946, 1732, 1899, 1915, 2067, 2071,  
2078, 2090, 2091, 2093, 2096, 2097, 2099,  
2105, 2106, 2107, 2114, 2115, 2116, 2121, 2122,  
2123, 2126, 2127, 2128, 2133, 2134, 2135,  
2142, 2143, 2144, 2161, 2923, 5298, 5304,  
5310, 5314, 5315, 5316, 5320, 5325, 5352,  
5354, 5359, 5361, 5368, 5370, 5375, 5377,  
5388, 5391, 5399, 5404, 5408, 5428, 5454,  
5474, 5475, 5477, 5478, 5483, 5485, 5486,  
5524, 5525, 5528, 5540  
`\ExpandArgs` . . . . . 55  
`\ExplLoaderFileDate` . . . . . 9  
`\ExplSyntaxOff` . . 58, 1102, 2427, 2712, 3011  
`\ExplSyntaxOn` . . . 20, 68, 2394, 2688, 2995  
`\extractcolorspec` . . 964, 3460, 3461, 3462,  
3463, 3464  
`\fi` . . . . . 1478, 1534, 1542,  
1553, 1562, 1605, 1611, 1639, 1647, 1655,  
1663, 1755, 1761, 1762, 2052, 2281, 2289,  
2307, 2493, 2626, 2795, 2812, 2829, 2846,  
3458, 3472, 3477, 3489, 3490, 3491, 3542,  
3551, 3552, 3553, 3561, 3562, 3574, 3575,  
3582, 3583, 3584, 3591, 3592, 3593, 3594,

- 3595, 3597, 3603, 3604, 3608, 3617, 3618,  
3626, 3632, 3633, 3674, 3692, 3728, 3729,  
3755, 3798, 3799, 3800, 3801, 3802, 3803,  
3804, 3805, 3816, 3817, 3823, 3837, 3838,  
3846, 3847, 3856, 3865, 3868, 3869, 3891,  
3892, 3894, 3907, 3921, 3929, 3961, 3962,  
3963, 3965, 3980, 3995, 3996, 4004, 4019,  
4020, 4022, 4039, 4085, 4086, 4096, 4104,  
4111, 4112, 4113, 4120, 4121, 4136, 4138, 4139,  
4162, 4163, 4169, 4170, 4173, 4182, 4219,  
4222, 4223, 4246, 4249, 4250, 4251, 4252,  
4253, 4254, 4272, 4285, 4286, 4317, 4320,  
4321, 4344, 4347, 4348, 4349, 4350, 4351,  
4352, 4353, 4354, 4355, 4357, 4371, 4373,  
4378, 4396, 4397, 4408, 4409, 4416, 4421,  
4423, 4440, 4441, 4442, 4447, 4451, 4455,  
4461, 4478, 4484, 4502, 4515, 4521, 4553,  
4563, 4571, 4581, 4587, 4602, 4604, 4635,  
4636, 4638, 4646, 4651, 4656, 4666, 4671,  
4676, 4702, 4728, 4739, 4740, 4754, 4764,  
4765, 4766, 4822, 4844, 4852, 4862, 4866,  
4877, 4882, 4888, 4898, 4899, 4900, 4920,  
4946, 4953, 4954, 4971, 4981, 4982, 4983,  
5010, 5054, 5057, 5144, 5207, 5281, 5323,  
5328, 5329, 5338, 5344, 5345, 5363, 5379,  
5380, 5392, 5393, 5402, 5416, 5424, 5425,  
5433, 5436, 5450, 5470, 5479, 5498, 5512,  
5513, 5538, 5585, 5594, 5595, 5609, 5614,  
5619, 6081
- \fill ..... 3678, 6078  
\fmtversion ..... 44  
\fnum ..... 3961  
\footnotesize 3307, 3340, 3373, 3382, 3391,  
5671, 5686, 5692, 5752, 5800, 5815, 5841,  
5895, 5937, 5953, 5963, 6129, 6207, 6208  
\foreach ..... 48, 101, 576, 582, 595, 2350,  
2359, 3651, 3937, 3981, 3997, 4005, 4021,  
4032, 4041, 4051, 4056, 4192, 4209, 4235,  
4294, 4309, 4333, 4356, 4361, 4391, 4404,  
4413, 4418, 4528, 4555, 4575, 5457  
\g\_\_chronos\_century\_subheadings\_clist ..  
..... 102, 598, 600, 601  
\g\_\_chronos\_int ..... 108, 420, 740  
\g\_\_chronos\_lliwiau\_byw\_isod\_clist .. 78,  
180  
\g\_\_chronos\_lliwiau\_byw\_isod\_rhag\_clist  
..... 88  
\g\_\_chronos\_lliwiau\_byw\_uchod\_clist . 77,  
179  
\g\_\_chronos\_lliwiau\_byw\_uchod\_rhag\_clist  
..... 87  
\g\_\_chronos\_lliwiau\_digwyddiad\_isod\_clist  
..... 82, 182  
\g\_\_chronos\_lliwiau\_digwyddiad\_isod\_rhag\_clist  
..... 92  
\g\_\_chronos\_lliwiau\_digwyddiad\_uchod\_clist  
..... 81, 181  
\g\_\_chronos\_lliwiau\_digwyddiad\_uchod\_rhag\_clist  
..... 91  
\g\_\_chronos\_lliwiau\_isod\_clist . 76, 178,  
551, 566  
\g\_\_chronos\_lliwiau\_isod\_rhag\_clist . 86,  
551, 566  
\g\_\_chronos\_lliwiau\_parhad\_isod\_clist 80,  
184  
\g\_\_chronos\_lliwiau\_parhad\_isod\_rhag\_clist  
..... 90  
\g\_\_chronos\_lliwiau\_parhad\_uchod\_clist .  
..... 79, 183  
\g\_\_chronos\_lliwiau\_parhad\_uchod\_rhag\_clist  
..... 89  
\g\_\_chronos\_lliwiau\_theori\_isod\_clist 84,  
186  
\g\_\_chronos\_lliwiau\_theori\_isod\_rhag\_clist  
..... 94  
\g\_\_chronos\_lliwiau\_theori\_uchod\_clist .  
..... 83, 185  
\g\_\_chronos\_lliwiau\_theori\_uchod\_rhag\_clist  
..... 93  
\g\_\_chronos\_lliwiau\_uchod\_clist . 75, 177,  
552, 567  
\g\_\_chronos\_lliwiau\_uchod\_rhag\_clist 85,  
552, 567  
\g\_\_chronos\_tmpa\_clist ..... 105  
\gdef ..... 2890, 2915, 4876  
\global . 4119, 4220, 4247, 4318, 4345, 4643,  
4645, 4648, 4650, 4653, 4655, 4756, 4758,  
4761, 4763, 4890, 4892, 4895, 4897, 4973,  
4975, 4978, 4980, 5388, 5391, 5404, 5408,  
5469  
\group\_begin: ..... 747, 758, 769, 1064  
\group\_end: ..... 754, 765, 779, 1099  
\gwybodaeth ..... 5147, 5624  
\hawlfraint ..... 5194, 5287, 5628  
\hbox ..... 1294, 1296  
\ht ..... 1536, 1544, 1555, 1565  
\Huge ..... 3387  
\huge ..... 5698, 5901  
\i ..... 576, 577, 582, 595, 2350, 2359,  
3651, 3653, 4033, 4036, 4037, 4042, 4047,  
4048, 4361, 4362, 4366, 4368, 4370, 4391,  
4392, 4394, 4404, 4405, 4407, 4413, 4414,  
4415, 4418, 4420, 4528, 4549, 4555, 4562,  
4575, 4577, 4578, 4579, 5457, 5467  
\ifbool ..... 5586  
\IfBooleanExprF ..... 102, 1026, 3967  
\IfBooleanExprT 102, 1026, 3426, 3744, 3940,  
4129  
\IfBooleanExprTF 102, 1026, 2601, 3874, 3930,  
5214  
\IfBooleanF ..... 1736, 4661, 5173  
\IfBooleanT .. 820, 823, 829, 872, 893, 964,

