

# chronos

Clea F. Rees\*

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## Abstract

`chronos` is a  $\text{\LaTeX}$  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 T \$\text{\E}\$ X StackExchange](#) or view the PDF.

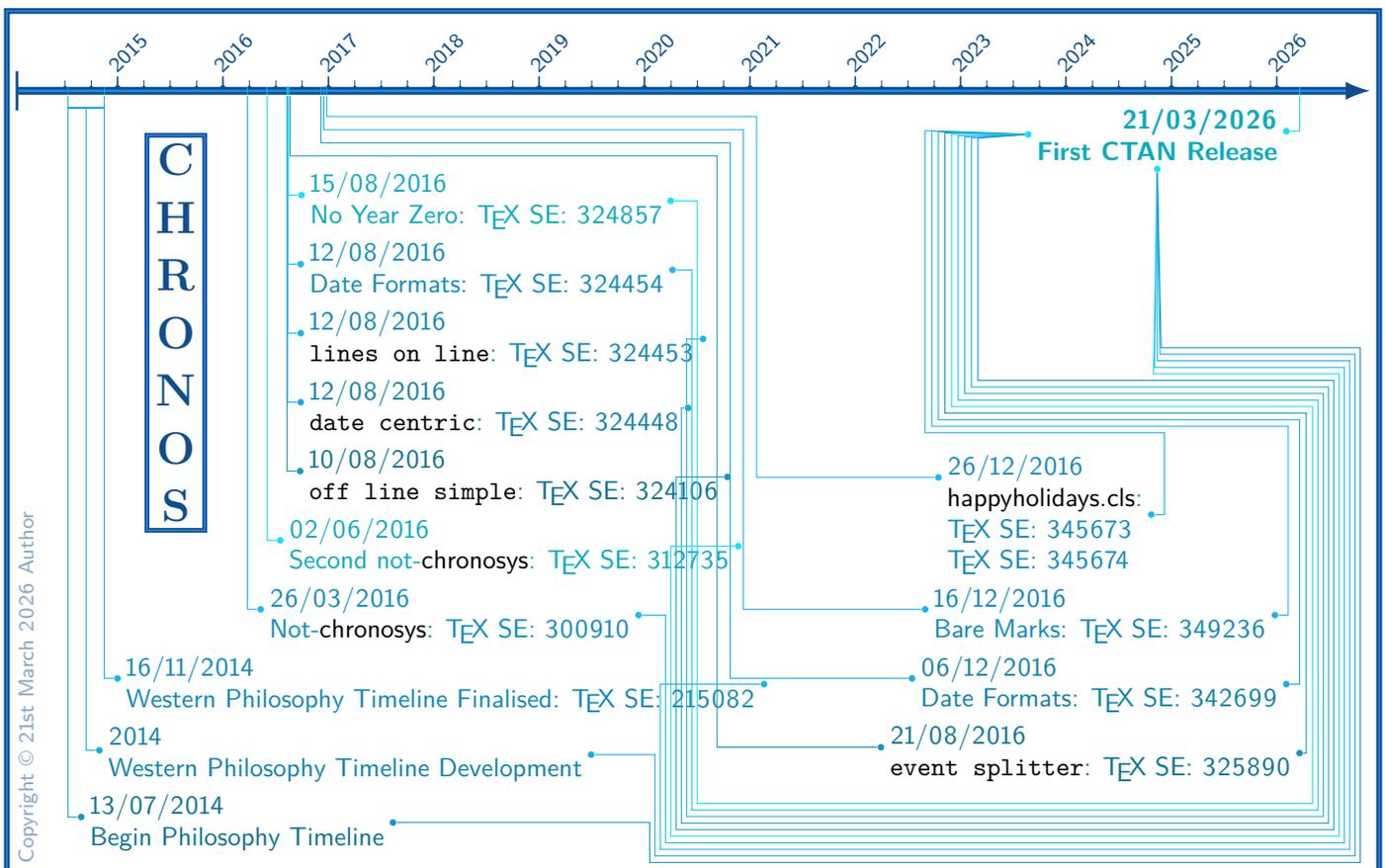


Figure 1: Chronos development: a chronos timeline (sections 6 and 8.4) with chronos style blues below (section 7.1.2) and custom styles tag left, tag post and tag right (section 13.3).

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## 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

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

<sup>3</sup>I am grateful to Martin Scharrer for for this at [TeX StackExchange: 56405](https://tex.stackexchange.com/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,
    step minor year=250,
    step major year=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  $\text{\LaTeX}$  2 $\epsilon$  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  $\text{\LaTeX}$  2 $\epsilon$  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  $\langle\text{chronos preamble}\rangle$ , any prior use of `\chronosset` and fallback defaults.

In addition to configuring the `timeline` itself, the  $\langle\text{chronos preamble}\rangle$  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  $\langle\text{timeline additions specification}\rangle$ . The  $\langle\text{timeline additions specification}\rangle$  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  $\langle\text{timeline additions specification}\rangle$ .

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  $\langle\text{chronos preamble}\rangle$ , 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:



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	✓	✓

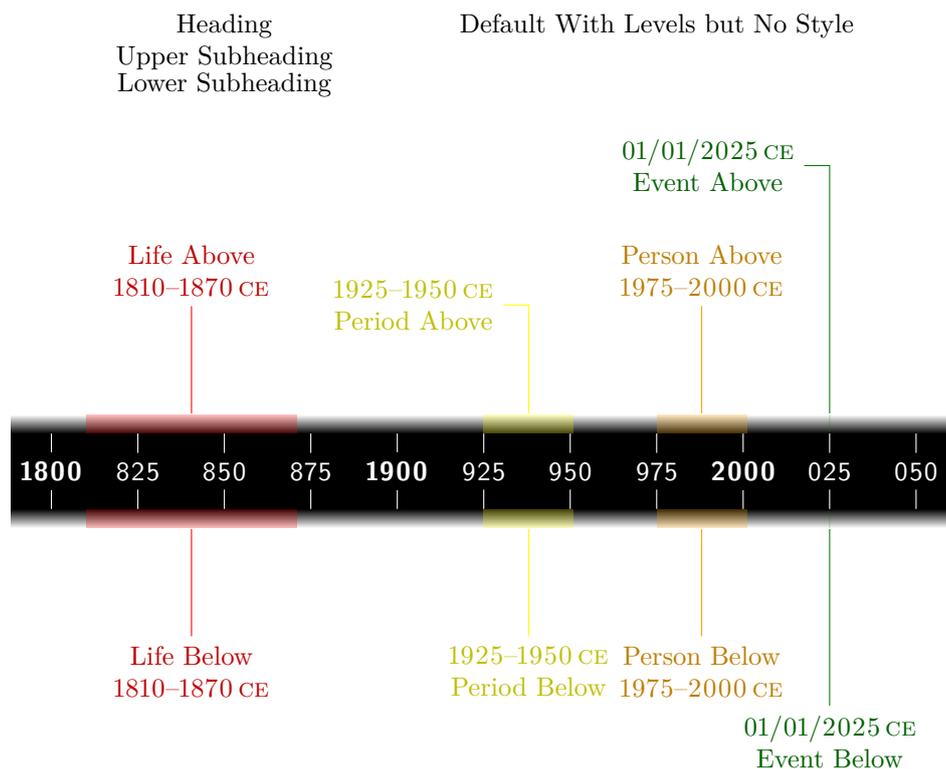


Figure 4: Chronos style: none.

### 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

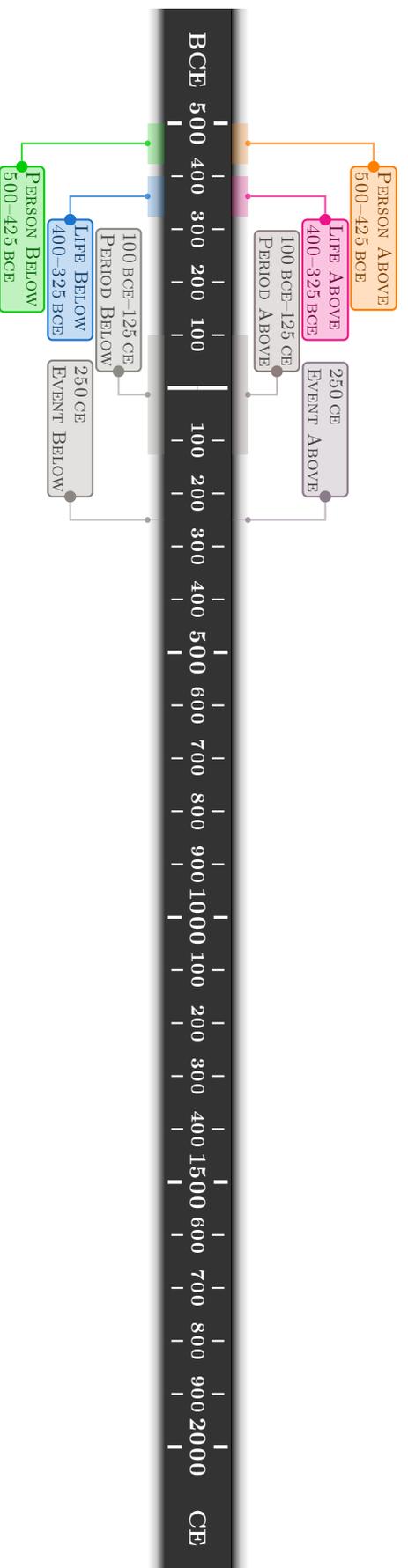


Figure 5: Chronos style: cronoleg.

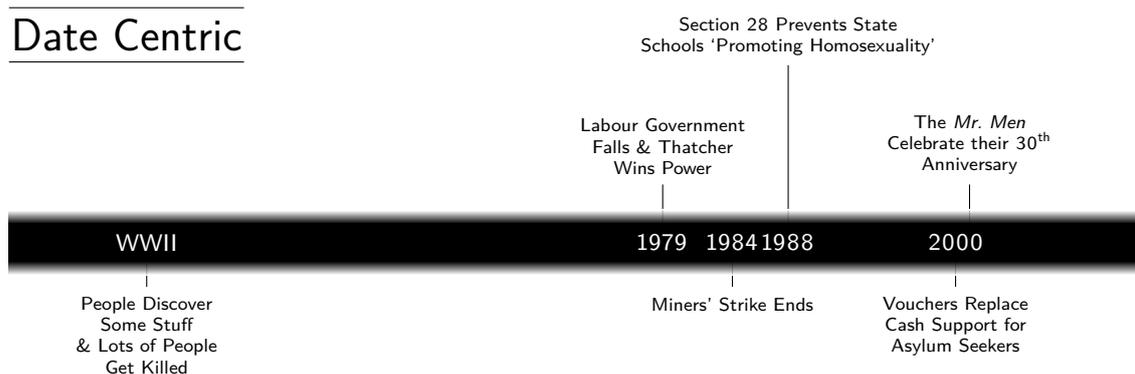


Figure 6: Chronos style: date centric.

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

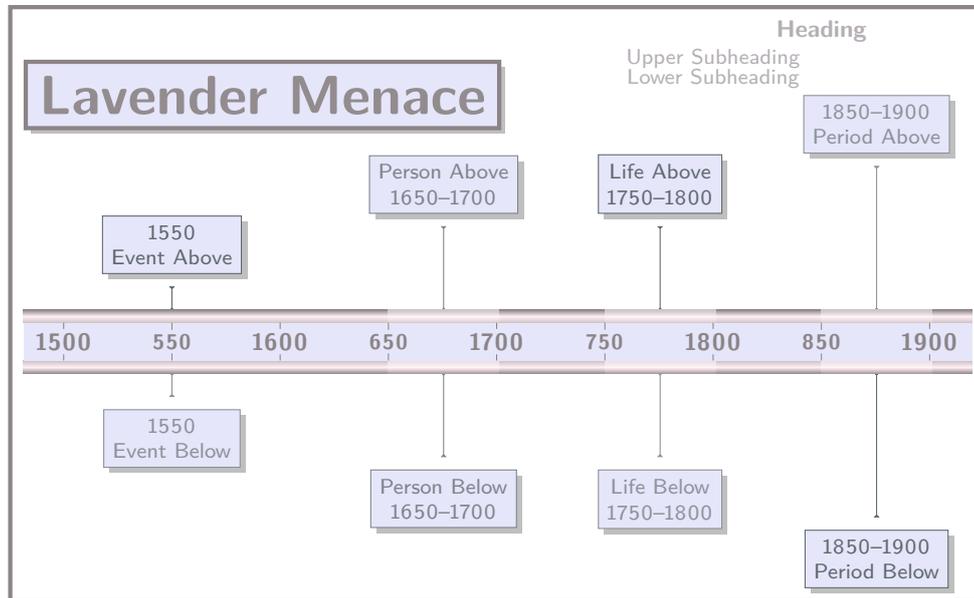
See table 1 and fig. 17.

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

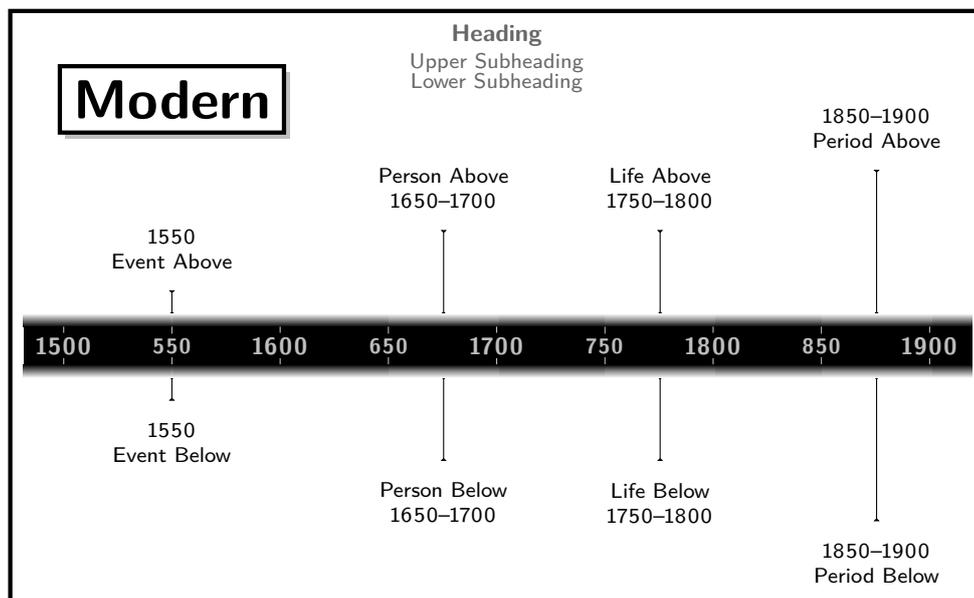
<sup>15</sup>Based on my answer at [TeX StackExchange: 342699](#).

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

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

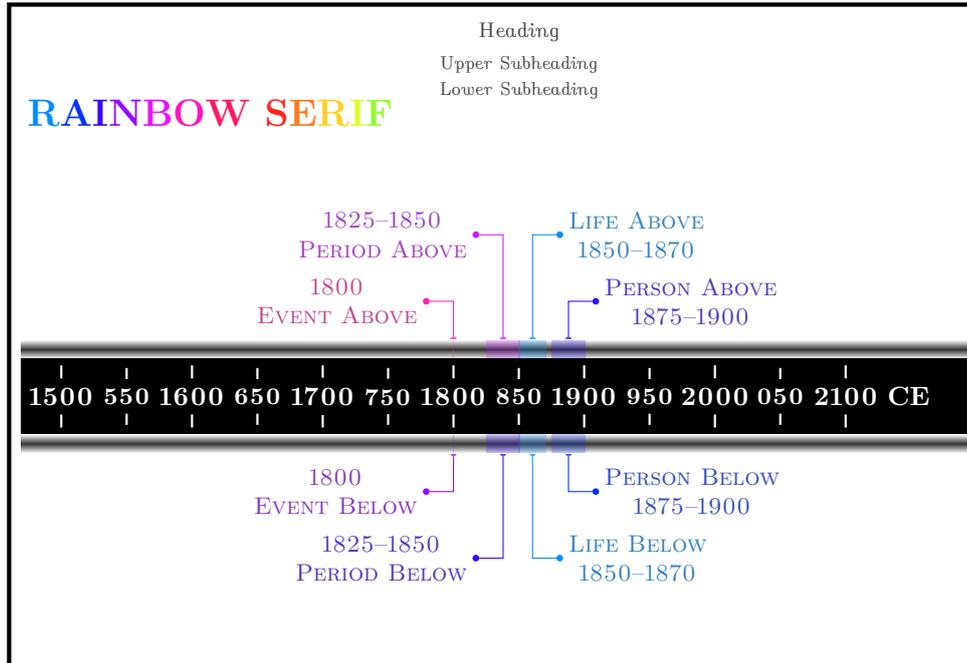


(a) Chronos style: lavender menace

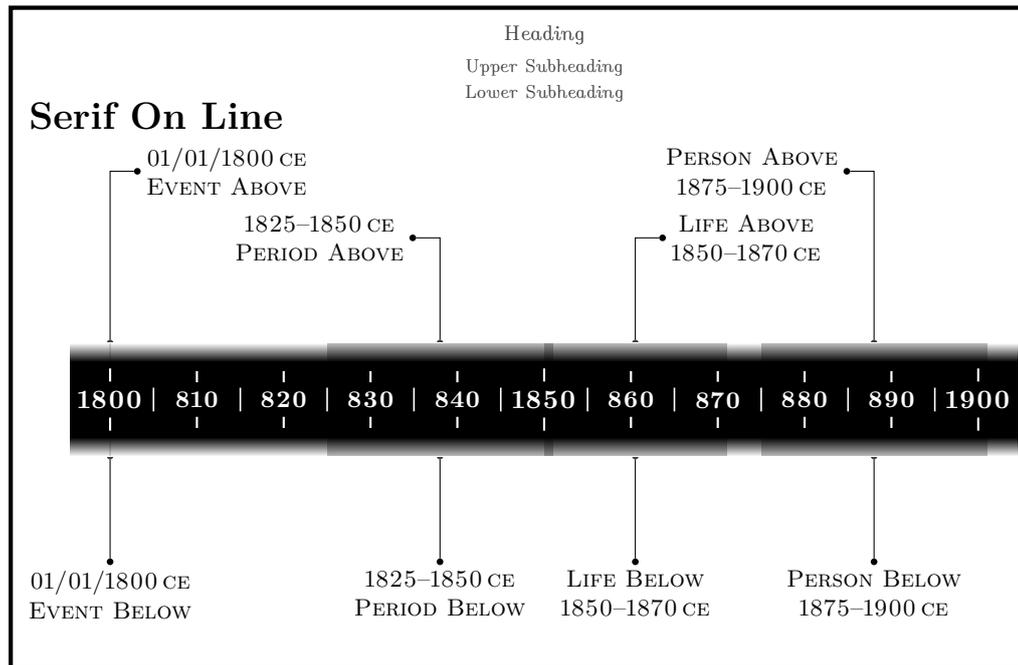


(b) Chronos style: modern

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.