- 1631, 1748  
 \IfBooleanTF . 817, 911, 920, 922, 929, 5526  
 \ifboolexpr . . . . . 102, 4023, 4050  
 \ifchronos@blynyddoeddisod . . . 1269, 3569,  
 3575, 3577, 3583, 3586, 3592  
 \ifchronos@blynyddoedduchod . . 1267, 3572,  
 3574, 3580, 3582, 3589, 3591  
 \ifchronos@bufarw . . . . . 1261, 4728  
 \ifchronos@byw@cysylltiad . . . . . 1205  
 \ifchronos@byw@cysylltiadtheori . . 1207,  
 4750  
 \ifchronos@byw@isod 1197, 4662, 4760, 5605  
 \ifchronos@byw@isod@rhag . . . . . 1199, 4642  
 \ifchronos@cam@mod . 1237, 4140, 4163, 4170  
 \ifchronos@copyleft . . . . . 1275, 5203  
 \ifchronos@dangoscyfnodau 1241, 1635, 1643,  
 1751, 1757, 2787, 2804  
 \ifchronos@digwyddiad@cysylltiad . . . 1217  
 \ifchronos@digwyddiad@cysylltiadtheori .  
 . . . . . 1219, 4883  
 \ifchronos@digwyddiad@isod . . . 1209, 4667,  
 4894, 5610  
 \ifchronos@digwyddiad@isod@rhag 1211, 4647  
 \ifchronos@dimondblynyddoedd . 1271, 1651,  
 1659, 1750, 2821, 2838, 5331  
 \ifchronos@enwaulliwsym . . . . . 21, 5447  
 \ifchronos@eventdatessplit . . . 1193, 4699,  
 4788, 4857, 4864, 4917, 5499  
 \ifchronos@eventyearsonline . . 1181, 4374,  
 4868  
 \ifchronos@every@byw@isod . . . . 1201, 4755  
 \ifchronos@every@byw@uchod . . . 1203, 4757  
 \ifchronos@every@digwyddiad@isod . . . 1213,  
 4889  
 \ifchronos@every@digwyddiad@uchod . . 1215,  
 4891  
 \ifchronos@every@parhad@isod . 1225, 4972  
 \ifchronos@every@parhad@uchod 1227, 4974  
 \ifchronos@felymae . . . . . 1243  
 \ifchronos@frame . . . 1249, 4433, 4442, 4506,  
 4521, 4582, 4587  
 \ifchronos@framedefnyddiobb . . 1251, 4436,  
 4440, 4508, 4515  
 \ifchronos@gorffenedig . . . . . 1263, 4946  
 \ifchronos@headings 1247, 4434, 4441, 4443,  
 4502, 4554  
 \ifchronos@markateraswitch . . . 1185, 4164  
 \ifchronos@markeras 1189, 3620, 3633, 3693,  
 3729, 4574, 4581  
 \ifchronos@marks . . . 1173, 4183, 4254, 4273,  
 4352  
 \ifchronos@marks@bare . . 1177, 3840, 3849,  
 3856, 4115, 4188, 4253, 4292, 4350  
 \ifchronos@marks@minor . . . . . 1175, 4158  
 \ifchronos@middleanchorborder 1238, 1601,  
 1607  
 \ifchronos@minoryears . . . . . 1195, 4170  
 \ifchronos@onlytext 1187, 4726, 4789, 4838,  
 4944  
 \ifchronos@parhad@cysylltiad . . . . . 1229  
 \ifchronos@parhad@cysylltiadtheori . 1231,  
 4967  
 \ifchronos@parhad@isod . 1221, 4672, 4977,  
 5615  
 \ifchronos@parhad@isod@rhag . . 1223, 4652  
 \ifchronos@phantom . . . . . 1277, 5036, 5521  
 \ifchronos@placeholders . . . . . 1253  
 \ifchronos@preset . . . . . 1265, 2289  
 \ifchronos@showbb . . . . . 1257, 4605, 4638  
 \ifchronos@showcoords . . 1255, 4410, 4526,  
 4571, 4588, 4602, 4621, 4635, 5133, 5270  
 \ifchronos@shownodes 1259, 1473, 4572, 4604,  
 4613, 4636  
 \ifchronos@tag@cysylltu 1273, 5396, 5556,  
 5594  
 \ifchronos@temp 1245, 2307, 2622, 4175, 4182,  
 4256, 4272, 4274, 4730, 4948  
 \ifchronos@theori@cysylltiadtheori . 1235  
 \ifchronos@theori@isod . . . . . 1233, 5006  
 \ifchronos@timeline@showyears 1179, 3730,  
 4550, 6076  
 \ifchronos@troilliwiau . . . . . 1239, 5428  
 \ifchronos@yearsonline . . 1191, 2271, 3465,  
 3536, 3557, 3563, 3677, 3692, 3694, 4067,  
 4088, 4174, 5349, 5365, 5488, 5500  
 \ifchronos@yearzero . 1183, 3925, 4107, 4111  
 \ifchronostimelinearrow 1279, 2489, 3473  
 \ifcsdef . . . . . 102, 5427  
 \IfCSExistF . . . . . 102, 1002, 5297, 5303  
 \IfCSExistT . . . . . 102, 1002  
 \IfCSExistTF . . 102, 1002, 5296, 5383, 5453  
 \IfCSFreeF . . . . . 102, 990  
 \IfCSFreeT . . . . . 102, 990, 5427  
 \IfCSFreeTF . . . . . 102, 990  
 \ifcsundef . . . . . 102  
 \ifcsunef . . . . . 5427  
 \ifdef . . . . . 102  
 \ifdim . . 1532, 1540, 1551, 1560, 3470, 3533,  
 3538, 3544, 3553, 3554, 3566, 3567, 3568,  
 3584, 3593, 3594, 3661, 4207, 4217, 4222,  
 4233, 4244, 4249, 4307, 4317, 4320, 4331,  
 4342, 4347, 4444, 4448, 4452, 4462, 5387,  
 5390, 5403, 5407, 5411, 5534, 5581  
 \IfExistF . 102, 978, 3824, 3850, 4720, 4790,  
 4804, 4805, 4828, 4938, 5015, 5114, 5155,  
 5156, 5161, 5202, 5209, 5213, 5219, 5230,  
 5621, 5622, 5623, 5624, 5625, 5626, 5627,  
 5628, 5629, 5630, 5631, 5643, 5644, 5645,  
 5646, 5647, 5648, 5649, 5650, 5651, 5652  
 \IfExistT . 102, 978, 3605, 3855, 3923, 5022  
 \IfExistTF 102, 978, 1914, 3738, 3739, 3758,  
 3807, 3947, 4024, 4029, 4716, 4723, 4791,