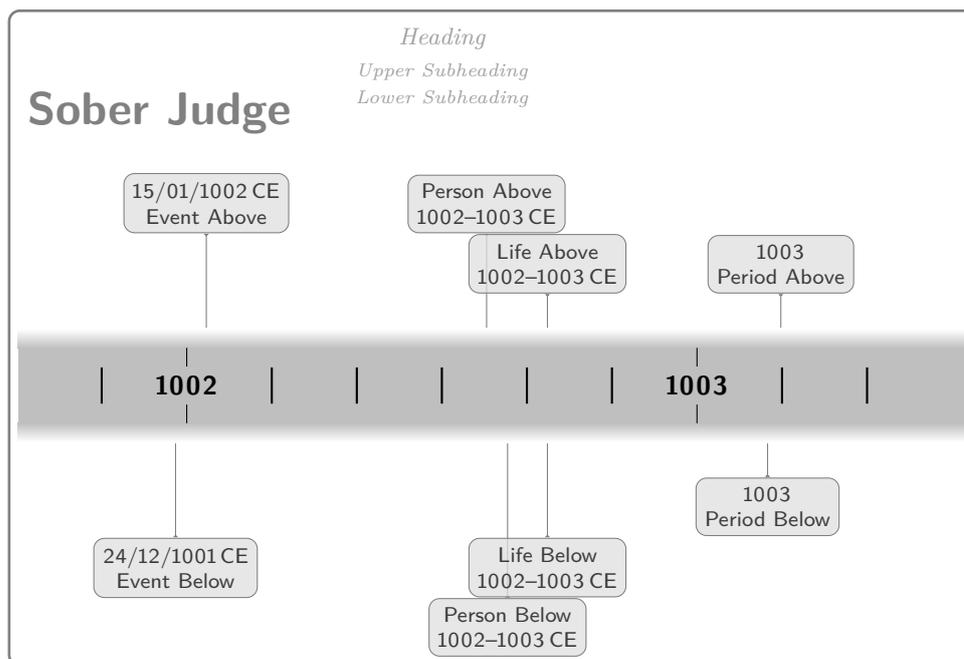


Figure 9: Chronos style: sober judge.

`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 type life and 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.

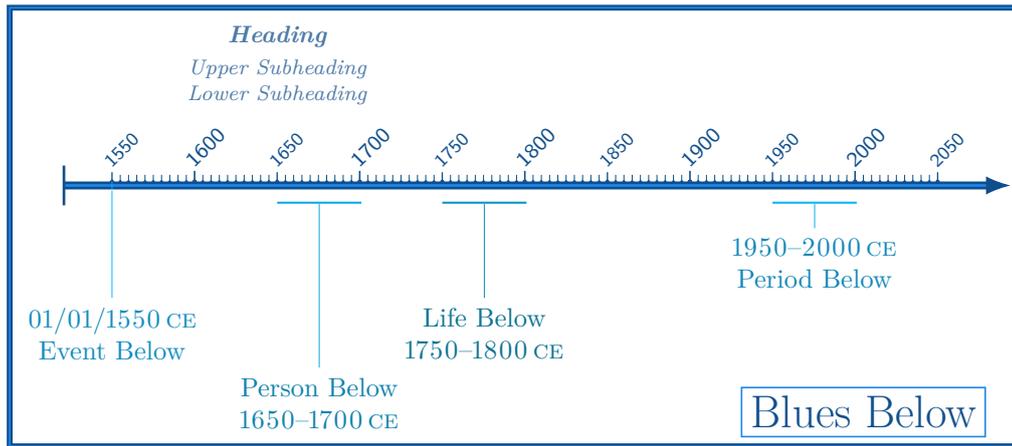
To load a colour schemes, you just write

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

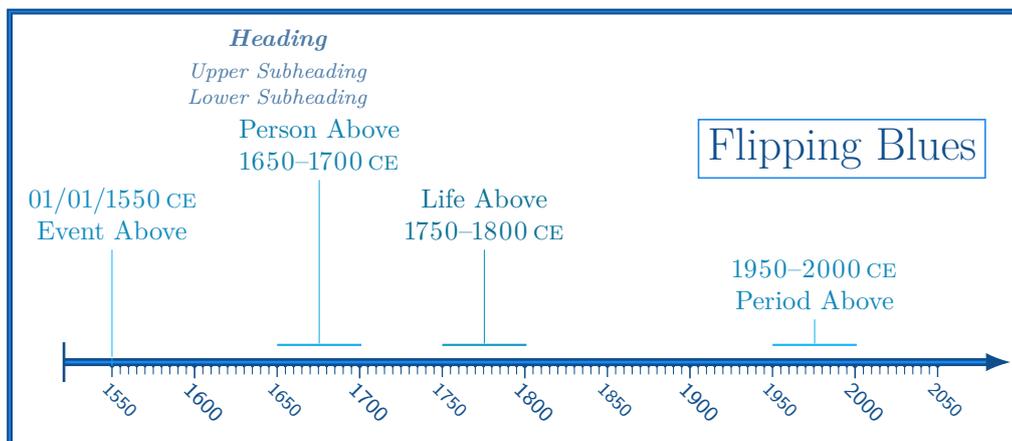
which would load the `chronos` style `modern` followed by the colour schemes `blues`. Since `chronos` styles may legitimately load colour schemes, but colour schemes may not load `chronos` styles, always load any `chronos` style *before* any colour scheme. Then make any further modifications you wish.

```
\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.

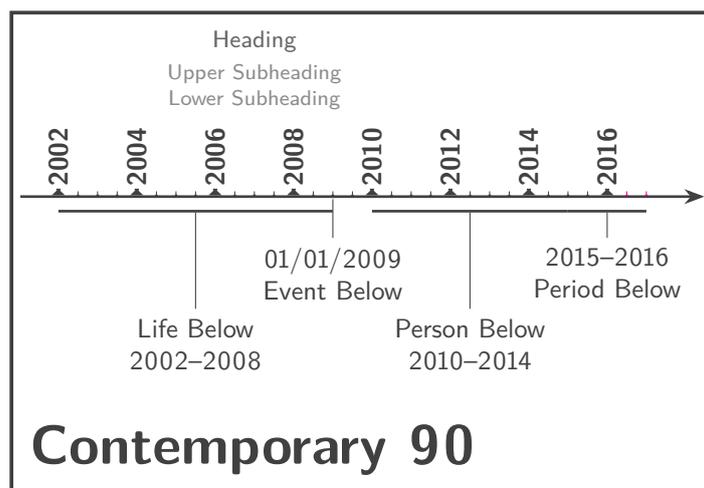
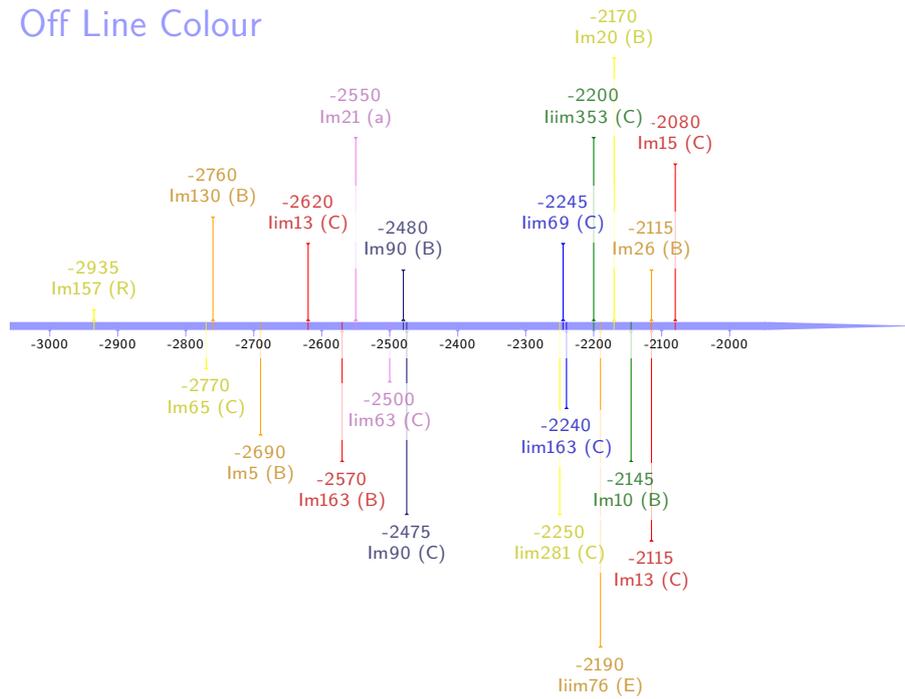


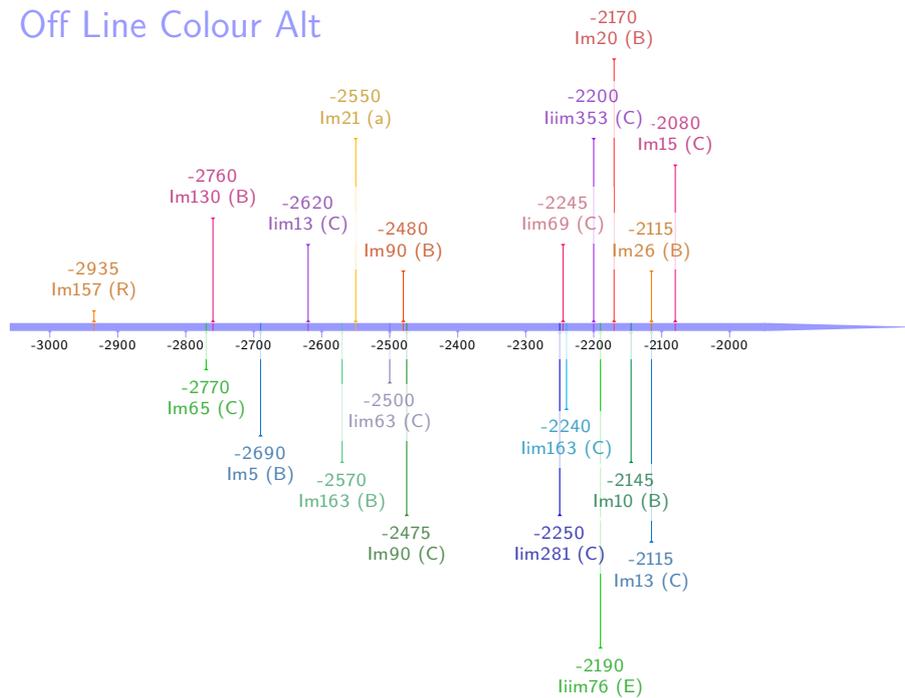
Figure 11: Chronos style: contemporary 90.

Off Line Colour



(a) Chronos style: off line colour.

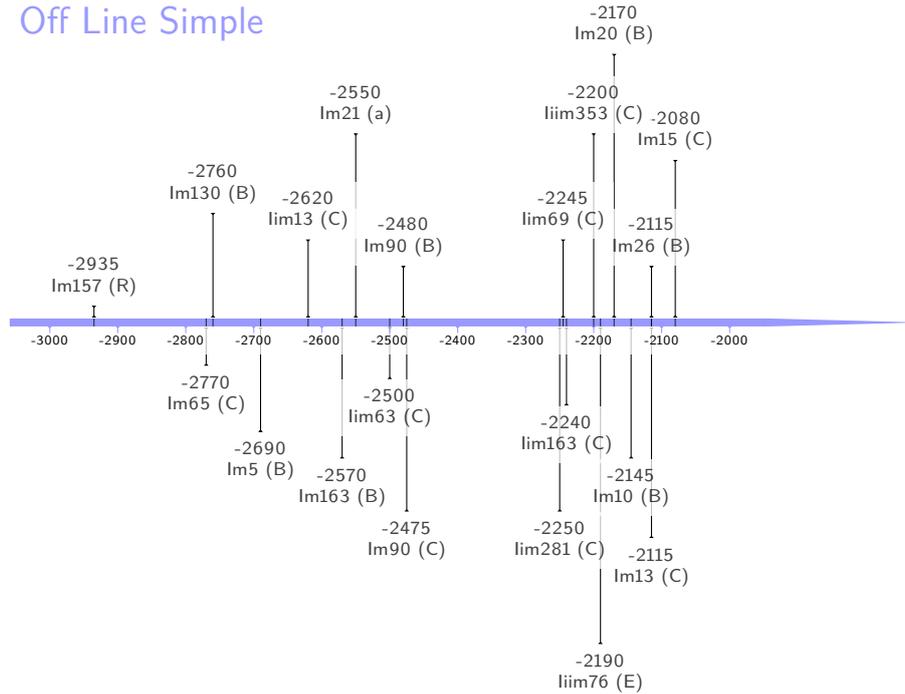
Off Line Colour Alt



(b) Chronos style: off line colour alt.

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

Off Line Simple



(c) Chronos style: off line simple.

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

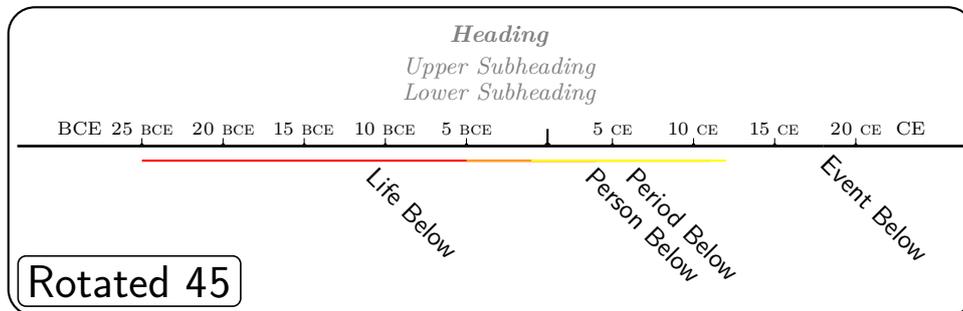


Figure 13: Chronos style: rotated 45.

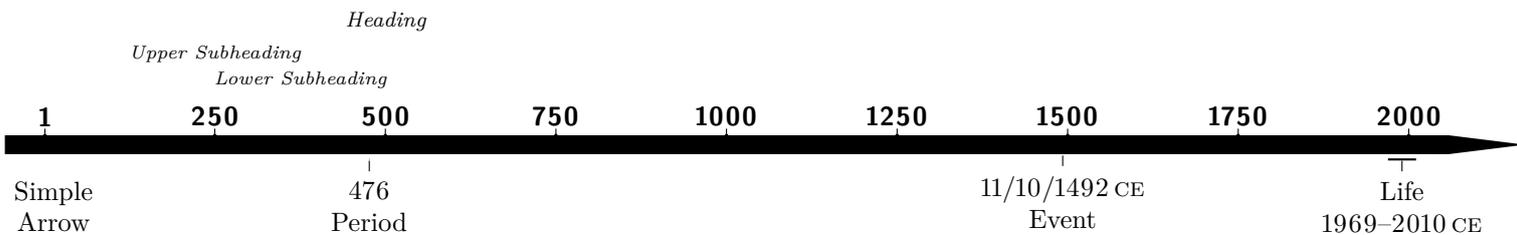


Figure 14: Chronos style: simple arrow.

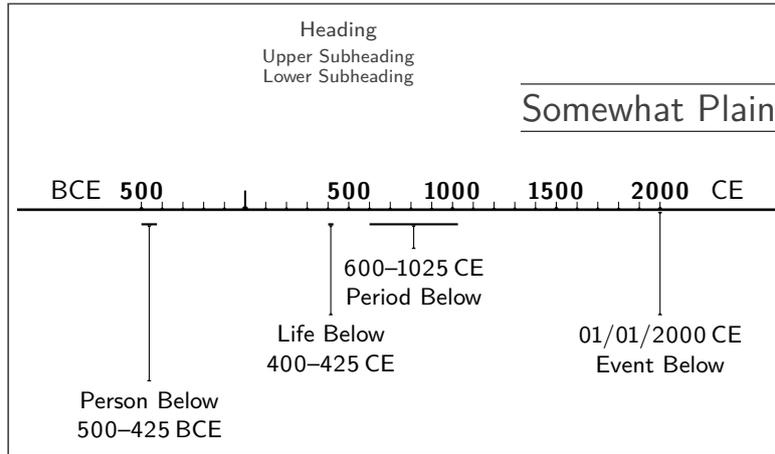


Figure 15: Chronos style: somewhat plain.

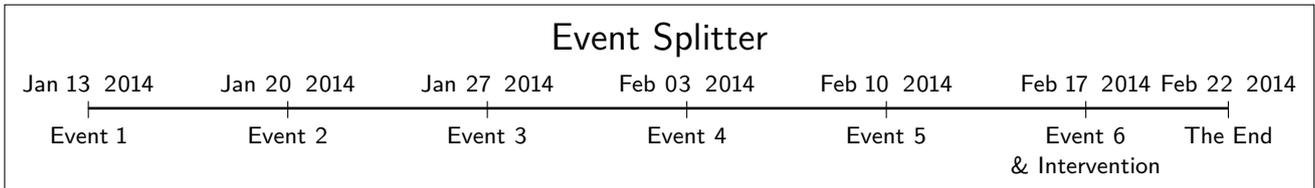
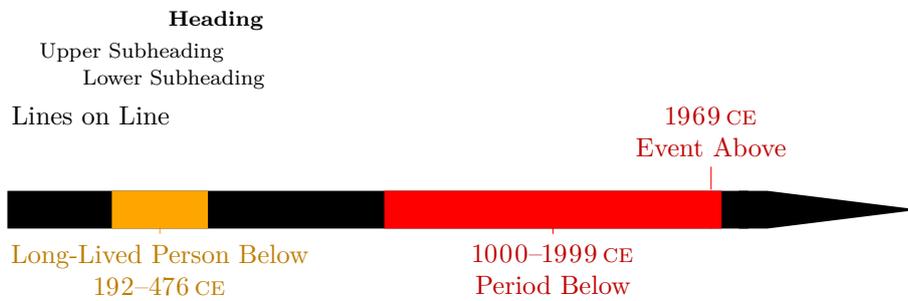
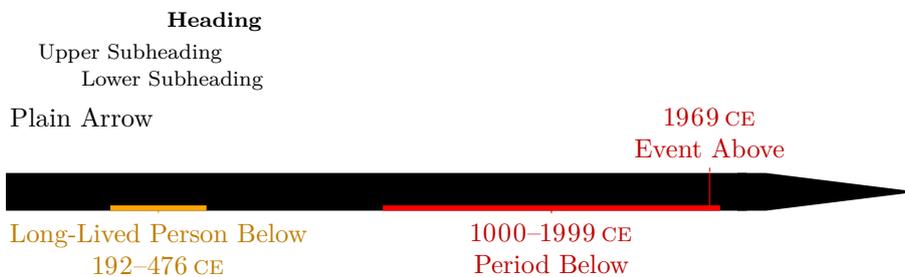


Figure 16: Chronos style: event splitter.



(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 *value* 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** *key-value list*s are comma-separated lists of items, each of which is either a simple *key-name* or a *key-name*= {*comma-separated list of values*}. In general, the *comma-separated list of values* will be a TikZ *key-value list*, 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 = argument specification tag1, tag2, tag3, ...
  key type
  ⟨Description of key and explanation of usage.⟩
  Default: ⟨key’s default value⟩
  Initially: ⟨key’s initial value⟩
  Example: ⟨example of usage⟩
  ⟨Commentary.⟩

```

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 keys is available in six forms<sup>20</sup>:

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

The dimension key parses the  $\langle\textit{specified value}\rangle$  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.

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

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

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

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

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

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

$\langle\textit{dimension key}\rangle-$  =  $\{\langle\textit{pgfmath-parsable dimension}\rangle\}$   
*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` =  $\{(\langle date\ format\ specification \rangle)\}$   
*date format key*

When used in the  $\langle chronos\ preamble \rangle$  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` =  $\{(\langle date\ format\ specification \rangle)\}$   
*date format key*

*event*

<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

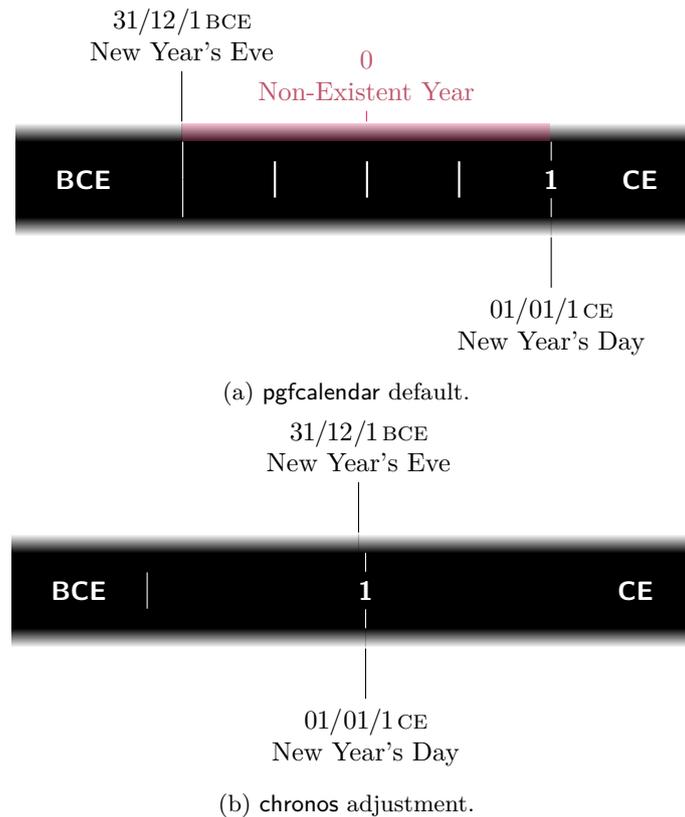


Figure 18: The problem of the non-existent year.

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/⟨key name⟩` or, in the  $\langle chronos\ preamble \rangle$  or in `\chronosset` as `timeline/⟨key name⟩`. 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).

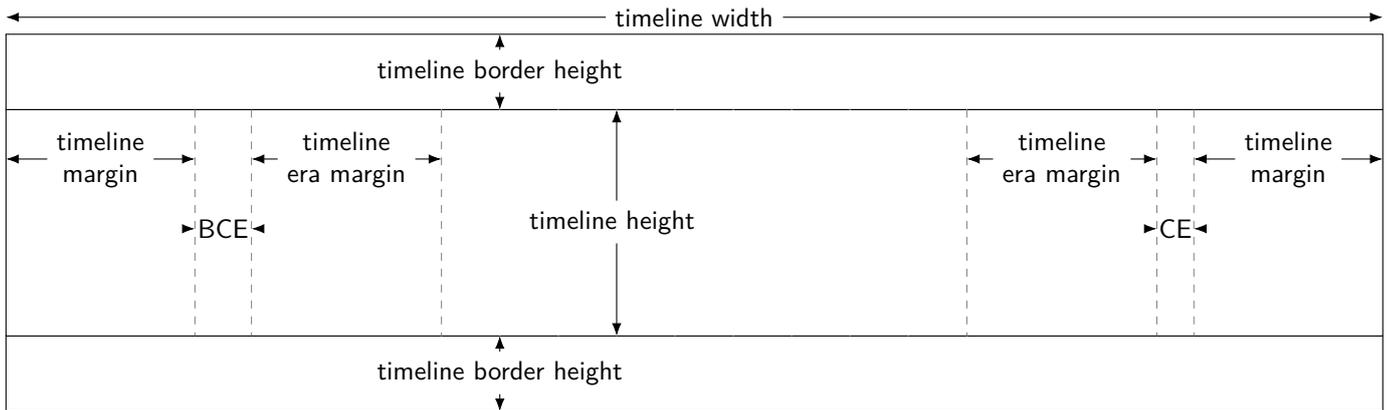


Figure 19: Timeline dimensions.

```

    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.

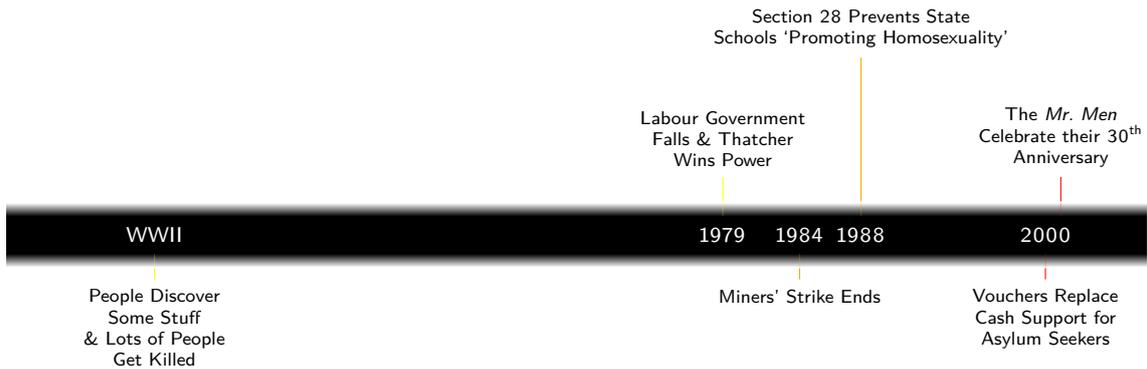


Figure 20: Illustration of event years on line.

`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.

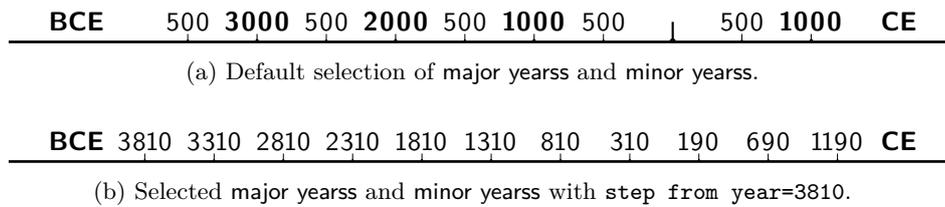


Figure 21: Default (fig. 21a) and non-default (fig. 21b) selection of major years and minor years when `dates={-3814}:1213`, `step major year=1000` and `step minor year=500`.

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 marks.

`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` 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` 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` The style to use if years are 'off line' and `mark at era switch` is true. With the standard `line` 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}
```

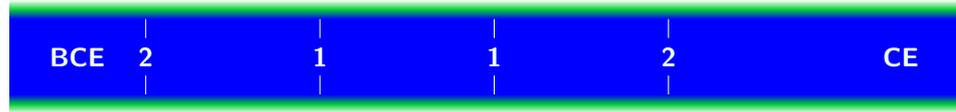


Figure 22: Cumulative effect of colour settings given as examples in sections 8.4.5 and 8.8.

`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` =  $\{ \langle \text{key-value list} \rangle \}$

`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` =  $\{ \langle \text{number above} \rangle \} : \{ \langle \text{number below} \rangle \}$

*key*  $\langle \text{number above} \rangle$  and  $\langle \text{number below} \rangle$  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` =  $\{ \langle \text{coordinate} \rangle \}$

*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+` PGF/TikZ options to apply to headings. `headings style` and `headings style'` replace the 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+` PGF/TikZ options to apply to subheadings. `subheadings style` and `subheadings style'` 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`

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` = *<list of colour names>*  
`life/colors above`  
*colour list key* Sets the colour list for use with elements of type `life` placed above the timeline to *<list of colour names>*.  
 Default: `empty`

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

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

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

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

`period/colours below` = *<list of colour names>*  
`period/colors below`  
*colour list key* Sets the colour list for use with elements of type `period` placed below the timeline to *<list of colour names>*.  
 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/ineffective (-) 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	✓	✓	✓	✓	✓	✓	✓	✓
	at aux	✓	-	✓	-	-	-	-	-
	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+	✓	-	✓	-	-	-	-	-
	line add yshift	✓	-	✓	-	-	-	-	-
	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`  $\{ \langle key-value list \rangle \}$   
*macro*

*event*

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

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

<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.

`at aux` =  $\langle text \rangle$  *life, period*  
*key*

A wrapper around `at` which appends a space followed by the sanitised name of the current element to  $\langle text \rangle$  before passing the result to the key.

At present, the only values of  $\langle text \rangle$  which make sense are `birth` or `death` (for `life`) and `start` or `end` (for `period`). These options allow the `text` tag to be placed relative to the end points of the line, rather than at its centre.

This key is intended for use with `off line` styles, especially those utilising `line add yshift`.

`tag anchor` =  $\langle node anchor \rangle$  *life, event, period, theory, info, main, copleft, 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** *life, event, period, theory*  
*boolean key*

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`. *life, event, period, theory*  
*key*

Thus the previous code could be rewritten as

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

`line add yshift` = `{<dimension>}` life, period  
`line add yshift+`  
`line add yshift'` Additional vertical displacement of lines from the timeline. This is *added* to the default vertical  
`line add yshift-` displacement.  
dimension key

Cf. `line yshift`.

`\lineyshift` The `line yshift`. This macro is available *only within the <timeline specification>*.

```
macro
  dates = {<birth date>}{<death date>} life
date key
        ={<start date>}{<end date>} 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  $\langle text \rangle$  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** =  $\{(text)\}$  *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{\name=c17,dates=1600:1699,colour=cyan,phantom}`

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},  
  },
```

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

```

    ...
  ]
  % 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` =  $\langle \text{text} \rangle$  *info*  
*key* The caption for an element of type info.

`labels` =  $\langle \text{upper label} \rangle : \langle \text{lower label} \rangle$  *theory circle*  
*key* Labels to be placed above and below a theory circle.

`circle texts` =  $\langle \text{upper text} \rangle : \langle \text{lower text} \rangle$  *theory circle*  
*key* 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*  
 <tag>/full dates

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

See section 8.2 for details and defaults.

**only years** Show only years. *life, event, period*  
 <tag>/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  $\langle\text{chronos preamble}\rangle$  or  $\backslash\text{chronosset}$  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  $\langle\text{chronos preamble}\rangle$ . 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
  }
\end{chronos}
```

$\langle\text{tag}\rangle/\text{connection}$  =  $\{(key\text{-value list})\}$  life, event, period, theory

$\langle\text{tag}\rangle/\text{connection}+$   $\langle\text{key-value list}\rangle$  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.  $\langle\text{tag}\rangle/\text{connection}$  and  $\langle\text{tag}\rangle/\text{connection}'$  replace any current list;  $\langle\text{tag}\rangle/\text{connection}+$  adds to it.

$\langle\text{tag}\rangle/\text{line}$  =  $\{(key\text{-value list})\}$  life, event, period

$\langle\text{tag}\rangle/\text{line}+$   $\langle\text{key-value list}\rangle$  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.  $\langle\text{tag}\rangle/\text{line}$  and  $\langle\text{tag}\rangle/\text{line}'$  replace any current list;  $\langle\text{tag}\rangle/\text{line}+$  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)

`line yshift` =  $\{(dimension)\}$  life, period

`line yshift+`  
`line yshift'` 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.  
`line yshift-`  
*dimension key*

Cf. `line add yshift`.

`\lineyshift` The `line yshift`. This macro is available *only within the  $\langle\text{timeline specification}\rangle$* .

*macro*  
 $\langle\text{tag}\rangle/\text{text tag}$  =  $\{(key\text{-value list})\}$  life, event, period, theory, info

$\langle\text{tag}\rangle/\text{text tag}+$   $\langle\text{key-value list}\rangle$  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.  $\langle\text{tag}\rangle/\text{text tag}$  and  $\langle\text{tag}\rangle/\text{text tag}'$  replace any current list;  $\langle\text{tag}\rangle/\text{text tag}+$  adds to it.

```
\chronosset{%
  life/text tag+={font=\scshape\small},
  event/text tag+={font=\scshape\footnotesize},
  period/text tag+={font=\itshape\footnotesize},
```

<sup>33</sup>There is a seventh set,  $\langle\text{tag}\rangle/\text{tag}$ ,  $\langle\text{tag}\rangle/\text{tag}+$  and  $\langle\text{tag}\rangle/\text{tag}'$ , which may be of interest to advanced users. These keys are also potentially destructive. Not only  $\langle\text{tag}\rangle/\text{tag}'$ , but also  $\langle\text{tag}\rangle/\text{tag}$  and even  $\langle\text{tag}\rangle/\text{tag}+$ , can overwrite default settings for such things as colour rotation.