- 4810, 4824, 4833, 4934, 4941, 4999, 5000,  
5012, 5115, 5220, 5221, 5231, 5252
- \IfFileExists ..... 63, 1490
- \IfFormatAtLeastTF ..... 44, 45, 52
- \IfFreeF ..... 102, 966
- \IfFreeT ..... 102, 966, 3438, 3439, 5121
- \IfFreeTF ..... 102, 966, 3857, 3908
- \IfIntCompareF ..... 102, 1046
- \IfIntCompareT ..... 102, 1046
- \IfIntCompareTF ..... 102, 1046, 4463
- \ifnum ..... 3441, 3598, 3601, 3606, 3614,  
3615, 3621, 3627, 3740, 3772, 3775, 3778,  
3781, 3784, 3787, 3790, 3793, 3809, 3812,  
3819, 3825, 3830, 3833, 3858, 3869, 3872,  
3880, 3887, 3898, 3909, 3946, 3950, 3956,  
3959, 3962, 3963, 3965, 3975, 3984, 3987,  
3998, 4000, 4008, 4011, 4023, 4039, 4057,  
4065, 4086, 4087, 4097, 4099, 4102, 4106,  
4112, 4113, 4114, 4121, 4122, 4126, 4134, 4138,  
4139, 4165, 4189, 4191, 4202, 4223, 4226,  
4250, 4251, 4252, 4276, 4290, 4293, 4302,  
4321, 4324, 4348, 4349, 4351, 4354, 4355,  
4385, 4390, 4398, 4403, 4412, 4417, 4456,  
4479, 5043, 5314, 5315, 5334, 5340
- \ifnumcomp ..... 102, 4050
- \ifundef ..... 102
- \IfValueT ..... 748, 759, 770
- \IfValueTF ..... 792, 799, 1469, 1743, 5633
- \ifx ... 2049, 3485, 3486, 3596, 3861, 3862,  
3865, 3868, 4359, 4367, 4871, 5309, 5468
- \ilast ..... 4053, 4203, 4303
- \ino ..... 4391, 4393, 4404, 4406
- \int\_abs:n ..... 235, 270, 278, 280
- \int\_abs:v ..... 249, 261, 263
- \int\_compare:nF ..... 1061
- \int\_compare:nNnT ..... 348
- \int\_compare:nT ..... 285, 293, 305, 1057
- \int\_compare:nTF 191, 199, 219, 290, 302, 379,  
1053
- \int\_compare\_p:nNn ..... 1049
- \int\_gincr:N ..... 420
- \int\_gzero\_new:N ..... 108
- \int\_new:N ..... 109, 110
- \int\_set:Nn ..... 190, 218, 606, 607
- \int\_to\_arabic:n ..... 610, 611, 740
- \IntCompareBoolean .. 102, 1046, 3745, 3876,  
3931, 3932, 3933, 3934, 3935, 3942, 3943,  
3944, 3968, 3970, 4131
- \itshape 3373, 3382, 5649, 5651, 5803, 5805,  
5949, 5953, 6024, 6027, 6129, 6130
- \j ..... 576, 577, 582, 583, 584, 595, 3651,  
3653, 4528, 4549, 4555, 4562, 4575, 4579,  
5457, 5469
- \k ..... 576, 577, 582, 584, 585, 595
- \keys\_define:mn ..... 22, 143
- \keys\_set\_exclude\_groups:nnn ..... 735
- \keys\_set\_filter:nnn ..... 738
- \keys\_set\_groups:nnn .... 1068, 1073, 1080
- \l\_\_chronos\_byw\_prop ..... 111, 522
- \l\_\_chronos\_byw\_troi\_bool ..... 69
- \l\_\_chronos\_date\_tl 130, 239, 240, 242, 244,  
246, 248, 250, 252, 254, 256, 258, 260, 262,  
264
- \l\_\_chronos\_dateformat\_tl .. 131, 136, 239,  
314, 315, 905
- \l\_\_chronos\_digwyddiad\_prop .... 112, 523
- \l\_\_chronos\_digwyddiad\_troi\_bool .... 70
- \l\_\_chronos\_dyddiadau\_coords\_clist . 100
- \l\_\_chronos\_gosod\_seq . 127, 842, 848, 852,  
857
- \l\_\_chronos\_gwybodaeth\_prop .... 113, 526
- \l\_\_chronos\_gwybodaeth\_troi\_bool .... 73
- \l\_\_chronos\_headings\_clist . 103, 571, 573,  
574
- \l\_\_chronos\_lliw\_tl 129, 369, 370, 372, 373,  
784, 788
- \l\_\_chronos\_llythrennau\_bach\_clist 95, 96,  
389
- \l\_\_chronos\_minoryearformat\_tl . 134, 138,  
326, 327, 781, 905
- \l\_\_chronos\_parhad\_prop ..... 114, 524
- \l\_\_chronos\_parhad\_troi\_bool ..... 71
- \l\_\_chronos\_prop 117, 428, 487, 489, 499, 501,  
507, 508, 509, 510, 515, 516, 533
- \l\_\_chronos\_rhagosedig\_prop 116, 507, 515
- \l\_\_chronos\_subheadings\_clist .. 101, 590,  
592, 593
- \l\_\_chronos\_theori\_prop ..... 115, 525
- \l\_\_chronos\_theori\_troi\_bool ..... 72
- \l\_\_chronos\_tikzname\_tl 135, 381, 383, 385,  
808
- \l\_\_chronos\_tmpa\_clist ..... 104
- \l\_\_chronos\_tmpa\_int 109, 190, 193, 201, 218,  
221, 607, 610
- \l\_\_chronos\_tmpa\_prop ..... 118, 508, 509
- \l\_\_chronos\_tmpa\_seq .. 128, 603, 604, 605
- \l\_\_chronos\_tmpa\_tl ..... 139
- \l\_\_chronos\_tmpb\_clist 106, 863, 865, 884,  
886
- \l\_\_chronos\_tmpb\_int ... 110, 606, 607, 611
- \l\_\_chronos\_tmpb\_tl ..... 140
- \l\_\_chronos\_tmpe\_clist 107, 864, 867, 874,  
885, 888, 895
- \l\_\_chronos\_tmpe\_tl 141, 333, 334, 335, 337,  
339, 396, 402, 406, 408, 440, 444, 445, 454,  
458, 459, 469, 473, 474, 482, 486, 487, 494,  
498, 499, 604, 606, 608, 609, 772, 773, 775,  
793, 794, 795, 800, 801, 802
- \l\_\_chronos\_tmpe\_tl 142, 442, 443, 456, 457,  
471, 472, 484, 485, 496, 497, 605, 608, 609
- \l\_\_chronos\_troi\_bool ..... 74
- \l\_\_chronos\_year\_tl 132, 268, 269, 271, 273,