}

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+`  
`<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` Place `main` title between two parallel lines aligned to the width of the text. *main*  
*style*

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` = `{<(key-value list)>}` *life, event, period, theory*  
`event`  
`period`  
`theory`  
`key`

Equivalent to prefixing each item in `<(key-value list)>` with `<tag>`.

```
\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}
```

`<tag>/default colour` = `<(colour name)>` *life, event, period, theory, info*  
`<tag>/default color`  
`colour key`

The default colour to use for all elements of type `<tag>`, 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` = `{(colour list)}` *life, event, period, theory*  
`colors above`  
`<tag>/colours above` The default and tag-specific colour lists for all susceptible elements above the timeline. *These keys*  
`<tag>/colors above` *should never be used when creating specific elements.*  
*colour list key*

```
\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` = `{(colour list)}` *life, event, period, theory*  
`colors below`  
`<tag>/colours below` The default and tag-specific colour lists for all susceptible elements below the timeline. *These keys*  
`<tag>/colors below` *should never be used when creating specific elements.*  
*colour list key*

```
\begin{chronos}[
  colours below={red,orange,magenta},
  theory/colours below={black,gray},
]
\end{chronos}
```

See section 8.8 for details and defaults.

`colour rotation` = `true|false` *life, event, period, theory*  
`color rotation`  
`<tag>/colour rotation` Whether colour rotation is enabled by default.  
`<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'`  
`copyleft+` Style to apply to the copyleft or copyright, an element of tag type copyleft / copyright.  
`copyright` Default: empty  
`copyright'`  
`copyright+` `copyleft`, `copyleft'`, `copyright` and `copyright'` replace the current list; `copyleft+` and  
*key* `copyright+` replace it.

`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 `\chronoset`.

`text tags = {(key-value list)}` *life, event, period, theory, info*  
`text tags+`  
`text tags'`  
*key* 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.

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-value list)}` *life, event, period, theory*  
`connections+`  
`connections'`  
*key* Set or modify the global default `<key-value list>` 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.

Default: `draw=#1`

These keys are related to the tag-specific `<tag>/connection`, `<tag>/connection+` and `<tag>/connection'` 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.

`lines = {(key-value list)}` *life, event, period*  
`lines+`  
`lines'`  
*key* Set or modify the global default `<key-value list>` 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.

Default: none (see section 9.4 for tag-specific defaults.)

These keys are related to the tag-specific `<tag>/line`, `<tag>/line+` and `<tag>/line'` 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.

`chronos connectors = {(key-value list)}` *life, event, period, theory*  
`chronos connectors+`  
`chronos connectors'`  
*key* Set or modify the global default `<key-value list>` 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.

Default: `anchor=center, inner sep=0pt, outer sep=0pt`

These keys are related to the tag-specific `<tag>/chronos connector`, `<tag>/chronos connector+` and `<tag>/chronos 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.

`text tag connectors` = `{(key-value list)}` *life, event, period, theory*

`text tag connectors+`  
`text tag connectors'` Set or modify the global default `<key-value list>` 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 `<tag>/text tag connector`, `<tag>/text tag connector+` and `<tag>/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.

`main text tag connectors` = `{(key-value list)}` *life, event, period, theory*

`main text tag connectors+`  
`main text tag connectors'` Set or modify the global default `<key-value list>` 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'` 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.

*key*

`every connections` = `{(key-value list)}` *life, event, period, theory*

`every connections+`  
`every connections'` 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.

*key*

`every lines` = `{(key-value list)}` *life, event, period*

`every lines+`  
`every lines'` 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.

*key*

`every chronos connectors` = `{(key-value list)}` *life, event, period, theory*

`every chronos connectors+`  
`every chronos connectors'` 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.

*key*

`every text tag connectors` = `{(key-value list)}` *life, event, period, theory*

`every text tag connectors+`  
`every text tag connectors'` 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.

*key*

`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  $\langle$ key-value list $\rangle$  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` =  $\langle$ key-value list $\rangle$  *theory circle*  
`every theory circle circle'`  
`every theory circle circle+` 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= $\langle$ chronos main colour $\rangle$` , `draw= $\langle$ chronos main colour $\rangle$` , even odd rule

`every theory circle circle` and `every theory circle circle+` add to the current  $\langle$ key-value list $\rangle$ ; `every theory circle circle'` replaces it.

`every theory circle text` =  $\langle$ key-value list $\rangle$  *theory circle*  
`every theory circle text'`  
`every theory circle text+` 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.

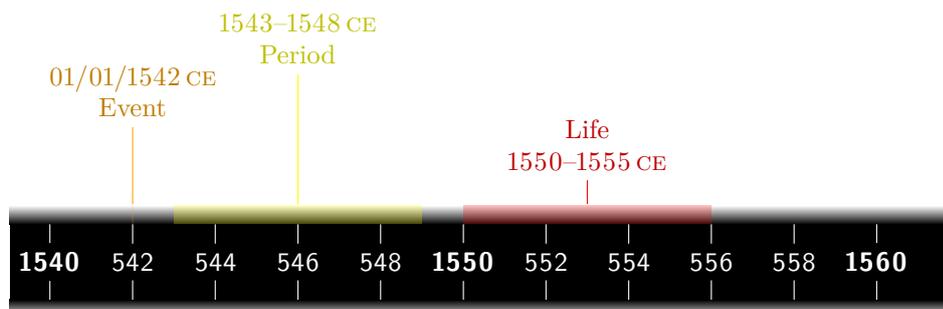
Default: `decoration={text effects along path, text={##1}, text effects/.cd, fit text to path, text=chronos@prifliw@cefndir, characters={text along path, font=\scriptsize\s}`  
`decorate`

`every theory circle text` and `every theory circle text+` add to the current  $\langle$ key-value list $\rangle$ ; `every theory circle text'` replaces it.

`text tag yshift` =  $\langle$ dimension $\rangle$  *life, event, period, theory*  
*dimension key*

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.

<pre>every life = {(key-value list)} every life' every life+   key</pre>	<pre>life</pre> <p>Additional configuration for all elements of tag type life. These do much the same as <code>life/tag</code>, <code>life/tag+</code> and <code>life/tag'</code>, but should <i>never</i> be used when creating a specific element. <code>every life</code> and <code>every life+</code> add to the current <code>&lt;key-value list&gt;</code>; <code>every life'</code> replaces it.</p>
<pre>every event = {(key-value list)} every event' every event+   key</pre>	<pre>event</pre> <p>Additional configuration for all elements of tag type event. These do much the same as <code>event/tag</code>, <code>event/tag+</code> and <code>event/tag'</code>, but should <i>never</i> be used when creating a specific element. <code>every event</code> and <code>every event+</code> add to the current <code>&lt;key-value list&gt;</code>; <code>every event'</code> replaces it.</p>
<pre>every period = {(key-value list)} every period' every period+   key</pre>	<pre>period</pre> <p>Additional configuration for all elements of tag type period. These do much the same as <code>period/tag</code>, <code>period/tag+</code> and <code>period/tag'</code>, but should <i>never</i> be used when creating a specific element. <code>every period</code> and <code>every period+</code> add to the current <code>&lt;key-value list&gt;</code>; <code>every period'</code> replaces it.</p>
<pre>every theory = {(key-value list)} every theory' every theory+   key</pre>	<pre>theory</pre> <p>Additional configuration for all elements of tag type theory. These do much the same as <code>theory/tag</code>, <code>theory/tag+</code> and <code>theory/tag'</code>, but should <i>never</i> be used when creating a specific element. <code>every theory</code> and <code>every theory+</code> add to the current <code>&lt;key-value list&gt;</code>; <code>every theory'</code> replaces it.</p>
<pre>every info = {(key-value list)} every info' every info+   key</pre>	<pre>info</pre> <p>Additional configuration for all elements of tag type info. These do much the same as <code>info/tag</code>, <code>info/tag+</code> and <code>info/tag'</code>, but should <i>never</i> be used when creating a specific element. <code>every info</code> and <code>every info+</code> add to the current <code>&lt;key-value list&gt;</code>; <code>every info'</code> replaces it.</p>

## 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 gutenberg] (connector johannes gutenberg) -- (
connector printing press) (connector johannes gutenberg2) |- (connector movable type) (
connector johannes gutenberg3) -- ++(5pt,0pt) |-| (connector gutenberg bible);
```

This will draw a line using the style for connections of tag type `life` and the colour assigned to the element named `johannes gutenberg`. Note the use of connectors on both the element's own text tag and on other elements' text tags. In this case, tag `johannes gutenberg` is being connected to tag `printing press`, tag `movable type` and tag `gutenberg 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 connector` =  $\langle tag \rangle : \langle element name \rangle$  *life, event, period*  
*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 connector` =  $\langle tag \rangle : \langle element name \rangle$  *life, event, period, theory*  
*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}
```

## 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.

<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.

<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.

## 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 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.

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,
```

<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`.

<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]

}

### 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’ 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.

### 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`.
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.

<sup>41</sup>That is, ‘can implies ought’.

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!	CORE	core { foreground	chronos main colour	CORE
		background	chronos main background colour	
		derivative { timeline foreground	chronos timeline foreground colour	
	background	chronos timeline background colour		
	border { timeline border outer	chronos timeline border outer colour		
	inner	chronos timeline border inner colour		
middle	chronos timeline border middle colour			
Should NOT touch!	ELEMENTAL	default { 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	-			

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 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,
```

<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.

### 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=Opt 3,reversed,length=Opt 1.5]}--{Triangle[width
=Opt 5,reversed,length=Opt 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

```
✗ 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 `##`.

?

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.

<sup>43</sup>For real fun with hashes, may I recommend `chronos` or `forest`?

*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}{%
    lline1 amser/.cd,
```

```

    timeline@arrow/.style={/chronos/.cd,#1},
    no@timeline@arrow/.style={/chronos/.cd,#2},
    do timeline arrow/.add code={%
      \ifchronostimelinearrow
        \tikzset{/chronos/lilinell amser/timeline@arrow}%
      \else
        \tikzset{/chronos/lilinell amser/no@timeline@arrow}%
      \fi
    },
  }%
},

```

If the timeline uses off line years, `\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.

<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.

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.

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`,

<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.

```

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

```

x 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}{%
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,

```

<sup>46</sup>PGF/TikZ has this type of containment down to a fine art. `Chronos`'s approach is altogether cruder.

```

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*

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.

<sup>47</sup>I am grateful to Qrrbrbirlbel for providing the code implementing this at [TeX StackExchange: 694967](https://tex.stackexchange.com/questions/694967).

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.

*style*

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` *macro* 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.

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⟩*] *life, event, period, theory, info*  
*macro*

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`.

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
```

<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.

```
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†

v0.9.4 (SVN 11797)

## 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 11797 2026-03-21 16:01:38Z cfrees
  $}[v0.9.4 \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@enwauiliwsyml
```

`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~syml .legacy_if_set:n = chronos@enwauiliwsyml,
25   enwau~lliw~syml .default:n = true,
26   enwau~lliw~syml .initial:n = true,
27   enwau~lliw~syml .usage:n = general,
28   simple~colour~names .legacy_if_set:n = chronos@enwauiliwsyml,
29   simple~colour~names .default:n = true,
30   simple~colour~names .usage:n = general,
31   simple~color~names .legacy_if_set:n = chronos@enwauiliwsyml,
32   simple~color~names .default:n = true,
33   simple~color~names .usage:n = general,
34   dim~enwau~lliw~syml .legacy_if_set_inverse:n = chronos@enwauiliwsyml,
35   dim~enwau~lliw~syml .default:n = true,
36   dim~enwau~lliw~syml .usage:n = general,
37   no~simple~colour~names .legacy_if_set_inverse:n = chronos@enwauiliwsyml,
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@enwauiliwsyml,
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 , e }
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 , e }
235 \cs_generate_variant:Nn \int_abs:n { v }
236 \cs_generate_variant:Nn \tl_replace_all:Nnn { Nne }

```

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:Nne \l__chronos_date_tl { !a }
241     { \pgfcalendarweekdayshortname{\thechronos@weekday} }
242   \tl_replace_all:Nne \l__chronos_date_tl { !A }
243     { \pgfcalendarweekdayname{\thechronos@weekday} }
244   \tl_replace_all:Nne \l__chronos_date_tl { !b }
245     { \pgfcalendarmonthshortname{\csname chronos@#1month\endcsname} }
246   \tl_replace_all:Nne \l__chronos_date_tl { !B }
247     { \pgfcalendarmonthname{\csname chronos@#1month\endcsname} }
248   \tl_replace_all:Nne \l__chronos_date_tl { !c }
249     { \__chronos_year_semi_shorten:e { \int_abs:v { chronos@#1year } } }
250   \tl_replace_all:Nne \l__chronos_date_tl { !d }
251     { \csname chronos@#1day\endcsname }
252   \tl_replace_all:Nne \l__chronos_date_tl { !E }
253     { \__chronos_dateformat_era:v { chronos@#1year } }
254   \tl_replace_all:Nne \l__chronos_date_tl { !m }
255     { \csname chronos@#1month\endcsname }
256   \tl_replace_all:Nne \l__chronos_date_tl { !q }
257     { \__chronos_dateformat_sign:v { chronos@#1year } }
258   \tl_replace_all:Nne \l__chronos_date_tl { !Q }
259     { \__chronos_dateformat_signs:v { chronos@#1year } }
260   \tl_replace_all:Nne \l__chronos_date_tl { !y }
261     { \__chronos_year_shorten:e { \int_abs:v { chronos@#1year } } }
262   \tl_replace_all:Nne \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/CC0 at \url{https://
268   \tl_set_eq:NN \l__chronos_year_tl \l__chronos_yearformat_tl
269   \tl_replace_all:Nne \l__chronos_year_tl { !c }
270     { \__chronos_year_semi_shorten:e { \int_abs:n { #1 } } }
271   \tl_replace_all:Nne \l__chronos_year_tl { !E }
272     { \__chronos_dateformat_era:n { #1 } }
273   \tl_replace_all:Nne \l__chronos_year_tl { !q }
274     { \__chronos_dateformat_sign:n { #1 } }
275   \tl_replace_all:Nne \l__chronos_year_tl { !Q }
276     { \__chronos_dateformat_signs:n { #1 } }
277   \tl_replace_all:Nne \l__chronos_year_tl { !y }
278     { \__chronos_year_shorten:e { \int_abs:n { #1 } } }
279   \tl_replace_all:Nne \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:Ne \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:n
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 grwp
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
487     \regex_replace_once:nnN { }\z } { , \u{l__chronos_tmpd_tl} \} } \l__chronos_tmpc_tl
488     \prop_put:NnV \l__chronos_prop { #1 } \l__chronos_tmpc_tl
489   }{
490     \prop_put:Nnn \l__chronos_prop { #1 } { {#2} }
491   }

```

```

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_tmpc_tl\l__chronos_tmpd_tl}%
609     [\l__chronos_tmpc_tl\textsuperscript{\l__chronos_tmpd_tl}c.]%
610     {chronos ~ year ~ \int_to_arabic:n {\l__chronos_tmpa_int}}%
611     {chronos ~ year ~ \int_to_arabic:n {\l__chronos_tmpb_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!\*\***

```

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 \protected\def\chronos@showdate@cs[#1]#2
746 {
747 \group_begin:
748 \__chronos_set_dateformat:v { #1 }
749 \pgfcalendarjuliantoweekday{\csname thechronos@#2date\endcsname}{\c@chronos@weekday}%
750 \__chronos_show_date:n { #2 }
751 \group_end:
752 }
753 \protected\def\chronos@showyear[#1]#2
754 {
755 \group_begin:
756 \tl_set:No \l__chronos_tmpc_tl { #1 }
757 \tl_if_empty:NF \l__chronos_tmpc_tl
758 {
759 \__chronos_set_yearformat:V \l__chronos_tmpc_tl
760 }
761 \__chronos_show_year:n { #2 }
762 \group_end:
763 }

764 \def\chronos@minoryearformat{\l__chronos_minoryearformat_tl}
765 \protected\def\chronos@troilliwiiau@uchod#1{
766 \__chronos_troilliwiiau:mn { #1 } { uchod }
767 \expandafter\def\csname chronos@#1@lliw\endcsname{\l__chronos_lliw_tl}
768 }
769 \protected\def\chronos@troilliwiiau@isod#1{
770 \__chronos_troilliwiiau:mn { #1 } { isod }
771 \expandafter\def\csname chronos@#1@lliw\endcsname{\l__chronos_lliw_tl}
772 }
773 \protected\def \chronos@lliwiau@uchod@tag#1#2{
774 \tl_set:Nn \l__chronos_tmpc_tl { _#1 }
775 \clist_gset:cn { g__chronos_lliwiau \l__chronos_tmpc_tl _uchod_clist } { #2 }

```

```

776 }
777 \protected\def \chronos@lliwiau@uchod#1{
778   \tl_clear:N \l__chronos_tmpc_tl
779   \clist_gset:cn { g__chronos_lliwiau \l__chronos_tmpc_tl _uchod_clist } { #1 }
780 }
781 \protected\def \chronos@lliwiau@isod>tag#1#2{
782   \tl_set:Nn \l__chronos_tmpc_tl { _#1 }
783   \clist_gset:cn { g__chronos_lliwiau \l__chronos_tmpc_tl _isod_clist } { #2 }
784 }
785 \protected\def \chronos@lliwiau@isod#1{
786   \tl_clear:N \l__chronos_tmpc_tl
787   \clist_gset:cn { g__chronos_lliwiau \l__chronos_tmpc_tl _isod_clist } { #1 }
788 }
789 \cs_new_eq:NN \chronos@lliwiau@clear \__chronos_lliwiau_clririo:
790 \cs_new_eq:NN \chronos@lliwiau@cadw@rhag \__chronos_lliwiau_cadw_rhag:

791 \newcommand* \chronos@creu@tikzname [2] {% m m
792   \__chronos_creu_tikzname:n { #2 }
793   \expandafter\let\csname chronos@#1@tikzname\endcsname \l__chronos_tikzname_tl
794 }
795 \cs_new_eq:NN \chronos@enw@priflythrennu \__chronos_enw_priflythrennu:V
796 \cs_new_eq:NN \chronos@testunteitl@priflythrennu \__chronos_enw_priflythrennu:n
797 \cs_new_eq:NN \chronos@cadw@nodweddion@rhag \__chronos_cadw_nodweddion_rhag:nn
798 \cs_new_eq:NN \chronos@cadw@nodweddion \__chronos_cadw_nodweddion:nnn
799 \cs_new_eq:NN \chronos@ychwanegu@nodweddion \__chronos_ychwanegu_nodweddion:nnn

800 \cs_new_eq:NN \chronos@ychwanegu@nodweddion@rhestr \__chronos_ychwanegu_nodweddion_rhestr_pr

801 \cs_new_eq:NN \chronos@ychwanegu@nodweddion@rhag \__chronos_ychwanegu_nodweddion_rhag:nn
802 \cs_new_eq:NN \chronos@gosod@nodweddion \__chronos_gosod_nodweddion:n
803 \cs_new_eq:NN \chronos@gosod@nodweddion@var \__chronos_gosod_nodweddion:V
804 \cs_new_eq:NN \chronos@ailosod@nodweddion \__chronos_ailosod_nodweddion:
805 \cs_new_eq:NN \chronos@dangos@nodweddion \__chronos_dangos_nodweddion:n
806 \cs_new_eq:NN \chronos@dangos@nodweddion@rhag \__chronos_dangos_nodweddion_rhag:
807 \newcommand* \chronos@ychwanegu@gosod [1]
808 {
809   \legacy_if:nF { chronos@preset } {
810     \clist_map_inline:nn { #1 }
811     {
812       \seq_put_right:Nn \l__chronos_gosod_seq {##1}
813     }
814   }
815 }%
816 \newcommand* \chronos@dangos@gosod
817 {
818   \seq_show:N \l__chronos_gosod_seq
819 }
820 \newcommand* \chronos@if@gosodTF [3]
821 {
822   \seq_if_in:NnTF \l__chronos_gosod_seq { #1 } { #2 } { #3 }
823 }

```

`\chronos@if@gosodF` Conditionalise on property installation.

```

824 \def\chronos@if@gosodF#1#2
825 {
826   \chronos@presettrue
827   \seq_if_in:NnF \l__chronos_gosod_seq { #1 } { #2 }
828   \chronos@presetfalse
829 }

```

`\chronosdangoslliwiau` Becomes `\chronosshowcolours`.

```

830 \NewDocumentCommand \chronosdangoslliwiau {
831   s 0 { byw, digwyddiad, parhad, theori } D () { isod, uchod }
832 } {
833   \clist_set:Nn \l__chronos_tmpb_clist { #2 }
834   \clist_set:Nn \l__chronos_tmpc_clist { #3 }
835   \clist_map_inline:Nn \l__chronos_tmpb_clist
836   {
837     \clist_map_inline:Nn \l__chronos_tmpc_clist
838     {
839       \clist_show:c { g__chronos_lliwiau_##1_####1_clist }
840     }
841   }
842   \IfBooleanT { #1 }
843   {
844     \clist_map_inline:Nn \l__chronos_tmpc_clist
845     {
846       \clist_show:c {g__chronos_lliwiau_##1_clist}
847     }
848   }
849 }

```

`\chronosdangoslliwiaurhag` For showing default colours.

```

850 \NewDocumentCommand \chronosdangoslliwiaurhag
851 {
852   s 0 { byw, digwyddiad, parhad, theori } D () { isod, uchod }
853 } {
854   \clist_set:Nn \l__chronos_tmpb_clist { #2 }
855   \clist_set:Nn \l__chronos_tmpc_clist { #3 }
856   \clist_map_inline:Nn \l__chronos_tmpb_clist
857   {
858     \clist_map_inline:Nn \l__chronos_tmpc_clist
859     {
860       \clist_show:c { g__chronos_lliwiau_##1_####1_rhag_clist }
861     }
862   }
863   \IfBooleanT { #1 }
864   {
865     \clist_map_inline:Nn \l__chronos_tmpc_clist
866     {
867       \clist_show:c {g__chronos_lliwiau_##1_rhag_clist}
868     }
869   }
870 }

```

`\chronos@dangos@fformatiaudyddiadau` Macros for showing date formats.

`\chronosdangosfformatiaudyddiadau`

```

871 \newcommand* \chronos@dangos@fformatiaudyddiadau{%
872   \clist_map_inline:nn
873   { \l__chronos_dateformat_tl, \l__chronos_yearformat_tl, \l__chronos_minoryearformat_tl}
874   { \tl_show:N ##1 }
875 }
876 \cs_new_eq:NN \chronosdangosfformatiaudyddiadau \chronos@dangos@fformatiaudyddiadau

```

`\chronos@to@clist` Wrappers for `l3clist` functions.

```

\chronos@to@clist@append
\chronos@global@to@clist
\chronos@global@to@clist@append
\chronos@global@to@clist@star@append
\chronos@global@clear@to@clist
\chronos@from@clist
\chronos@global@from@clist
\chronos@global@eq@clist
\chronos@dangos@clist
877 \protected\def\chronos@to@clist#1#2{%^A m m }
878   \clist_set:co { l__chronos_#1_clist } { #2 }
879 }
880 \protected\def\chronos@to@clist@append#1#2{%^A t {+} m m }

```

```

881 \clist_put_right:co { l__chronos_#1_clist } { #2 }
882 }
883 \protected\def\chronos@global@to@clist#1#2{%^A m m
884 \clist_gset:co { g__chronos_#1_clist } { #2 }
885 }
886 \protected\def\chronos@global@to@clist@append#1#2{%^A t {+} m m
887 \clist_gput_right:co { g__chronos_#1_clist } { #2 }
888 }
889 \protected\def\chronos@global@to@clist@star@append#1#2{%^A s t {+} m m
890 \clist_gput_right:ce { g__chronos_#1_clist } { #2 }
891 }
892 \def\chronos@global@clear@to@clist#1{% m
893 \clist_gclear:c { g__chronos_#1_clist }
894 }
895 \def\chronos@from@clist#1#2{% m m
896 \clist_remove_duplicates:c { l__chronos_#1_clist }
897 \clist_if_empty:cTF { l__chronos_#1_clist }
898 {
899 \expandafter\let#2\@empty
900 }{
901 \expandafter\let\expandafter#2\csname l__chronos_#1_clist\endcsname
902 }
903 }
904 \def\chronos@global@from@clist#1{
905 \clist_use:cn { g__chronos_#1_clist } { , }
906 }
907 \def\chronos@global@eq@clist#1#2{
908 \clist_gset_eq:cc { g__chronos_#1_clist } { g__chronos_#2_clist }
909 }
910 \def\chronos@dangos@clist#1{ \clist_show:c { #1_clist } }

```

Internal 2e wrappers for internal functions.

```

911 \cs_new_eq:NN \chronos@at@end \__chronos_at_end:
912 \cs_new_eq:NN \chronos@set@date@aux \__chronos_set_date_aux:n
913 \cs_new_eq:NN \chronos@set@date \__chronos_set_date:nnnn % blwyddyn; mis; dydd; tag for
macro
914 \cs_new_eq:NN \chronos@legacy@if \legacy_if:oTF
915 \def\chronos@legacy@if@set#1#2{\cs:w #1#2\cs_end:}
916 \def\chronos@datetojulian@extractyear #1-#2-#3 {#1}
917 \protected\def\chronos@dangoslliw#1{
918 \extractcolorspec{#1}{\chronos@temp@lliw}%
919 }

```

`\chronosshowcolour` Public interface with options.

```

920 \NewDocumentCommand \chronosshowcolour
921 { s 0 {\chronos@temp@lliw} m }
922 {\extractcolorspec{#3}{#2}\IfBooleanT{#1}{\show#2}}
923 \cs_new_eq:NN \chronos@keymaker \__chronos_kexkeymaker:nnn

```

`\IfFreeTF` 2e document-level wrappers for expl3 alternatives to etoolbox macros.

`\IfFreeT` yn lle \ifundef o etoolbox - instead of \ifundef from etoolbox

`\IfFreeF`

```

924 \cs_if_exist:NTF \IfFreeTF {\PackageWarning{chronos}{
925 Refusing ~ to ~ overwrite ~ existing ~ \protect\IfFreeTF.
926 ~ This ~ may ~ not ~ work}
927 } { \cs_new_eq:NN \IfFreeTF \cs_if_free:NTF }
928 \cs_if_exist:NTF \IfFreeT {\PackageWarning{chronos}{

```

```

929 Refusing ~ to ~ overwrite ~ existing ~ \protect\IfFreeT.
930 ~ This ~ may ~ not ~ work}
931 } { \cs_new_eq:NN \IfFreeT \cs_if_free:NT }
932 \cs_if_exist:NTF \IfFreeF {\PackageWarning{chronos}{
933 Refusing ~ to ~ overwrite ~ existing ~ \protect\IfFreeF.
934 ~ This ~ may ~ not ~ work}
935 } { \cs_new_eq:NN \IfFreeF \cs_if_free:NF }

\IfExistTF yn lle \ifdef o etoolbox - in place of \ifdef from etoolbox
\IfExistT
\IfExistF 936 \cs_if_exist:NTF \IfExistTF {\PackageWarning{chronos}{
937 Refusing ~ to ~ overwrite ~ existing ~ \protect\IfExistTF.
938 ~ This ~ may ~ not ~ work}
939 } { \cs_new_eq:NN \IfExistTF \cs_if_exist:NTF }
940 \cs_if_exist:NTF \IfExistT {\PackageWarning{chronos}{
941 Refusing ~ to ~ overwrite ~ existing ~ \protect\IfExistT.
942 ~ This ~ may ~ not ~ work}
943 } { \cs_new_eq:NN \IfExistT \cs_if_exist:NT }
944 \cs_if_exist:NTF \IfExistF {\PackageWarning{chronos}{
945 Refusing ~ to ~ overwrite ~ existing ~ \protect\IfExistF.
946 ~ This ~ may ~ not ~ work}
947 } { \cs_new_eq:NN \IfExistF \cs_if_exist:NF }

\IfCSFreeTF yn lle \ifcsundef o etoolbox - instead of \ifcsundef
\IfCSFreeT
\IfCSFreeF 948 \cs_if_exist:NTF \IfCSFreeTF {\PackageWarning{chronos}{
949 Refusing ~ to ~ overwrite ~ existing ~ \protect\IfCSFreeTF.
950 ~ This ~ may ~ not ~ work}
951 } { \cs_new_eq:NN \IfCSFreeTF \cs_if_free:cTF }
952 \cs_if_exist:NTF \IfCSFreeT {\PackageWarning{chronos}{
953 Refusing ~ to ~ overwrite ~ existing ~ \protect\IfCSFreeT.
954 ~ This ~ may ~ not ~ work}
955 } { \cs_new_eq:NN \IfCSFreeT \cs_if_free:cT }
956 \cs_if_exist:NTF \IfCSFreeF {\PackageWarning{chronos}{
957 Refusing ~ to ~ overwrite ~ existing ~ \protect\IfCSFreeF.
958 ~ This ~ may ~ not ~ work}
959 } { \cs_new_eq:NN \IfCSFreeF \cs_if_free:cF }

\IfCSEExistTF yn lle \ifcsdef o etoolbox - instead of \ifcsdef
\IfCSEExistT
\IfCSEExistF 960 \cs_if_exist:NTF \IfCSEExistTF {\PackageWarning{chronos}{
961 Refusing ~ to ~ overwrite ~ existing ~ \protect\IfCSEExistTF.
962 ~ This ~ may ~ not ~ work}
963 } { \cs_new_eq:NN \IfCSEExistTF \cs_if_exist:cTF }
964 \cs_if_exist:NTF \IfCSEExistT {\PackageWarning{chronos}{
965 Refusing ~ to ~ overwrite ~ existing ~ \protect\IfCSEExistT.
966 ~ This ~ may ~ not ~ work}
967 } { \cs_new_eq:NN \IfCSEExistT \cs_if_exist:cT }
968 \cs_if_exist:NTF \IfCSEExistF {\PackageWarning{chronos}{
969 Refusing ~ to ~ overwrite ~ existing ~ \protect\IfCSEExistF.
970 ~ This ~ may ~ not ~ work}
971 } { \cs_new_eq:NN \IfCSEExistF \cs_if_exist:cF }

\Undefine yn lle \undef o etoolbox - instead of \undef

972 \cs_if_exist:NTF \Undefine {\PackageWarning{chronos}{
973 Refusing ~ to ~ overwrite ~ existing ~ \protect\Undefine.
974 ~ This ~ may ~ not ~ work}
975 } { \cs_new_eq:NN \Undefine \cs_undefine:N }

\CSletCS yn lle \csletcs o etoolbox - instead of \csletcs

```

```

976 \cs_if_exist:NTF \CSletCS {\PackageWarning{chronos}{
977   Refusing ~ to ~ overwrite ~ existing ~ \protect\CSletCS.
978   ~ This ~ may ~ not ~ work}
979 } { \cs_new_eq:NN \CSletCS \cs_set_eq:cc }

```

`\CSlet` yn lle `\cslet` o `etoolbox` - instead of `\cslet`

```

980 \cs_if_exist:NTF \CSlet {\PackageWarning{chronos}{
981   Refusing ~ to ~ overwrite ~ existing ~ \protect\CSlet.
982   ~ This ~ may ~ not ~ work}
983 } { \cs_new_eq:NN \CSlet \cs_set_eq:cN }

```

`\IfBooleanExprTF` yn lle `\ifboolexpr` o `etoolbox` (ish) - instead of `\ifboolexpr`

```

\IfBooleanExprTF
\IfBooleanExprT
\IfBooleanExprF
984 \cs_if_exist:NTF \IfBooleanExprTF {\PackageWarning{chronos}{
985   Refusing ~ to ~ overwrite ~ existing ~ \protect\IfBooleanExprTF.
986   ~ This ~ may ~ not ~ work}
987 } { \cs_new_eq:NN \IfBooleanExprTF \bool_if:nTF }
988 \cs_if_exist:NTF \IfBooleanExprT {\PackageWarning{chronos}{
989   Refusing ~ to ~ overwrite ~ existing ~ \protect\IfBooleanExprT.
990   ~ This ~ may ~ not ~ work}
991 } { \cs_new_eq:NN \IfBooleanExprT \bool_if:nT }
992 \cs_if_exist:NTF \IfBooleanExprF {\PackageWarning{chronos}{
993   Refusing ~ to ~ overwrite ~ existing ~ \protect\IfBooleanExprF.
994   ~ This ~ may ~ not ~ work}
995 } { \cs_new_eq:NN \IfBooleanExprF \bool_if:nF }

```

`\LegacyBoolean` yn lle `bool` o `etoolbox` (ish) - instead of `bool` from `etoolbox`

```

996 \cs_if_exist:NTF \LegacyBoolean {\PackageWarning{chronos}{
997   Refusing ~ to ~ overwrite ~ existing ~ \protect\LegacyBoolean.
998   ~ This ~ may ~ not ~ work}
999 } { \cs_new_eq:NN \LegacyBoolean \legacy_if_p:n }

```

`\CSFreeBoolean` yn lle `test` o `etoolbox` (ish) - instead of `test` from `etoolbox`

```

1000 \cs_if_exist:NTF \CSFreeBoolean {\PackageWarning{chronos}{
1001   Refusing ~ to ~ overwrite ~ existing ~ \protect\CSFreeBoolean.
1002   ~ This ~ may ~ not ~ work}
1003 } { \cs_new_eq:NN \CSFreeBoolean \cs_if_free_p:N }

```

`\IntCompareBoolean` yn lle `\ifnumcomp` o `etoolbox` (ish) - instead of `\ifnumcomp` from `etoolbox`

```

\IntCompareBoolean
\IfIntCompareTF
\IfIntCompareT
\IfIntCompareF
1004 \cs_if_exist:NTF \IntCompareBoolean {\PackageWarning{chronos}{
1005   Refusing ~ to ~ overwrite ~ existing ~ \protect\IntCompareBoolean.
1006   ~ This ~ may ~ not ~ work}
1007 } { \cs_new_eq:NN \IntCompareBoolean \int_compare_p:nNn }
1008 \cs_if_exist:NTF \IfIntCompareTF {\PackageWarning{chronos}{
1009   Refusing ~ to ~ overwrite ~ existing ~ \protect\IfIntCompareTF.
1010   ~ This ~ may ~ not ~ work}
1011 } { \cs_new_eq:NN \IfIntCompareTF \int_compare:nTF }
1012 \cs_if_exist:NTF \IfIntCompareT {\PackageWarning{chronos}{
1013   Refusing ~ to ~ overwrite ~ existing ~ \protect\IfIntCompareT.
1014   ~ This ~ may ~ not ~ work}
1015 } { \cs_new_eq:NN \IfIntCompareT \int_compare:nT }
1016 \cs_if_exist:NTF \IfIntCompareF {\PackageWarning{chronos}{
1017   Refusing ~ to ~ overwrite ~ existing ~ \protect\IfIntCompareF.
1018   ~ This ~ may ~ not ~ work}
1019 } { \cs_new_eq:NN \IfIntCompareF \int_compare:nF }

```

`\chronosnewcolourscheme`  
`\chronosnewcolorscheme`