- 275, 277, 279, 281
- `\l__chronos_yearformat_tl` . . . 133, 137, 268, 320, 321, 905
- `\LARGE` . . . . . 5801, 5956, 6021, 6172
- `\Large` . . . . . 5762, 5849, 6074, 6152
- `\legacy_if:nF` . . . . . 346, 397, 839
- `\legacy_if:nT` . . . . . 578
- `\legacy_if:nTF` . . . . . 734
- `\legacy_if:oTF` . . . . . 959
- `\legacy_if:p:n` . . . . . 1041
- `\LegacyBoolean` 102, 1038, 2602, 2603, 3746, 3747, 3748, 3875, 3936, 3941, 4130
- `\let` . . . . . 808, 944, 946, 1281, 1292, 1293, 1299, 1302, 1465, 1516, 1732, 1850, 2282, 2923, 2924, 2925, 3449, 3450, 3451, 3452, 3453, 3454, 3455, 3456, 3457, 3625, 3631, 3659, 3759, 3820, 3822, 4066, 4119, 4147, 4156, 4425, 4426, 4427, 4428, 4429, 4430, 4431, 4657, 4685, 4717, 4718, 4726, 4825, 4826, 4838, 4876, 4935, 4936, 4944, 5013, 5151, 5162, 5224, 5232, 5234, 5483, 5485, 5486, 5524, 5525, 5528, 5540, 5621, 5622, 5623, 5624, 5625, 5626, 5627, 5628, 5629, 5630, 5631, 5643, 5644, 5645, 5646, 5647, 5648, 5651
- `\lineyshift` . . . . . **74**, 101, 4431
- `\m` . 595, 3981, 3983, 3987, 3995, 3997, 4005, 4007, 4011, 4019, 4021, 4192, 4294
- `\MessageBreak` . . . . . 14, 2188
- `\middenortheast` . . . 1527, 1567, 1569, 1572, 1576, 1580, 1586, 1595, 1608
- `\middlesouthwest` 1546, 1568, 1570, 1571, 1574, 1582, 1588, 1593, 1602
- `\mmzset` . . . . . 1095, 3281, 5599
- `\month` . . . . . 2057, 4698, 4916
- `\n` . 4192, 4197, 4199, 4209, 4235, 4294, 4299, 4300, 4301, 4309, 4333
- `\NeedsTeXFormat` . . . . . 4
- `\newcommand` . . . . . 740, 781, 782, 786, 806, 837, 846, 850, 854, 903, 937, 940, 949, 952, 955, 960, 1356, 1432
- `\newcounter` 1153, 1154, 1155, 1156, 1157, 1158, 1159, 1160, 1161, 1162, 1163, 1164, 1165, 1166, 1167, 1168, 1169, 1170, 1171, 1172
- `\newdimen` 1114, 1115, 1116, 1118, 1119, 1120, 1121, 1122, 1123, 1124, 1125, 1126, 1127, 1128, 1129, 1130, 1131, 1132, 1133, 1134, 1135, 1136, 1137, 1138
- `\NewDocumentCommand` . . . . . 745, 756, 767, 790, 797, 815, 826, 860, 880, 909, 918, 962, 1062, 1467, 1626, 4659, 4678, 4686, 4770, 4904, 4987, 5032, 5059, 5108, 5147, 5194, 5284, 5290, 5347, 5382, 5452, 5482, 5516
- `\NewDocumentEnvironment` . . . . . 3404
- `\newif` . . . . . 21, 1173, 1175, 1177, 1179, 1181, 1183, 1185, 1187, 1189, 1191, 1193, 1195, 1197, 1199, 1201, 1203, 1205, 1207, 1209, 1211, 1213, 1215, 1217, 1219, 1221, 1223, 1225, 1227, 1229, 1231, 1233, 1235, 1237, 1238, 1239, 1241, 1243, 1245, 1247, 1249, 1251, 1253, 1255, 1257, 1259, 1261, 1263, 1265, 1267, 1269, 1271, 1273, 1275, 1277, 1279
- `\newlength` 1103, 1104, 1105, 1106, 1107, 1108, 1109, 1110, 1111, 1112, 1113
- `\node` . . . 1472, 3695, 3702, 3711, 3720, 4068, 4076, 4176, 4257, 4264, 4386, 4392, 4399, 4405, 4509, 4513, 4549, 4551, 4562, 4564, 4579, 4585, 4589, 4596, 4610, 4614, 4622, 4629, 4879, 5044, 5051, 5093, 5096, 5099, 5138, 5164, 5174, 5275, 5547, 5558, 5566
- `\noexpand` . . . . . 1617, 1618, 1619
- `\normalfont` . . 3306, 3307, 3308, 5747, 5748, 5749, 5814, 5815, 5816
- `\normalsize` . . . . . 3308, 5816
- `\northeast` . . . . . 1610
- `\orig@settodim` . . . . . 1292, 1302
- `\PackageError` . . . . . 11, 2187, 3428
- `\PackageInfo` 3534, 3539, 3545, 3555, 3827, 3843, 3851, 4700, 4918
- `\PackageWarning` 966, 970, 974, 978, 982, 986, 990, 994, 998, 1002, 1006, 1010, 1014, 1018, 1022, 1026, 1030, 1034, 1038, 1042, 1046, 1050, 1054, 1058, 3442, 3475, 3596, 3742, 3750, 3761, 3766, 3888, 3900, 3952, 4446, 4450, 4454, 4458, 4466, 4471, 4481, 4680, 5037, 5211, 5400, 5412
- `\parhad` . . . . . 103, 4904, 5623
- `\patchcmd` . . . . . 1294
- `\path` . . . . . 3642, 3643, 3662, 3668, 3691, 4089, 4093, 4184, 4186, 4195, 4203, 4212, 4227, 4231, 4238, 4277, 4287, 4296, 4303, 4311, 4325, 4329, 4335, 4516, 4854, 4858, 5070, 5083, 5088, 5385, 5489, 5494, 5501, 5507, 5532, 5577, 5579, 5868, 5926, 6049, 6119, 6194
- `\pgf@marshal` . . . . . 1617, 1621
- `\pgf@process` . . 1574, 1576, 1580, 1582, 1586, 1588, 1593, 1595, 1621
- `\pgf@relevantforpicturesizefalse` . . 4524
- `\pgf@sh@anchor` 1567, 1568, 1569, 1571, 1573, 1579, 1585, 1592
- `\pgf@sh@anchorborder` . . . . . 1599
- `\pgf@sh@savdanchor` . . . . . 1527, 1546
- `\pgf@sm@shape@name` . . . . . 1526
- `\pgf@x` 1528, 1530, 1532, 1533, 1535, 1547, 1549, 1551, 1552, 1554, 1569, 1570, 1571, 1572, 1575, 1577, 1581, 1583, 1600, 1606, 1612, 1614, 1621
- `\pgf@xa` . . 1569, 1570, 1571, 1572, 1575, 1577, 1581, 1583, 1606, 1612, 1615, 1621
- `\pgf@xb` . . 1531, 1532, 1533, 1550, 1551, 1552, 1600, 1618
- `\pgf@xc` 1529, 1530, 1548, 1549, 1614, 1615, 1619

- \pgf@y 1536, 1538, 1540, 1541, 1543, 1544, 1555, 1556, 1558, 1560, 1561, 1563, 1564, 1565, 1587, 1589, 1590, 1594, 1596, 1597, 1600, 1606, 1613, 1614, 1621
- \pgf@ya . 1587, 1590, 1594, 1597, 1606, 1613, 1616, 1621
- \pgf@yb . . 1539, 1540, 1541, 1559, 1560, 1561, 1600, 1618
- \pgf@yc 1537, 1538, 1557, 1558, 1614, 1616, 1619
- \pgfcalendar datetojulian . . . . . 344
- \pgfcalendarjuliantoweekday . . . . . 752, 763
- \pgfcalendarmonthname . . . . . 247
- \pgfcalendarmonthshortname . . . . . 245
- \pgfcalendarweekdayname . . . . . 243
- \pgfcalendarweekdaysshortname . . . . . 241
- \pgfdeclarelayer . . . . . 1486
- \pgfgetlastxy 4204, 4228, 4232, 4304, 4326, 4330, 5386, 5533, 5578, 5580
- \pgfinterruptpicture . . . . . 1296
- \pgfkeys . . 536, 1480, 1814, 1818, 1822, 1826, 1830, 1834, 1843, 1848, 1861, 2045, 5603
- \pgfkeysalso . . . . . 1851
- \pgfkeysalsofrom . . . 5068, 5131, 5168, 5268, 5550
- \pgfkeyscurrentname . . . . . 1850
- \pgfkeyscurrentpath . . . . . 1768, 1772, 1773, 1774, 1775, 1779, 1785, 1791, 1795, 1799, 1803, 1807, 1813, 1815, 1840, 1844, 1849, 1862, 2045
- \pgfkeysdef 1768, 1772, 1773, 1774, 1775, 1779, 1840, 2224, 2227
- \pgfkeysdefargs 1785, 1791, 1795, 1799, 1803, 1807
- \pgfkeysfiltered . . . . . 1744, 1746
- \pgfkeysvalueof 1529, 1531, 1537, 1539, 1548, 1550, 1557, 1559
- \pgflinewidth . . . . . 5678
- \pgfmathparse . 1769, 1776, 1780, 1786, 1788, 1804, 1805, 1808, 1809, 2894, 2903, 3884, 3897, 3949, 4125, 4133
- \pgfmathresult 1770, 1777, 1781, 1787, 1789, 1804, 1805, 1808, 1809, 2895, 2896, 2904, 2905, 3887, 3890, 3898, 3950, 3956, 3959, 3961, 3962, 3963, 4126, 4134, 4138
- \pgfmathsetcounter . 3731, 3732, 3733, 3881, 3896, 3973
- \pgfmathsetlength . . 1529, 1531, 1537, 1539, 1548, 1550, 1557, 1559, 3550, 3558, 5072, 5073, 5074
- \pgfmathsetmacro . . 3634, 3638, 3870, 3910, 3916, 3924, 4059, 4116, 4225, 4323, 4363, 4703, 4706, 4709, 4781, 4921, 4924, 4927
- \pgfnodeparttextbox 1528, 1535, 1536, 1543, 1544, 1547, 1554, 1555, 1556, 1564, 1565
- \pgfonlayer . . . . . 1515
- \pgfpoinborderrectangle . . . . . 1617
- \pgfqkeys . . . . . 536, 537, 621, 623, 627, 632, 637, 651, 664, 682, 685, 688, 695, 715, 724, 731, 1484, 1510, 1632, 1636, 1638, 1644, 1646, 1652, 1654, 1660, 1662, 1667, 1668, 1669, 1670, 1671, 1672, 1673, 1674, 1676, 1678, 1679, 1681, 1684, 1686, 1687, 1693, 1694, 1695, 1696, 1698, 1701, 1704, 1706, 1707, 1708, 1709, 1711, 1714, 1717, 1739, 1752, 1754, 1758, 1760, 2040, 2047, 2051, 2103, 2112, 2131, 2140, 2225, 2228, 2239, 2240, 2244, 2245, 2258, 2260, 2262, 2264, 2266, 2268, 2270, 2287, 2291, 2428, 2473, 2484, 2515, 2520, 2524, 2531, 2562, 2572, 2583, 2594, 2605, 2662, 2668, 2675, 2682, 2713, 2762, 2767, 2774, 2777, 2788, 2792, 2805, 2809, 2822, 2826, 2839, 2843, 2882, 2929, 2934, 2968, 2976, 2979, 3012, 3047, 3050, 3090, 3093, 3098, 3101, 3287, 3466, 3467, 3468, 3469, 3479, 3480, 3481, 3483, 3565, 4061, 4141, 4150, 4375, 4438, 4503, 4505, 4522, 4525, 4660, 5116, 5119, 5253, 5260, 5529, 5541, 5657
- \pgfqpoint . . . . . 1618, 1619
- \pgfresetboundingbox . . . . . 3690
- \pgfsetlayers . . . . . 414
- \pgfutil@empty . . . . . 1516, 2923
- \pgfutil@tempboxa . . . . . 2919, 2920
- \pgfutil@voidbox . . . . . 2919
- \phantom 4074, 4084, 4271, 4389, 4394, 4402, 4407
- \pi . 1140, 1141, 1142, 1146, 3470, 3533, 3538, 3544, 3553, 3554, 3566, 3594, 4053, 4054, 4065, 4086, 4189, 4252, 4290, 4351, 4462
- \plstyle . . . . . 102, 5643, 5893, 5895, 5901
- \pretocmd . . . . . 4724, 4835, 5001, 5418, 5421
- \prideitl . . . . . 5108
- \prifdeitl . . . . . 5108, 5627
- \ProcessKeyOptions . . . . . 47
- \ProcessKeysOptions . . . . . 50
- \prop\_concat:NNc . . . . . 508
- \prop\_concat:NNN . . . . . 504
- \prop\_get:cnNTF . . . 440, 454, 469, 482, 494
- \prop\_map\_function:NN . . . . . 510, 516
- \prop\_new:N 111, 112, 113, 114, 115, 116, 117, 118
- \prop\_put:cn . . . . . 424, 435, 447, 461, 476
- \prop\_put:cnV . . . . . 445, 459, 474
- \prop\_put:Nnn . . . . . 428, 489, 501
- \prop\_put:NnV . . . . . 487, 499
- \prop\_put\_from\_keyval:Nn . . . . . 430
- \prop\_set\_eq:NN . . . . . 507, 509, 515
- \prop\_show:c . . . . . 528
- \prop\_show:N . 522, 523, 524, 525, 526, 533
- \protect . . . . . 967, 971, 975, 979, 983, 987, 991, 995, 999, 1003, 1007, 1011, 1015, 1019, 1023, 1027, 1031, 1035, 1039, 1043, 1047, 1051, 1055, 1059