```

1020 \NewDocumentCommand \chronosnewcolourscheme { 0 {rhagosedig} m m }
1021 {
1022   \group_begin:
1023     \cs_new_nopar:cn { __chronos_lliwiau_#2 : }
1024     {
1025       \cs:w chronos@lliwiau@#1 \cs_end:
1026       \keys_set_groups:nnn { chronos / lliwiau } { core } { #3 }
1027       \__chronos_color_set_from_existing:nn { chronos@lliw@cefndir@llinell }
1028         { chronos@prifliw }
1029       \__chronos_color_set_from_existing:nn { chronos@lliw@llinell }
1030         { chronos@prifliw@cefndir }
1031       \keys_set_groups:nnn { chronos / lliwiau } { core ~ derivative } { #3 }
1032       \__chronos_color_set_from_existing:nn { chronos@borderinner }
1033         { chronos@lliw@cefndir@llinell }
1034       \__chronos_color_set_from_existing:nn { chronos@borderouter }
1035         { chronos@prifliw@cefndir }
1036       \__chronos_color_set_from_existing:nn { chronos@bordermiddle }
1037         { chronos@borderinner!50!chronos@borderouter }
1038       \keys_set_groups:nnn { chronos / lliwiau } { core ~ border } { #3 }
1039       \__chronos_color_set_from_existing:nn { chronos@byw@lliw@rhagosodedig }
1040         { chronos@prifliw }
1041       \__chronos_color_set_from_existing:nn { chronos@digwyddiad@lliw@rhagosodedig }
1042         { chronos@prifliw }
1043       \__chronos_color_set_from_existing:nn { chronos@parhad@lliw@rhagosodedig }
1044         { chronos@prifliw }
1045       \__chronos_color_set_from_existing:nn { chronos@theori@lliw@rhagosodedig }
1046         { chronos@prifliw }
1047       \__chronos_color_set_from_existing:nn { chronos@gwybodaeth@lliw@rhagosodedig }
1048         { chronos@prifliw }

1049       \__chronos_keys_set_exclude_groups:nnn { chronos / lliwiau }
1050         { core, core ~ derivative, core ~ border } { #3 }
1051       \@ifpackageloaded{memoize}
1052       {
1053         \mmzset { csname ~ meaning ~ to ~ context={ __chronos_lliwiau_#2 : } }
1054       }-{}
1055     }
1056     \cs_new_eq:cc { chronos@lliwiau@#2 } { __chronos_lliwiau_#2 : }
1057   \group_end:
1058 }
1059 \cs_new_eq:NN \chronosnewcolorscheme \chronosnewcolourscheme

1060 \ExplSyntaxOff

1061 \newlength{\chronos@diwedd@diwedd}
1062 \newlength{\chronos@dechrau@dechrau}
1063 \newlength{\chronos@byw@border}
1064 \newlength{\chronos@parhad@border}
1065 \newlength{\chronos@digwyddiad@border}
1066 \newlength{\chronos@byw@border@inv}
1067 \newlength{\chronos@parhad@border@inv}
1068 \newlength{\chronos@digwyddiad@border@inv}

1069 \newlength{\chronos@templgtha}
1070 \newlength{\chronos@templgthb}
1071 \newlength{\chronos@templgthc}

1072 \newdimen\chronos@borderheight
1073 \newdimen\chronos@height
1074 \newdimen\chronos@width
1075 \chronos@width=\textwidth
1076 \newdimen\chronos@eramargin
1077 \newdimen\chronos@timelinemargin

```

1078 \newdimen\chronos@inner@halfheight  
1079 \newdimen\chronos@outer@halfheight  
  
1080 \newdimen\chronos@pgflinewidth@saved  
1081 \newdimen\chronos@border@de  
1082 \newdimen\chronos@border@chwith  
1083 \newdimen\chronos@border@penawdau  
1084 \newdimen\chronos@border@pen  
1085 \newdimen\chronos@border@gwaelod  
1086 \newdimen\chronos@border@allanol  
1087 \newdimen\chronos@subheading@drop@uchod  
1088 \newdimen\chronos@subheading@drop@isod  
1089 \newdimen\chronos@heading@drop  
1090 \newdimen\chronos@llinell@yshift  
1091 \newdimen\chronos@llinell@yshift@base  
1092 \newdimen\chronos@llinell@add@yshift  
1093 \newdimen\chronos@testun@yshift  
1094 \newdimen\chronos@baselineskip  
1095 \newdimen\chronos@cylchtheori@mawr  
1096 \newdimen\chronos@cylchtheori@bach  
1097 \newdimen\chronos@tmpdimena  
1098 \newdimen\chronos@tmpdimenb  
1099 \chronos@testun@yshift=5pt  
1100 \chronos@height=\pi pt  
1101 \chronos@borderheight=\pi pt  
1102 \chronos@llinell@yshift=\pi pt  
1103 \chronos@llinell@yshift@base=\pi pt  
1104 \chronos@llinell@add@yshift=0pt  
1105 \chronos@timelinemargin=15pt  
1106 \chronos@eramargin=15pt  
1107 \chronos@border@allanol=5pt  
1108 \chronos@border@penawdau=\pi pt  
1109 \chronos@border@pen=0pt  
1110 \chronos@border@de=0pt  
1111 \chronos@border@gwaelod=0pt  
1112 \chronos@border@chwith=0pt  
1113 \chronos@cylchtheori@mawr=15pt  
1114 \chronos@cylchtheori@bach=9pt  
  
1115 \newcounter{chronos@date}  
1116 \newcounter{chronos@startdate}  
1117 \newcounter{chronos@enddate}  
1118 \newcounter{chronos@startyear}  
1119 \newcounter{chronos@startmarkyear}  
1120 \newcounter{chronos@endyear}  
1121 \newcounter{chronos@yeardate}  
1122 \newcounter{chronos@thingdate}  
1123 \newcounter{chronos@otherthingdate}  
1124 \newcounter{chronos@genidate}  
1125 \newcounter{chronos@marwdate}  
1126 \newcounter{chronos@digdate}  
1127 \newcounter{chronos@weekday}  
1128 \newcounter{chronos@theori@countanchors}  
1129 \newcounter{chronos@tempcnta}  
1130 \newcounter{chronos@tempcntb}  
1131 \newcounter{chronos@tempcntc}  
1132 \newcounter{chronos@tempadate}  
1133 \newcounter{chronos@tempbdate}  
1134 \newcounter{chronos@bagpuss}

Internal pre/2e booleans.

1135 \newif\ifchronos@marks  
1136 \chronos@markstrue  
1137 \newif\ifchronos@marks@minor  
1138 \chronos@marks@minortrue  
1139 \newif\ifchronos@marks@bare  
1140 \chronos@marks@barefalse  
1141 \newif\ifchronos@timeline@showyears  
1142 \chronos@timeline@showyearstrue  
1143 \newif\ifchronos@eventyearsonline  
1144 \chronos@eventyearsonlinefalse  
1145 \newif\ifchronos@yearzero  
1146 \chronos@yearzerofalse  
1147 \newif\ifchronos@markateraswitch  
1148 \chronos@markateraswitchfalse  
1149 \newif\ifchronos@onlytext  
1150 \chronos@onlytextfalse  
1151 \newif\ifchronos@markeras  
1152 \chronos@markerasfalse  
1153 \newif\ifchronos@yearsonline  
1154 \chronos@yearsonlinefalse  
1155 \newif\ifchronos@eventdatessplit  
1156 \chronos@eventdatessplitfalse  
1157 \newif\ifchronos@minoryears  
1158 \chronos@minoryearstrue  
1159 \newif\ifchronos@byw@isod  
1160 \chronos@byw@isodfalse  
1161 \newif\ifchronos@byw@isod@rhag  
1162 \chronos@byw@isod@rhagfalse  
1163 \newif\ifchronos@every@byw@isod  
1164 \chronos@every@byw@isodfalse  
1165 \newif\ifchronos@every@byw@uchod  
1166 \chronos@every@byw@uchodfalse  
1167 \newif\ifchronos@byw@cysylltiad  
1168 \chronos@byw@cysylltiadtrue  
1169 \newif\ifchronos@byw@cysylltiadtheori  
1170 \chronos@byw@cysylltiadtheorifalse  
1171 \newif\ifchronos@digwyddiad@isod  
1172 \chronos@digwyddiad@isodfalse  
1173 \newif\ifchronos@digwyddiad@isod@rhag  
1174 \chronos@digwyddiad@isod@rhagfalse  
1175 \newif\ifchronos@every@digwyddiad@isod  
1176 \chronos@every@digwyddiad@isodfalse  
1177 \newif\ifchronos@every@digwyddiad@uchod  
1178 \chronos@every@digwyddiad@uchodfalse  
1179 \newif\ifchronos@digwyddiad@cysylltiad  
1180 \chronos@digwyddiad@cysylltiadtrue  
1181 \newif\ifchronos@digwyddiad@cysylltiadtheori  
1182 \chronos@digwyddiad@cysylltiadtheorifalse  
1183 \newif\ifchronos@parhad@isod  
1184 \chronos@parhad@isodfalse  
1185 \newif\ifchronos@parhad@isod@rhag  
1186 \chronos@parhad@isod@rhagfalse  
1187 \newif\ifchronos@every@parhad@isod  
1188 \chronos@every@parhad@isodfalse  
1189 \newif\ifchronos@every@parhad@uchod  
1190 \chronos@every@parhad@uchodfalse  
1191 \newif\ifchronos@parhad@cysylltiad  
1192 \chronos@parhad@cysylltiadtrue  
1193 \newif\ifchronos@parhad@cysylltiadtheori  
1194 \chronos@parhad@cysylltiadtheorifalse  
1195 \newif\ifchronos@theori@isod

```
1196 \chronos@theori@isodfalse
1197 \newif\ifchronos@theori@cysylltiadtheori
1198 \chronos@theori@cysylltiadtheorifalse
1199 \newif\ifchronos@cam@mod
1200 \newif\ifchronos@middleanchorborder
1201 \newif\ifchronos@troilliwiiau
1202 \chronos@troilliwiiautru
1203 \newif\ifchronos@dangoscyfnodau
1204 \chronos@dangoscyfnodautru
1205 \newif\ifchronos@felymae
1206 \chronos@felymaefalse
1207 \newif\ifchronos@temp
1208 \chronos@temptrue
1209 \newif\ifchronos@headings
1210 \chronos@headingsfalse
1211 \newif\ifchronos@frame
1212 \chronos@framefalse
1213 \newif\ifchronos@framedefnyddiobb
1214 \chronos@framedefnyddiobbtrue
1215 \newif\ifchronos@placeholders
1216 \chronos@placeholdersfalse
1217 \newif\ifchronos@showcoords
1218 \chronos@showcoordsfalse
1219 \newif\ifchronos@showbb
1220 \chronos@showbbfalse
1221 \newif\ifchronos@shownodes
1222 \chronos@shownodesfalse
1223 \newif\ifchronos@bufarw
1224 \chronos@bufarwtrue
1225 \newif\ifchronos@gorffenedig
1226 \chronos@gorffenedigtrue
1227 \newif\ifchronos@preset
1228 \chronos@presettrue
1229 \newif\ifchronos@blynyddoedduchod
1230 \chronos@blynyddoedduchodfalse
1231 \newif\ifchronos@blynyddoeddisod
1232 \chronos@blynyddoeddisodfalse
1233 \newif\ifchronos@dimondblynyddoedd
1234 \chronos@dimondblynyddoeddfalse
1235 \newif\ifchronos@tag@cysylltu
1236 \chronos@tag@cysylltutru
1237 \newif\ifchronos@copyleft
1238 \chronos@copyleftfalse
1239 \newif\ifchronos@phantom
1240 \chronos@phantomfalse
1241 \newif\ifchronostimelinearrow
1242 \chronostimelinearrowfalse
```

Whether text tag is to be split (and this is the first bit). We can't use `\ifchronos@eventdatessplit` when splitting the tag as that is true during the entire element creation.

```
1243 \newif\ifchronos@hollti@testun@tag
1244 \chronos@hollti@testun@tagfalse

1245 \let\chronos@coords\@empty
1246 \def\chronos@ce{CE}
1247 \def\chronos@bce{BCE}
1248 \def\chronos@yearce{\textsc{ce}}
1249 \def\chronos@yearbce{\textsc{bce}}
1250 \def\chronos@yshift{0pt}
1251 \def\chronos@ffont@camaumawr{\sffamily\bfseries}
1252 \def\chronos@ffont@camaubach{\sffamily}
```

```
1253 \def\chronos@ffont@cyfnodau{\sffamily\bfseries}
```

```
1254 \def\chronos@uchod{0}
```

```
1255 \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

LPLP permission: <https://tex.stackexchange.com/users/2975/martin-scharrer>

```
1256 \let\orig@settodim\@settodim
```

```
1257 \let\chronos@settodim\@settodim
```

```
1258 \patchcmd{\chronos@settodim}{\setbox\@tempboxa\hbox}{\chronos@tikz@setbox}{-}{-}
```

```
1259 \def\chronos@tikz@setbox#1{%
```

```
1260 \setbox\@tempboxa\hbox{\pgfinterruptpicture #1\endpgfinterruptpicture}%
```

```
1261 }
```

```
1262 \appto\tikz@installcommands{%
```

```
1263 \let\@settodim\chronos@settodim
```

```
1264 }
```

```
1265 \appto\tikz@uninstallcommands{%
```

```
1266 \let\@settodim\orig@settodim
```

```
1267 }
```

Blue Copied from xcolor.sty, x11names.def, svgnames.def

```
Blue3 1268 \definecolorset{rgb}{chronos}{-}{% xcolor.sty, x11names.def, svgnames.def
DarkGoldenrod1 1269 Blue,0,0,1;%
DarkGray 1270 Blue3,0,0,.804;%
DarkOrange1 1271 DarkGoldenrod1,1,.725,.06;%
DarkOrchid3 1272 DarkGray,.664,.664,.664;%
DarkSlateGrey 1273 DarkOrange1,1,.498,0;%
DeepPink2 1274 DarkOrchid3,.604,.196,.804;%
DeepSkyBlue2 1275 DarkSlateGrey,.185,.31,.31;%
DodgerBlue1 1276 DeepPink2,.932,.07,.536;%
DodgerBlue2 1277 DeepSkyBlue2,0,.698,.932;%
DodgerBlue3 1278 DodgerBlue1,.116,.565,1;%
DodgerBlue4 1279 DodgerBlue2,.11,.525,.932;%
Firebrick1 1280 DodgerBlue3,.094,.455,.804;%
ForestGreen 1281 DodgerBlue4,.064,.305,.545;%
Green 1282 Firebrick1,1,.19,.19;%
Green3 1283 ForestGreen,.132,.545,.132;%
Ivory2 1284 Green,0,.5,0;%
Ivory3 1285 Green3,0,.804,0;%
Ivory4 1286 Ivory2,.932,.932,.88;%
Lavender 1287 Ivory3,.804,.804,.756;%
LavenderBlush1 1288 Ivory4,.545,.545,.512;%
LavenderBlush2 1289 Lavender,.9,.9,.98;%
LavenderBlush3 1290 LavenderBlush1,1,.94,.96;%
LavenderBlush4 1291 LavenderBlush2,.932,.88,.898;%
MediumPurple 1292 LavenderBlush3,.804,.756,.772;%
MidnightBlue 1293 LavenderBlush4,.545,.512,.525;%
MistyRose2 1294 MediumPurple,.576,.44,.86;%
MistyRose3 1295 MidnightBlue,.098,.098,.44;%
MistyRose4 1296 MistyRose2,.932,.835,.824;%
Orange 1297 MistyRose3,.804,.716,.71;%
OrangeRed1 1298 MistyRose4,.545,.49,.484;%
Purple0 1299 Orange,1,.648,0;%
Red 1300 OrangeRed1,1,.27,0;%
SeaGreen3 1301 Purple0,.628,.125,.94;%
Seashell12 1302 Red,1,0,0;%
Seashell13 1303 SeaGreen3,.264,.804,.5;%
Seashell14
Silver
SpringGreen4
Thistle2
Thistle3
Thistle4
```

```

1304 Seashell2,.932,.898,.87;%
1305 Seashell3,.804,.772,.75;%
1306 Seashell4,.545,.525,.51;%
1307 Silver,.752,.752,.752;%
1308 SpringGreen4,0,.545,.27;%
1309 Thistle2,.932,.824,.932;%
1310 Thistle3,.804,.71,.804;%
1311 Thistle4,.545,.484,.545;%
1312 Violet,.932,.51,.932;%
1313 Yellow,1,1,0;%
1314 darkgray,.25,.25,.25%
1315 }

```

`chronosCerulean` From `dvipsnames.def`

`chronosPeriwinkle`  
`chronosWildStrawberry`

```

1316 %^A dvipsnames.def
1317 \definecolor{chronosCerulean} {cmyk}{0.94,0.11,0,0}
1318 \definecolor{chronosPeriwinkle} {cmyk}{0.57,0.55,0,0}
1319 \definecolor{chronosWildStrawberry}{cmyk}{0,0.96,0.39,0}

```

`cronoleg colours`

```

1320 \newcommand*\chronos@lliwiau@cronoleg{%
1321   \chronos@lliwiau@isod{%
1322     chronosRed,%
1323     chronosOrange,%
1324     chronosYellow,%
1325     chronosGreen,%
1326     chronosBlue,%
1327     chronosMidnightBlue,%
1328     chronosViolet%
1329   }%
1330   \chronos@lliwiau@uchod{%
1331     chronosRed,%
1332     chronosOrange,%
1333     chronosYellow,%
1334     chronosGreen,%
1335     chronosBlue,%
1336     chronosMidnightBlue,%
1337     chronosViolet%
1338   }%
1339   \chronos@lliwiau@isod@tag{byw}{%
1340     chronosDodgerBlue3,%
1341     chronosGreen3,%
1342     chronosBlue3,%
1343     chronosSpringGreen4,%
1344     chronosDeepSkyBlue2,%
1345     chronosForestGreen,%
1346     chronosPeriwinkle,%
1347     chronosSeaGreen3%
1348   }%
1349   \chronos@lliwiau@uchod@tag{byw}{%
1350     chronosDeepPink2,%
1351     chronosDarkOrange1,%
1352     chronosFirebrick1,%
1353     chronosPurple0,%
1354     chronosWildStrawberry,%
1355     chronosOrangeRed1,%
1356     chronosDarkGoldenrod1,%
1357     chronosDarkOrchid3%
1358   }%
1359   \chronos@lliwiau@isod@tag{digwyddiad}{%

```

```

1360     chronosSeashell4,%
1361     chronosSeashell4!.5!chronosSeashell3,%
1362     chronosSeashell3,%
1363     chronosSeashell3!.5!chronosSeashell2,%
1364     chronosSeashell2%
1365 }%
1366 \chronos@lliwiau@uchod@tag{digwyddiad}{%
1367     chronosThistle4,%
1368     chronosThistle4!.5!chronosThistle3,%
1369     chronosThistle3,%
1370     chronosThistle3!.5!chronosThistle2,%
1371     chronosThistle2%
1372 }%
1373 \chronos@lliwiau@isod@tag{parhad}{%
1374     chronosIvory4,%
1375     chronosIvory4!.5!chronosIvory3,%
1376     chronosIvory3,%
1377     chronosIvory3!.5!chronosIvory2,%
1378     chronosIvory2%
1379 }%
1380 \chronos@lliwiau@uchod@tag{parhad}{%
1381     chronosMistyRose4,%
1382     chronosMistyRose4!.5!chronosMistyRose3,%
1383     chronosMistyRose3,%
1384     chronosMistyRose3!.5!chronosMistyRose2,%
1385     chronosMistyRose2%
1386 }%

1387 \colorlet{chronos@prifliw}{black}% prifliw
1388 \colorlet{chronos@prifliw@cefndir}{white}% prifliw cefndir
1389 \colorlet{chronos@lliw@cefndir@llinell}{black}%^^A oedd lliw cefndir amser?
1390 \colorlet{chronos@lliw@llinell}{white}%^^A oedd lliw amser

1391 \colorlet{chronos@lliw@theori}{white}%
1392 \colorlet{chronos@lliw@cefndir@theori}{black}%
1393 \colorlet{chronos@lliw@cefndir@gwybodaeth}{chronos@prifliw!25!chronos@prifliw@cefndir}%^^A
    lliw cefndir ee = prifliw!25!prifliw cefndir
1394 \colorlet{chronos@lliw@gwybodaeth}{chronos@prifliw}% lliw ee = prifliw

1395 }

default colours

1396 \newcommand*\chronos@lliwiau@rhagosodedig{%
1397     \chronos@lliwiau@isod{%
1398         chronosRed,%
1399         chronosOrange,%
1400         chronosYellow,%
1401         chronosGreen,%
1402         chronosBlue,%
1403         chronosMidnightBlue,%
1404         chronosViolet%
1405     }%
1406 \chronos@lliwiau@uchod{%
1407     chronosRed,%
1408     chronosOrange,%
1409     chronosYellow,%
1410     chronosGreen,%
1411     chronosBlue,%
1412     chronosMidnightBlue,%
1413     chronosViolet%
1414 }%

```

```

1415 \colorlet{chronos@prifliw}{black}%^^A prifliw
1416 \colorlet{chronos@prifliw@cefndir}{white}%^^A prifliw cefndir
1417 \colorlet{chronos@lliw@cefndir@llinell}{black}%^^A oedd lliw cefndir amser?
1418 \colorlet{chronos@lliw@llinell}{white}%^^A oedd lliw amser

1419 \colorlet{chronos@lliw@theori}{white}%
1420 \colorlet{chronos@lliw@cefndir@theori}{black}%
1421 \colorlet{chronos@lliw@cefndir@gwybodaeth}
1422 {chronos@prifliw!25!chronos@prifliw@cefndir}%^^A lliw cefndir ee = prifliw!25!prifliw
cefndir
1423 \colorlet{chronos@lliw@gwybodaeth}{chronos@prifliw}%^^A lliw ee = prifliw

1424 \colorlet{chronos@borderouter}{chronos@prifliw@cefndir}%
1425 \colorlet{chronos@borderinner}{chronos@lliw@cefndir@llinell}%
1426 \colorlet{chronos@bordermiddle}{chronos@borderouter!50!chronos@borderinner}%

1427 }

```

we need an English alias here

```

1428 \chronos@lliwiau@rhagosodedig
1429 \let\chronos@lliwiau@default\chronos@lliwiau@rhagosedig

```

`\testunteit1` Main title tag.

#1: opsiwn: style for node #2: enw sy'n cael ei ddefnyddio dwywaith -> node name + node content (`\chronos@testunteit1@priflythrennu`) #3: opsiwn: content y node #4: first node for horizontal (x) placement #5: second node for horizontal (x) placement (average taken) #6: () required: node for vertical (y) placement

```

1430 \NewDocumentCommand \testunteit1 { 0 {/chronos/@amserau} m o m m r() }{%^^A <<<
1431 \coordinate (chronos@coord@temp) at ($(#4)!1/2!(#5)$);
1432 \IfValueTF {#3}{\def\chronos@tempa{#3}}{%
1433 \edef\chronos@tempa{\chronos@testunteit1@priflythrennu{#2}}%
1434 }%
1435 \node (#2) [anchor=base,#1] at (#6 -| chronos@coord@temp) {\chronos@tempa};
1436 \ifchronos@shownodes
1437 \begin{scope}[on chronos overlay layer]
1438 \draw [help lines, draw=chronos@lliw@node] (#2.north east)
1439 -| (#2.south west) -| cycle;
1440 \end{scope}%
1441 \fi
1442 }% >>>

```

Number format from fixedpointarithmetic.

```

1443 \pgfkeys{/pgf/number format,
1444 int detect,
1445 set thousands separator={},
1446 }

```

Layers

```

1447 \pgfqkeys{/chronos}{%
1448 declare layer/.code={%\DeclareDocumentCommand
1449 \pgfdeclarelayer{chronos #1}%
1450 },
1451 declare layer/.list={background,middle ground,foreground,overlay},
1452 }
1453 \IfFileExists{tikzlibrarycfrforeground.code.tex}{%
1454 \def\chronos@layers{%
1455 background,%
1456 chronos background,%
1457 chronos middle ground,%

```

```

1458     main,%
1459     chronos foreground,%
1460     chronos overlay,%
1461     foreground%
1462 }%
1463 }{%
1464 \def\chronos@layers{%
1465     background,%
1466     chronos background,%
1467     chronos middle ground,%
1468     main,%
1469     chronos foreground,%
1470     chronos overlay%
1471 }%
1472 }
1473 \pgfqkeys{/chronos}{%
1474     create layer/.code={%
1475         \tikzset{%

```

adapted from `tex/generic/pgf/frontendlayer/tikz/libraries/tikzlibrarybackgrounds.code.tex`

```

1476         on chronos #1 layer/.style={%
1477             execute at begin scope={%
1478                 \pgfonlayer{chronos #1}%
1479                 \let\tikz@options=\pgfutil@empty%
1480                 \tikzset{every on chronos #1 layer/.try,##1}%
1481                 \tikz@options%
1482             },
1483             execute at end scope={\endpgfonlayer}
1484         },
1485     }%
1486 },
1487 create layer/.list={background,middle ground,foreground,overlay},
1488 }

```

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/>

```

1489 \def\pgf@sm@shape@name{rectangle}
1490 \pgf@sh@savedanchor\middlenortheast{%
1491     \pgf@x=\the\wd\pgfnodeparttextbox%
1492     \pgfmathsetlength\pgf@xc{\pgfkeysvalueof{/pgf/inner xsep}}%
1493     \advance\pgf@x by 2\pgf@xc%
1494     \pgfmathsetlength\pgf@xb{\pgfkeysvalueof{/pgf/minimum width}}%
1495     \ifdim\pgf@x<\pgf@xb
1496         \pgf@x=\pgf@xb
1497     \fi
1498     \pgf@x=.5\pgf@x\advance\pgf@x by.5\wd\pgfnodeparttextbox%
1499     \pgf@y=\ht\pgfnodeparttextbox\advance\pgf@y by\dp\pgfnodeparttextbox%
1500     \pgfmathsetlength\pgf@yc{\pgfkeysvalueof{/pgf/inner ysep}}%
1501     \advance\pgf@y by 2\pgf@yc%
1502     \pgfmathsetlength\pgf@yb{\pgfkeysvalueof{/pgf/minimum height}}%
1503     \ifdim\pgf@y<\pgf@yb
1504         \pgf@y=\pgf@yb
1505     \fi
1506     \pgf@y=.5\pgf@y\advance\pgf@y by-.5\dp\pgfnodeparttextbox%
1507     \advance\pgf@y by.5\ht\pgfnodeparttextbox%
1508 }
1509 \pgf@sh@savedanchor\middlesouthwest{%
1510     \pgf@x=\wd\pgfnodeparttextbox%

```

```

1511 \pgfmathsetlength\pgf@xc{\pgfkeysvalueof{/pgf/inner xsep}}
1512 \advance\pgf@x by 2\pgf@xc%
1513 \pgfmathsetlength\pgf@xb{\pgfkeysvalueof{/pgf/minimum width}}%
1514 \ifdim\pgf@x<\pgf@xb
1515   \pgf@x=\pgf@xb
1516 \fi
1517 \pgf@x=-.5\pgf@x\advance\pgf@x by.5\wd\pgfnodeparttextbox%
1518 \pgf@y=\ht\pgfnodeparttextbox%
1519 \advance\pgf@y by\dp\pgfnodeparttextbox%
1520 \pgfmathsetlength\pgf@yc{\pgfkeysvalueof{/pgf/inner ysep}}%
1521 \advance\pgf@y by 2\pgf@yc%
1522 \pgfmathsetlength\pgf@yb{\pgfkeysvalueof{/pgf/minimum height}}%
1523 \ifdim\pgf@y<\pgf@yb
1524   \pgf@y=\pgf@yb
1525 \fi
1526 \pgf@y=-.5\pgf@y%
1527 \advance\pgf@y by-.5\dp\pgfnodeparttextbox%
1528 \advance\pgf@y by.5\ht\pgfnodeparttextbox%
1529 }
1530 \pgf@sh@anchor{middle north east}{\middenortheast}
1531 \pgf@sh@anchor{middle south west}{\middlesouthwest}
1532 \pgf@sh@anchor{middle south east}{\middenortheast\pgf@xa=\pgf@x%
1533   \middlesouthwest\pgf@x=\pgf@xa}
1534 \pgf@sh@anchor{middle north west}{\middlesouthwest\pgf@xa=\pgf@x%
1535   \middenortheast\pgf@x=\pgf@xa}
1536 \pgf@sh@anchor{middle north}{%
1537   \pgf@process{\middlesouthwest}}%
1538   \pgf@xa=.5\pgf@x%
1539   \pgf@process{\middenortheast}}%
1540   \pgf@x=.5\pgf@x\advance\pgf@x by \pgf@xa
1541 }
1542 \pgf@sh@anchor{middle south}{%
1543   \pgf@process{\middenortheast}}%
1544   \pgf@xa=.5\pgf@x%
1545   \pgf@process{\middlesouthwest}}%
1546   \pgf@x=.5\pgf@x\advance\pgf@x by \pgf@xa
1547 }
1548 \pgf@sh@anchor{middle west}{%
1549   \pgf@process{\middenortheast}}%
1550   \pgf@ya=.5\pgf@y%
1551   \pgf@process{\middlesouthwest}}%
1552   \pgf@y=.5\pgf@y%
1553   \advance\pgf@y by \pgf@ya
1554 }
1555 \pgf@sh@anchor{middle east}{%
1556   \pgf@process{\middlesouthwest}}%
1557   \pgf@ya=.5\pgf@y%
1558   \pgf@process{\middenortheast}}%
1559   \pgf@y=.5\pgf@y%
1560   \advance\pgf@y by \pgf@ya
1561 }
1562 \pgf@sh@anchorborder{%
1563   \pgf@xb=\pgf@x\pgf@yb=\pgf@y%
1564   \ifchronos@middleanchorborder
1565     \middlesouthwest%
1566   \else
1567     \southwest
1568   \fi
1569   \pgf@xa=\pgf@x\pgf@ya=\pgf@y
1570   \ifchronos@middleanchorborder
1571     \middenortheast%

```

```

1572 \else
1573 \northeast%
1574 \fi
1575 \advance\pgf@x by-\pgf@xa%
1576 \advance\pgf@y by-\pgf@ya%
1577 \pgf@xc=.5\pgf@x\pgf@yc=.5\pgf@y%
1578 \advance\pgf@xa by\pgf@xc%
1579 \advance\pgf@ya by\pgf@yc%
1580 \edef\pgf@marshal{\noexpand\pgfpointborderrectangle
1581   {\noexpand\pgfqpoint{\the\pgf@xb}{\the\pgf@yb}}%
1582   {\noexpand\pgfqpoint{\the\pgf@xc}{\the\pgf@yc}}%
1583 }%
1584 \pgf@process{\pgf@marshal}\advance\pgf@x by\pgf@xa\advance\pgf@y by\pgf@ya%
1585 }
1586 \tikzset{%
1587 /chronos/middle anchorborder/.is if=chronos@middleanchorborder,
1588 }

```

Context initialisation.

Now have up to six stages of config, application and one auxiliary. Double first arg. 1. Prevent tag/default properties from being affected. 2. First stage of date-related key setup. 3. Common housekeeping. Install (apply) properties. 4. Filter keys. 5. Second stage of date-related key setup (formats).

```

1589 \protected\def\chronos@cyd@destun@init@craidd#1#2{% byw, digwyddiad, parhad
1590 \chronos@cyd@destun@init@un@nodweddion
1591 \chronos@cyd@destun@init@dau@dyddiadau{#1}%
1592 \chronos@cyd@destun@init@tri{#1}%
1593 \chronos@gosod@nodweddion{#1}%
1594 \chronos@cyd@destun@init@pedwar@filter{#1}{#2}%
1595 \chronos@cyd@destun@init@pump@dyddiadau{#1}%
1596 }
1597 \protected\def\chronos@cyd@destun@init@sylfaenol#1#2{% theori, gwybodaeth
1598 \chronos@cyd@destun@init@sylfaenol@aux{#1}{#1}{#2}%
1599 }
1600 \protected\def\chronos@cyd@destun@init@sylfaenol@aux#1#2#3{% cylch theori [theori, gwybodaeth
1601 \chronos@cyd@destun@init@un@nodweddion
1602 \chronos@cyd@destun@init@tri{#2}%
1603 \chronos@gosod@nodweddion{#2}%
1604 \chronos@cyd@destun@init@pedwar@filter{#1}{#3}%
1605 }
1606 \protected\def\chronos@cyd@destun@init@star#1#2{% prif, hawfaint
1607 \chronos@cyd@destun@init@un@nodweddion
1608 \chronos@cyd@destun@init@tri{#1}%
1609 \chronos@cyd@destun@init@pedwar@filter{#1}{#2}%
1610 }
1611 \protected\def\chronos@cyd@destun@init@un@nodweddion{% ^A oes angen \relax yn y fan hon?
1612 \def\chronos@ychwanegu@nodweddion##1##2##3{\relax}%
1613 \def\chronos@ychwanegu@nodweddion@rhag##1##2{\relax}%
1614 \def\chronos@cadw@nodweddion##1##2##3{\relax}%
1615 \def\chronos@cadw@nodweddion@rhag##1##2{\relax}%
1616 }

```

first stage of date processing

```

1617 \protected\def\chronos@cyd@destun@init@dau@dyddiadau#1{%
1618 \pgfqkeys{/chronos}{% paid ag ychwanegu i property lists rhagosodedig mewn cyd-destun
1619 lleoll

```

don't add to default property lists in a local context

```

1619 blynnyddoedd yn unig/.code={%