- \providecolor 3492, 3493, 3495, 3496, 3498, 3499, 3501, 3503, 3505, 3507, 3509, 3511, 3513, 3515, 3517, 3519, 3521, 3523, 3525, 3527, 3529, 5639, 5640, 5641, 5642
- \providecommand ..... 44, 55
- \ProvideDocumentCommand ..... 5632
- \ProvidesPackageSVN ..... 2, 5656, 6223
- \q\_stop 204, 207, 211, 227, 230, 337, 339, 357, 361
- \regex\_const:Nn .... 119, 120, 121, 125, 126
- \regex\_match:NnTF ..... 330
- \regex\_match:NVTF ..... 335
- \regex\_replace\_all:NnN 334, 385, 399, 403
- \regex\_replace\_all:nnN 443, 457, 472, 485, 497
- \regex\_replace\_once:nnN 444, 458, 473, 486, 498
- \relax ..... 1627, 1628, 1629, 1630, 3598, 3601, 3625, 3631, 3645, 3646, 3840, 3872, 3898, 3950, 4057, 4107, 4126, 4134, 4189, 4207, 4233, 4290, 4307, 4331, 4359, 4434, 4436, 4717, 4718, 4726, 4728, 4789, 4825, 4826, 4838, 4935, 4936, 4944, 4946, 5013, 5334, 5387, 5390, 5403, 5407, 5411, 5427, 5522
- \renewcommand ..... 1627, 1628, 1629, 1630
- \RequirePackage . 1, 7, 49, 54, 59, 60, 3403, 5655, 6222
- \resetcolorseries ..... 6246, 6247
- \revinfo ..... 2, 5656, 6223
- \rmfamily ..... 5803, 5805
- \s ..... 119, 123, 124
- \scoped . 580, 4507, 4878, 5546, 5557, 5587, 6077
- \scriptsize . 2434, 3364, 3369, 3377, 5753, 5805, 5843, 5939, 5999, 6063, 6130, 6167
- \scshape 2434, 3340, 3364, 3369, 5649, 5755, 5756, 5757
- \searchname ... 1850, 1852, 1853, 1854, 1855
- \selectcolormodel ..... 5767, 5904
- \seq\_get\_left:NN ..... 604
- \seq\_get\_right:NN ..... 605
- \seq\_if\_in:NnF ..... 857
- \seq\_if\_in:NnTF ..... 852
- \seq\_new:N ..... 127, 128
- \seq\_put\_right:Nn ..... 842
- \seq\_set\_split:Nnn ..... 603
- \seq\_show:N ..... 848
- \setbox ..... 1294, 1296, 2919
- \setcounter ... 345, 3446, 3447, 3448, 3735, 3878, 3890, 3926, 3928, 3938, 3964, 5040
- \setlength 3611, 3612, 4205, 4229, 4305, 4327, 5352, 5354, 5359, 5361, 5368, 5370, 5375, 5377
- \settowidth ..... 3622, 3628, 3710, 3719
- \sffamily 1287, 1288, 1289, 5670, 5671, 5672, 5686, 5692, 5695, 5698, 5800, 5801, 5814, 5815, 5816, 5832, 5841, 5843, 5849, 5857, 5881, 5882, 5883, 5893, 5895, 5901, 5937, 5939, 5963, 6017, 6021, 6040, 6063, 6074, 6149, 6152, 6164, 6167, 6172
- \show 964, 3232, 3460, 3461, 3462, 3463, 3464
- \sishape ..... 102, 5643
- \small . 5670, 5695, 5748, 5755, 5756, 5757, 5803, 5814, 5832, 5893, 5949, 6024, 6027, 6149, 6164
- \southwest ..... 1604
- \stepcounter 3736, 3864, 3867, 3965, 3999, 5042
- \str\_case:nnF ..... 520
- \str\_uppercase:n ..... 391
- \svnauthor ..... 75, 5220, 5222, 5224
- \svnFullAuthor ..... 75, 5221, 5222
- \svnyear ..... 5231, 5232
- \tempa . 1730, 1732, 2048, 2049, 3734, 3860, 3861, 3862, 3865, 3868, 5308, 5309
- \tempb .. 1731, 1732, 2048, 2049, 5308, 5309
- \testunteitl ..... 577, 595, 608, 1466
- \textbar ..... 4389, 4394, 4402, 4407
- \textbullet .. 4569, 4594, 4601, 4619, 4627, 4634
- \textcopyleft ..... 5204
- \textcopyright ..... 5206
- \textsc ..... 1284, 1285, 3396, 3397
- \textsi ..... 102, 5643
- \textsuperscript ..... 609
- \textui ..... 102, 5643
- \textwidth ..... 1117
- \the ..... 1528, 1618, 1619
- \thechronos@date ..... 345
- \thechronos@digdate ..... 4782
- \thechronos@enddate 3441, 3447, 3636, 3639, 3984, 3996, 4008, 4020, 4027
- \thechronos@endmonth ..... 4023
- \thechronos@endyear 3858, 3869, 3887, 3911, 3912, 3917, 3918, 3932, 3935, 3938, 3942, 3970, 3998, 4007, 4013, 4017, 4022, 4023, 4027, 4035, 4045, 4050, 4224, 4226, 4250, 4322, 4324, 4348
- \thechronos@genidate ..... 4704
- \thechronos@marwdate ..... 4707
- \thechronos@otherthingdate ..... 4925
- \thechronos@startdate .. 3441, 3446, 3636, 3639, 4026, 4059, 4364, 4704, 4707, 4782, 4922, 4925
- \thechronos@startmarkyear ..... 3871, 3876, 3882, 3885, 3897, 3911, 3913, 3917, 3919, 3931, 3934, 3935, 3942, 3944, 4026, 4035, 4045, 4099, 4113
- \thechronos@startyear . 3858, 3869, 3939, 3970, 3983, 3989, 3993, 3998, 4022, 4023, 4050

- `\thechronos@tempadate` . 3984, 3989, 3993, 3996, 4008, 4013, 4017, 4020, 4364  
`\thechronos@tempcnta` . . . 3448, 4034, 4043  
`\thechronos@tempcntb` . . . 3946, 3966, 3975, 3979, 4039  
`\thechronos@tempcntc` 3974, 4000, 4001, 4003  
`\thechronos@theori@countanchors` . . 5046, 5048, 5051, 5052  
`\thechronos@thingdate` . . . . . 4922  
`\thechronos@tmpstartmonth` . . . . . 4023  
`\thechronos@weekday` . . . . . 241, 243  
`\thechronos@yeardate` . . . . . 4037, 4048  
`\theori` . . . . . 4987, 5625  
`\thinspace` . . 2092, 2093, 2098, 2100, 2758, 2760, 3086, 3088, 6146  
throwaway definition  
`\tempa†` . . . . . 101  
`\tikz@addoption` . . . . . 2922  
`\tikz@installcommands` . . . . . 1298  
`\tikz@options` . . . . . 1516, 1518  
`\tikz@postactions` . . . . . 2925  
`\tikz@preactions` . . . . . 2924  
`\tikz@shape` . . . . . 2923  
`\tikz@uninstallcommands` . . . . . 1301  
`\tikz@whichbox` . . . . . 2920  
`\tikzset` . 1512, 1517, 1623, 1766, 2472, 2490, 2492, 3040, 3069, 4698, 4780, 4916, 4997, 5065, 5113, 5154, 5201  
`\timelineborderht` . . . . . 44, 101, 4429  
`\timelineht` 43, 101, 2282, 3659, 5865, 5866, 5868, 5920, 5923, 5924, 5925, 5926, 5928  
`\timelinewd` . . . . . 44, 101, 4430  
`\tiny` . . . . . 6040  
`\tl_clear:N` . . . . . 794, 801  
`\tl_count:n` . . . . . 190, 218, 379  
`\tl_if_empty:Nf` . . . . . 773  
`\tl_new:N` 129, 130, 131, 132, 133, 134, 135, 139, 140, 141, 142  
`\tl_replace_all:Nnn` . . . 236, 315, 321, 327  
`\tl_replace_all:Nnx` 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 269, 271, 273, 275, 277, 279  
`\tl_set:Nn` 136, 137, 138, 314, 320, 326, 383, 396, 442, 456, 471, 484, 496, 793, 800  
`\tl_set:No` . . . . . 381, 772  
`\tl_set:Nx` . . . . . 333  
`\tl_set_eq:NN` . . . . . 239, 268  
`\tl_show:N` . . . . . 906  
`\tlstyle` . 102, 5643, 5881, 5882, 5883, 5937, 5939  
`\today` . . . . . 5234  
`\TrimSpaces` . . . . . 3404  
`\u` . . . . . 444, 458, 473, 486, 498  
`\uishape` . . . . . 102, 5643, 5752, 5753  
`\undef` . . . . . 102  
`\Undefine` 102, 1014, 2532, 4688, 4689, 4690, 4691, 4692, 4693, 4694, 4695, 4696, 4772, 4773, 4774, 4775, 4776, 4777, 4778, 4906, 4907, 4908, 4909, 4910, 4911, 4912, 4913, 4914, 4989, 4990, 4991, 4992, 4993, 4994, 4995, 5061, 5062, 5063, 5064, 5111, 5112, 5149, 5150, 5152, 5153, 5197, 5198  
`\upshape` 5647, 5648, 5881, 5882, 5883, 5901  
`\url` . . . . . 267  
use of Welsh  
`\byw` . . . . . 101  
`\cylchtheori` . . . . . 101  
`\digwyddiad` . . . . . 101  
`\gwybodaeth` . . . . . 101  
`\parhad` . . . . . 101  
`\prifdeitl` . . . . . 101  
`\theori` . . . . . 101  
`\usetikzlibrary` . . . . . 61, 64, 66  
`\value` . 3735, 3737, 3772, 3775, 3778, 3781, 3784, 3787, 3790, 3793, 3825, 3830, 3833, 5043, 5340  
`\wd` . . . . . 1528, 1535, 1547, 1554  
`\xdef` . . . . . 4100, 4157  
`\xglobal` . 5186, 5187, 5188, 5442, 5443, 5444, 5449  
`\xx` . . . . . 5049, 5053  
`\xx:` . . . . . 5041  
`\year` . . . . . 2057, 4698, 4916  
`\z` . . . . . 444, 458, 486

## N

## NODES:

- caption  
as component of info . . . . . 66  
caption *<name>*  
as component of info . . . . . 66  
chronos connector leslie lamport† . . . 61  
chronos connector *<name>*  
as component of event . . . . . 64  
as component of life and period . . . . . 63  
chronos year *-<YYYY>* . . . . . 48  
chronos year *<YYYY>* . . . . . 48  
connector leslie lamport0† . . . . . 61  
connector leslie lamport1† . . . . . 61  
connector *<name>n*  
as component of event . . . . . 64  
as component of life and period . . . . . 63  
as component of theory . . . . . 65  
label above *<name>*  
as component of theory circle . . . . . 65  
label below *<name>*  
as component of theory circle . . . . . 65  
level *-2†* . . . . . 68  
level *1†* . . . . . 61  
main connector  
as component of theory . . . . . 65  
main connector leslie lamport† . . . . . 61

main connector $\langle name \rangle$		
as component of event	64	
as component of life and period	63	
as component of theory	65	
$\langle name \rangle$		
as component of copyleft and copyright	67	
as component of main/main title	66	
as component of theory circle	65	
tag leslie lamport†	61	
tag $\langle name \rangle$		
as component of event	64	
as component of info	66	
as component of life and period	63	
as component of theory	65	
text tag		
as component of copyleft/copyright	67	
as component of info	66	
as component of main	66	
as component of theory	65	
text tag connector		
as component of theory	65	
u1†	61	
<b>P</b>		
PACKAGE OPTIONS:		
no simple color names	10	
no simple colour names	10	
simple color names	10	
simple colour names	10	
PACKAGES:		
calc	10	
chronos	1	
adjustments required of styles	93	
chronos-lib-colschemes	10	
chronos-lib-styles	10	
dependencies	10	
fallback macro definitions	102	
incorrect assignment of colour names	93	
internal macro names	101, 101	
internal macros conditionally defined	101	
internal macros defined locally	101	
memoize-ready	84	
replacements for etoolbox macros	102	
typesetting a timeline†	5	
chronos-lib-colschemes	10	
chronos-lib-styles	10, 91	
chronosys	1	
etoolbox	10, 102	
as dependency	101	
compatibility of chronos replacements	101	
macros with chronos analogues	102	
expl3	10, 29, 102	
fp	10	
memoize	84	
compatibility	101	
PGF	1	
pgfcalendar	38	
pgfcalendar	10	
pgfkeys	31	
pgfmath		
$\langle value \rangle'$ + not parsed by	33	
$\langle value \rangle'$ - not parsed by	34	
$\langle value \rangle'$ not parsed by	33	
pgfmath	33	
$\langle value \rangle$ parsed by	33	
$\langle value \rangle$ + parsed by	33	
$\langle value \rangle$ - parsed by	34	
svn-prov	10	
TikZ	1	
tikz	10	
xcolor	10	
xparse	10	
PGF/TIKZ LIBRARIES:		
arrows		
compatibility	101	
arrows.meta	10	
compatibility	101	
backgrounds	15	
backgrounds	10	
calc	10	
decorations.text	10	
external		
cf. memoize	84	
incompatibility	84	
fit	10	
fixedpointarithmetic	10	
positioning	10	
shadows	10	
PROGRAMMES:		
perl	84	
python	84	
<b>S</b>		
STYLES:		
$\langle tag \rangle$ /title lines	75	
chronos connect	82	
chronos create chronos connector	82	
chronos create text tag connector	82	
chronos mark line	82	
chronos text tag	83	
custom		
tag left†	1, 96	
tag post†	1, 96, 97	
tag right†	1, 96	
event date split	78	
event year on line	50	
matching connection	58	
on chronos background layer	12	
on chronos background layer	83	
on chronos foreground layer	12	
on chronos foreground layer	83	
on chronos middle ground layer	83	

on chronos overlay layer	97
on chronos overlay layer	<b>83</b>
placeholder lines	<b>97</b>
show coord	98
show coord	<b>98</b>
show coordinate	<b>98</b>
show node coord	98
show node coord	<b>98</b>
tag right	96
timeline/era switch off line	<b>50</b>

## T

## TAGS:

-specific settings	
activated by installation under /chronos	96
copyleft	<b>66, 66</b>
copyright	<b>66, 66</b>
event	<b>63</b>
info	<b>66</b>
life	<b>61</b>
main	<b>66</b>
period	<b>64</b>
theory	<b>64</b>
theory circle	<b>65</b>
copyleft	78
as lacking connectors	9
at mandatory	67
availability of keys	66
components of	67
configuration, global	76
configuration, local	67
configuration, local/global	72
create element of tag type	67
default name	67
elements belonging to	14
options (summary)	62
use of name in content of	67
copyright	78
as lacking connectors	9
at mandatory	67
availability of keys	66
components of	67
configuration, global	76
configuration, local	67
configuration, local/global	72
create element of tag type	66
default name	67
elements belonging to	14
options (summary)	62
use of name in content of	67
event	
as connectable to other elements	82
as primary element	12
as supporting connectors	9
assignment of colours to elements of tag type	58
at optional	67
availability of keys	63
chronos connector	64
colour lists for colour rotation	58
colour rotation	58, 93
colour rotation (above)	60
colour rotation (below)	60
colours, using	82
components of	64
configuration, global	76, 81
configuration, local	67
configuration, local/global	72
connection	64
connectors	64
connectors, creating additional	68
create element of tag type	63
date	70
date formatting	36
default placement (lines on line)	21
<i>Diamond Sutra</i> †	6
effect of colour scheme in <i>chronoleg</i> †	17
effect of simple colour names on	10
holistic treatment of configuration	79
<i>Jikji</i> †	6
last position set globally	30
line	64
main connector	64
no style	79
options (summary)	62
plain arrow†	24
point connected to timeline	68
Publication of <i>Diamond Sutra</i> †	7
split text tags	78
split text tags, style	78
style for elements of type	21
styles, using	82
support for event years on line	46
text tag	64
text tag connector	64
use of name in content of	67
use of single date for placement	14
info	
as case of colour assignment without colour rotation	93
as lacking connectors	9
as primary element	12
as standalone	14
assignment of colours to elements of tag type	58
at mandatory	67
availability of keys	66
colours, using	82
components of	66
configuration, global	76, 82
configuration, local	67
configuration, local/global	72
create element of tag type	66
effect of simple colour names on	10

- options (summary) . . . . . 62
- setting caption . . . . . 71
- style of caption . . . . . 75
- styles, using . . . . . 82
- use of `name` in content of . . . . . 67
- life
  - as connectable to other elements . . . . . 82
  - as basis for levels . . . . . 6, 54
  - as example of tag context . . . . . 59
  - as prefix† . . . . . 32
  - as primary element . . . . . 12
  - as supporting connectors . . . . . 9
  - assignment of colours to elements of tag type 58
  - at optional . . . . . 67
  - availability of keys . . . . . 61
  - Bi Sheng† . . . . . 7
  - chronos connector . . . . . 63
  - colour lists for colour rotation . . . . . 58
  - colour names assigned to `donald knuth`† 58
  - colour rotation . . . . . 58
  - colour rotation (above) . . . . . 60
  - colour rotation (below) . . . . . 60
  - colours of the rainbow† . . . . . 58
  - colours, using . . . . . 82
  - components of . . . . . 63
  - configuration, global . . . . . 76, 81
  - configuration, local . . . . . 67
  - configuration, local/global . . . . . 72
  - connection . . . . . 63
  - connectors . . . . . 63
  - connectors, creating additional . . . . . 68
  - create element of tag type . . . . . 61
  - date formatting . . . . . 36
  - date ranges . . . . . 36
  - date specifications, equivalent . . . . . 70
  - `dates` . . . . . 70
  - default placement (`lines on line`) . . . . 21
  - Donald Knuth† . . . . . 7
  - effect of `simple colour names` on . . . . . 10
  - highlighted by colour scheme in `chronolog`† 17
  - line . . . . . 63
  - main connector . . . . . 63
  - options (summary) . . . . . 62
  - `plain arrow`† . . . . . 24
  - point connected to timeline . . . . . 68
  - split text tags unsupported . . . . . 78
  - styles, using . . . . . 82
  - text tag . . . . . 63
  - text tag connector . . . . . 63
  - use of `name` in content of . . . . . 67
  - use of two dates for placement . . . . . 14
- main
  - at mandatory . . . . . 67
  - availability of keys . . . . . 66
  - components of main title . . . . . 66
  - configuration, global . . . . . 76
  - configuration, local . . . . . 67
  - configuration, local/global . . . . . 72
  - default name for main title . . . . . 67
  - elements belonging to . . . . . 14
  - no associated list of properties . . . . . 99
  - options (summary) . . . . . 62
  - style for main title . . . . . 75
  - use of `name` in content of . . . . . 67
- period
  - as connectable to other elements . . . . . 82
  - as primary element . . . . . 12
  - as supporting connectors . . . . . 9
  - assignment of colours to elements of tag type 58
  - at optional . . . . . 67
  - availability of keys . . . . . 64
  - chronos connector . . . . . 63
  - colour lists for colour rotation . . . . . 58
  - colour rotation . . . . . 58
  - colour rotation (above) . . . . . 60
  - colour rotation (below) . . . . . 60
  - colours, using . . . . . 82
  - components of . . . . . 63
  - configuration, global . . . . . 76, 82
  - configuration, local . . . . . 67
  - configuration, local/global . . . . . 72
  - connection . . . . . 63
  - connectors . . . . . 63
  - connectors, creating additional . . . . . 68
  - create element of tag type . . . . . 64
  - date formatting . . . . . 36
  - date ranges . . . . . 36
  - date specifications, equivalent . . . . . 70
  - `dates` . . . . . 70
  - default placement (`lines on line`) . . . . 21
  - effect of colour scheme in `chronolog`† . . . . 17
  - effect of `simple colour names` on . . . . . 10
  - last position set globally . . . . . 30
  - line . . . . . 63
  - main connector . . . . . 63
  - mandatory keys for completed . . . . . 64
  - mandatory keys for ongoing . . . . . 64
  - options (summary) . . . . . 62
  - `plain arrow`† . . . . . 24
  - point connected to timeline . . . . . 68
  - representation on timeline . . . . . 64
  - split text tags unsupported . . . . . 78
  - styles, using . . . . . 82
  - text tag . . . . . 63
  - text tag connector . . . . . 63
  - use of `name` in content of . . . . . 67
  - use of two dates for placement . . . . . 14
  - `WoOdBlOcK pRiNtInG`† . . . . . 8
  - Woodblock Printing† . . . . . 8
- theory
  - `TEX`† . . . . . 8
  - as connectable . . . . . 64

as connectable to other elements . . . . .	82
as primary element . . . . .	12
as supporting connectors . . . . .	9
assignment of colours to elements of tag type	58
<b>at</b> optional . . . . .	67
availability of keys . . . . .	65
cf. non-connectable elements . . . . .	14
colour rotation . . . . .	58
colours, using . . . . .	82
components of . . . . .	65
configuration, global . . . . .	76, 82
configuration, local . . . . .	67
configuration, local/global . . . . .	72
connecting multiple people to . . . . .	9
connectors, creating additional . . . . .	68
create element of tag type . . . . .	65
<b>cronoleg</b> . . . . .	7
default placement . . . . .	65
effect of simple colour names on . . . . .	10
<b>metafont</b> † . . . . .	58
options (summary) . . . . .	62
styles, using . . . . .	82
text tags dateless . . . . .	67
use of <b>name</b> in content of . . . . .	67
using default colour lists as tag-specific . .	59
<b>theory circle</b>	
as lacking connectors . . . . .	9
as primary element . . . . .	12
as standalone . . . . .	14
<b>at</b> mandatory . . . . .	67
availability of keys . . . . .	65
common style for labels . . . . .	75
components of . . . . .	65
configuration, global . . . . .	76
configuration, local . . . . .	67
configuration, local/global . . . . .	72
configuring base ring . . . . .	80
non-use of <b>name</b> in . . . . .	67
options (summary) . . . . .	62
slowness . . . . .	14