```

```

1620     \chronos@dimondblynyddoeddtrue
1621     \ifchronos@dangoscyfnodau
1622     \pgfqkeys{/chronos/#1/dangos cyfnodau}{@blynyddoedd yn unig}%
1623     \else
1624     \pgfqkeys{/chronos/#1/heb gyfnodau}{@blynyddoedd yn unig}%
1625     \fi
1626 },
1627 dyddiadau llawn/.code={%
1628     \chronos@dimondblynyddoeddfalse
1629     \ifchronos@dangoscyfnodau
1630     \pgfqkeys{/chronos/#1/dangos cyfnodau}{@llawn}%
1631     \else
1632     \pgfqkeys{/chronos/#1/heb gyfnodau}{@llawn}%
1633     \fi
1634 },
1635 dangos cyfnodau/.code={%
1636     \chronos@dangoscyfnodaufalse
1637     \ifchronos@dimondblynyddoedd
1638     \pgfqkeys{/chronos/#1/dangos cyfnodau}{@blynyddoedd yn unig}%
1639     \else
1640     \pgfqkeys{/chronos/#1/dangos cyfnodau}{@llawn}%
1641     \fi
1642 },
1643 heb gyfnodau/.code={%
1644     \chronos@dangoscyfnodaufalse
1645     \ifchronos@dimondblynyddoedd
1646     \pgfqkeys{/chronos/#1/heb gyfnodau}{@blynyddoedd yn unig}%
1647     \else
1648     \pgfqkeys{/chronos/#1/heb gyfnodau}{@llawn}%
1649     \fi
1650 },
1651 }%
1652 }
1653 \protected\def\chronos@cyd@destun@init@tri#1{%
1654     \pgfqkeys{/chronos}{%^^A paid ag ychwanegu i property lists rhagosodedig mewn cyd-destun
1655     lleoll | ditto
1656     tags/.code={\pgfqkeys{/chronos}{@tag/.style={##1}}},
1657     tags+/.code={\pgfqkeys{/chronos}{@tag/.append style={##1}}},
1658     testunau/.code={\pgfqkeys{/chronos}{@testun/.style={##1}}},
1659     testunau+/.code={\pgfqkeys{/chronos}{@testun/.append style={##1}}},
1660     cysylltiadau/.code={\pgfqkeys{/chronos}{@cysylltiad/.style={##1}}},
1661     cysylltiadau+/.code={\pgfqkeys{/chronos}{@cysylltiad/.append style={##1}}},
1662     cysylltwyr chronos'/.code={\pgfqkeys{/chronos}{@cysylltwr@chronos/.style={##1}}},
1663     cysylltwyr chronos+/.code={%
1664         \pgfqkeys{/chronos}{@cysylltwr@chronos/.append style={##1}}%
1665     },
1666     cysylltwyr testun'/.code={\pgfqkeys{/chronos}{@cysylltwr@testun/.style={##1}}},
1667     cysylltwyr testun+/.code={\pgfqkeys{/chronos}{@cysylltwr@testun/.append style={##1}}},
1668     prif gysylltwyr testun'/.code={%
1669         \pgfqkeys{/chronos}{@cysylltwr@testun@prif/.style={##1}}%
1670     },
1671     prif gysylltwyr testun+/.code={%
1672         \pgfqkeys{/chronos}{@cysylltwr@testun@prif/.append style={##1}}%
1673     },
1674     llinellau/.code={\pgfqkeys{/chronos}{@llinell/.style={##1}}},
1675     llinellau+/.code={\pgfqkeys{/chronos}{@llinell/.append style={##1}}},
1676     phantom/.is if=chronos@phantom,
1677     phantom/.default=true,
1678     troi lliwiau/.is if=chronos@troilliwiau,
1679     troi lliwiau/.default=true,
1680     testun yshift/.chronos dimen=\chronos@testun@yshift,

```

```

1680 #1/tag'/.code={\pgfqkeys{/chronos}{@tag/.style={##1}}},
1681 #1/testun'/.code={\pgfqkeys{/chronos}{@testun/.style={##1}}},
1682 #1/cysylltiad'/.code={\pgfqkeys{/chronos}{@cysylltiad/.style={##1}}},
1683 #1/llinell'/.code={\pgfqkeys{/chronos}{@llinell/.style={##1}}},
1684 #1/cysylltwr chronos'/.code={%
1685   \pgfqkeys{/chronos}{@cysylltwr@chronos/.style={##1}}%
1686 },
1687 #1/cysylltwr testun'/.code={%
1688   \pgfqkeys{/chronos}{@cysylltwr@testun/.style={##1}}%
1689 },
1690 #1/prif gysylltwr testun'/.code={%
1691   \pgfqkeys{/chronos}{@cysylltwr@testun@prif/.style={##1}}%
1692 },
1693 #1/tag+/.code={\pgfqkeys{/chronos}{@tag/.append style={##1}}},
1694 #1/testun+/.code={\pgfqkeys{/chronos}{@testun/.append style={##1}}},
1695 #1/cysylltiad+/.code={\pgfqkeys{/chronos}{@cysylltiad/.append style={##1}}},
1696 #1/llinell+/.code={\pgfqkeys{/chronos}{@llinell/.append style={##1}}},
1697 #1/cysylltwr chronos+/.code={%
1698   \pgfqkeys{/chronos}{@cysylltwr@chronos/.append style={##1}}%
1699 },
1700 #1/cysylltwr testun+/.code={%
1701   \pgfqkeys{/chronos}{@cysylltwr@testun/.append style={##1}}%
1702 },
1703 #1/prif gysylltwr testun+/.code={%
1704   \pgfqkeys{/chronos}{@cysylltwr@testun@prif/.append style={##1}}%
1705 },
1706 #1/blynyddoedd yn unig/.forward to=/chronos/blynyddoedd yn unig,
1707 #1/dyddiadau llawn/.forward to=/chronos/dyddiadau llawn,
1708 #1/dangos cyfnodau/.forward to=/chronos/dangos cyfnodau,
1709 #1/heb gyfnodau/.forward to=/chronos/heb gyfnodau,
1710 #1/testun yn unig/.forward to=/chronos/testun yn unig,
1711 #1/troi lliwiau/.is if=chronos@troilliwiau,
1712 #1/troi lliwiau/.default=true,
1713 #1/phantom/.is if=chronos@phantom,
1714 #1/phantom/.default=true,
1715 #1/testun yshift/.chronos dimen=\chronos@testun@yshift,
1716 #1/lliw rhagosodedig/.code={%
1717   \edef\tempa{\csname chronos@#1@lliw\endcsname}%
1718   \edef\tempb{\csname chronos@#1@lliw@rhagosodedig\endcsname}%
1719   \expandafter\let\tempa\tempb
1720 },
1721 }%
1722 \def\chronos@cadw{}% clirio'r macro
1723 }
1724 \protected\def\chronos@cyd@destun@init@pedwar@filter#1#2{%
1725   \pgfqkeys{/pgf}{%
1726     key filters/defined/.install key filter,
1727     key filter handlers/append filtered to/.install key filter handler=\chronos@cadw,
1728   }%
1729   %^A defnyddio'r allweddau sy'n diffinio | define defined keys
1730   \pgfkeysfiltered{/chronos/#1/.cd,/chronos/@tag,#2}%
1731 }

1732 \protected\def\chronos@cyd@destun@init@pump@dyddiadau#1{%
1733 %^A set date formats, whether showing eras, whether using full dates
1734 \chronos@if@gosodF{@#1@fformatiau@dyddiadau}{%
1735   \ifchronos@dimondblynyddoedd
1736     \ifchronos@dangoscyfnodau
1737       \pgfqkeys{/chronos/#1/dangos cyfnodau}{@blynyddoedd yn unig}%
1738     \else
1739       \pgfqkeys{/chronos/#1/heb gyfnodau}{@blynyddoedd yn unig}%

```

```

1740     \fi
1741   \else
1742     \ifchronos@dangoscyfnodau
1743       \pgfqkeys{/chronos/#1/dangos cyfnodau}{@llawn}%
1744     \else
1745       \pgfqkeys{/chronos/#1/heb gyfnodau}{@llawn}%
1746     \fi
1747   \fi
1748 }%
1749 }% >>>

1750 \tikzset{%
1751 /handlers/.chronos dimen/.code={%
1752   \pgfkeysdef{\pgfkeyscurrentpath}{%
1753     \pgfmathparse{##1}%
1754     #1=\pgfmathresult pt
1755   }%
1756   \pgfkeysdef{\pgfkeyscurrentpath'}{##1}%
1757   \pgfkeysdef{\pgfkeyscurrentpath'+}{\advance #1 by ##1}%
1758   \pgfkeysdef{\pgfkeyscurrentpath'-}{\advance #1 by -##1}%
1759   \pgfkeysdef{\pgfkeyscurrentpath+}{%
1760     \pgfmathparse{##1}%
1761     \advance #1 by \pgfmathresult pt
1762   }%
1763   \pgfkeysdef{\pgfkeyscurrentpath-}{%
1764     \pgfmathparse{##1}%
1765     \advance #1 by -\pgfmathresult pt
1766   }%
1767 },
1768 /handlers/.chronos 2 dimens/.code 2 args={%
1769   \pgfkeysdefargs{\pgfkeyscurrentpath}{##1:##2}{%
1770     \pgfmathparse{##1}%
1771     #1=\pgfmathresult pt
1772     \pgfmathparse{##2}%
1773     #2=\pgfmathresult pt
1774   }%
1775   \pgfkeysdefargs{\pgfkeyscurrentpath'}{##1:##2}{%
1776     #1=##1
1777     #2=##2
1778   }%
1779   \pgfkeysdefargs{\pgfkeyscurrentpath'+}{##1:##2}{%
1780     \advance #1 by ##1
1781     \advance #2 by ##2
1782   }%
1783   \pgfkeysdefargs{\pgfkeyscurrentpath'-}{##1:##2}{%
1784     \advance #1 by -##1
1785     \advance #2 by -##2
1786   }%
1787   \pgfkeysdefargs{\pgfkeyscurrentpath+}{##1:##2}{%
1788     \pgfmathparse{##1}\advance #1 by \pgfmathresult pt
1789     \pgfmathparse{##2}\advance #2 by \pgfmathresult pt
1790   }%
1791   \pgfkeysdefargs{\pgfkeyscurrentpath-}{##1:##2}{%
1792     \pgfmathparse{##1}\advance #1 by -\pgfmathresult pt
1793     \pgfmathparse{##2}\advance #2 by -\pgfmathresult pt
1794   }%
1795 },
1796 /handlers/.chronos layer choice/.code={%

```

`\chronos@ychwanegu@gosod` tracks the setting so if a user sets the layer explicitly, `chronos` won't

override it

```

1797 \edef\chronos@temppgfpath{\pgfkeyscurrentpath}%
1798 \pgfkeys{%^^A set the layer to put all things of some kind on e.g. connections, lines,
      timeline border
1799 \pgfkeyscurrentpath/.is choice,
1800 \chronos@temppgfpath/.cd,
1801 background/.code={%
1802 \pgfkeys{/chronos/chronos@#1@haenen/.style={on chronos background layer}}%
1803 \chronos@ychwanegu@gosod{#1}%
1804 },
1805 middle ground/.code={%
1806 \pgfkeys{/chronos/chronos@#1@haenen/.style={on chronos middle ground layer}}%
1807 \chronos@ychwanegu@gosod{#1}%
1808 },
1809 foreground/.code={%
1810 \pgfkeys{/chronos/chronos@#1@haenen/.style={on chronos foreground layer}}%
1811 \chronos@ychwanegu@gosod{#1}%
1812 },
1813 overlay/.code={%
1814 \pgfkeys{/chronos/chronos@#1@haenen/.style=on chronos overlay layer}%
1815 \chronos@ychwanegu@gosod{#1}%
1816 },
1817 main/.code={%
1818 \pgfkeys{/chronos/chronos@#1@haenen/.style={}}%
1819 \chronos@ychwanegu@gosod{#1}%
1820 },
1821 }%
1822 },
1823 /handlers/.chronos lliw/.code={% chronos colour
1824 \pgfkeysdef{\pgfkeyscurrentpath}{\colorlet{chronos@#1}{##1}}%
1825 },
1826 /handlers/.chronos track/.code={% track setting of property by user
1827 \pgfkeys{%
1828 \pgfkeyscurrentpath/.append code={\chronos@ychwanegu@gosod{#1}},
1829 }%
1830 },
1831 /handlers/.chronos search/.code={%^^A set up search so english paths work e.g. /chronos/li
1832 \pgfkeys{%
1833 \pgfkeyscurrentpath/.unknown/.code={%
1834 \let\searchname=\pgfkeyscurrentname%
1835 \pgfkeysalso{%^^A **angen** y {} o gwmpas ##1 isod! | **need** the {} around ##1
      below!
1836 /chronos/#1/\searchname/.try={##1},
1837 /chronos/\searchname/.retry={##1},
1838 /tikz/\searchname/.retry={##1},
1839 /pgf/\searchname/.lastretry={##1}%
1840 }%
1841 },
1842 }%
1843 },
1844 /handlers/.chronos tag init/.code 2 args={%^^A initialise a chronos 'tag' e.g. life,
      event, period
1845 \pgfkeys{%
1846 \pgfkeyscurrentpath/.cd,

```

english translations below

```

1847 enw/.store in/.expand once=\csname chronos@#1@enw\endcsname,

```

create a tikz-friendly version of name, in case name contains anything problematic

```

1848     chronos@tikzname/.code={\chronos@creu@tikzname {#1}{##1}},
1849     enw/.forward to=/chronos/#1/chronos@tikzname,
1850     fel y mae/.is if=chronos@felymae,
1851     fel y mae/.default=true,
1852     llinell'/.code={\chronos@cadw@nodweddion{#1}{@llinell}{##1}},
1853     llinell+/.code={\chronos@ychwanegu@nodweddion{#1}{@llinell}{##1}},
1854     llinell/.forward to=/chronos/#1/llinell',
1855     llinell add yshift/.chronos dimen=\chronos@llinell@add@yshift,
1856     lliw/.store in/.expand once=\csname chronos@#1@lliw\endcsname,

1857     lliw rhagosodedig/.store in/.expand once=\csname chronos@#1@lliw@rhagosodedig\endcsname
1858     lliw rhagosodedig=chronos@prifliw,
1859     lliwiau uchod/.code={\chronos@lliwiau@uchod@tag{#1}{##1}},
1860     lliwiau isod/.code={\chronos@lliwiau@isod@tag{#1}{##1}},
1861     lliwiau uchod o clist/.code={\chronos@global@eq@clist{lliwiau_#1_uchod}{##1}},
1862     lliwiau isod o clist/.code={\chronos@global@eq@clist{lliwiau_#1_isod}{##1}},
1863     isod/.is if=chronos@#1@isod,
1864     uchod/.code/.expand once={\csname chronos@#1@isodfalse\endcsname},
1865     at/.store in/.expand once=\csname chronos@#1@at\endcsname,
1866     at/.expand once=\csname chronos@#1@tikzname\endcsname,

1867     at aux/.code={%
1868         \expandafter\def\expandafter\chronos@tempa{\csname chronos@#1@tikzname\endcsname}%
1869         \expandafter\def\csname chronos@#1@at\endcsname {%
1870             ##1 \chronos@tempa}},
1871     angor/.store in/.expand once=\csname chronos@#1@angor\endcsname,
1872     angor/.forward to=/tikz/anchor,
1873     cysylltu/.is if=chronos@#1@cysylltiad,
1874     cysylltiad'/.code={\chronos@cadw@nodweddion{#1}{@cysylltiad}{##1}},
1875     cysylltiad+/.code={\chronos@ychwanegu@nodweddion{#1}{@cysylltiad}{##1}},
1876     cysylltiad/.forward to=/chronos/#1/cysylltiad',
1877     cysylltwr chronos'/.code={%
1878         \chronos@cadw@nodweddion{#1}{@cysylltwr@chronos}{##1}},
1879     cysylltwr chronos+/.code={%
1880         \chronos@ychwanegu@nodweddion{#1}{@cysylltwr@chronos}{##1}},
1881     cysylltwr chronos/.forward to=/chronos/#1/cysylltwr chronos+,
1882     cysylltwr testun'/.code={%
1883         \chronos@cadw@nodweddion{#1}{@cysylltwr@testun}{##1}},
1884     cysylltwr testun+/.code={%
1885         \chronos@ychwanegu@nodweddion{#1}{@cysylltwr@testun}{##1}},
1886     cysylltwr testun/.forward to=/chronos/#1/cysylltwr testun+,
1887     ffont testun/.code={%
1888         \expandafter\def\csname chronos@#1@ffonttestun\endcsname{##1}},
1889     ffont testun=,
1890     prif gysylltwr testun'/.code={%
1891         \chronos@cadw@nodweddion{#1}{@cysylltwr@testun@prif}{##1}},
1892     prif gysylltwr testun+/.code={%
1893         \chronos@ychwanegu@nodweddion{#1}{@cysylltwr@testun@prif}{##1}},
1894     prif gysylltwr testun/.forward to=/chronos/#1/prif gysylltwr testun',
1895     tag'/.code={\chronos@cadw@nodweddion{#1}{@tag}{##1}},
1896     tag+/.code={\chronos@ychwanegu@nodweddion{#1}{@tag}{##1}},
1897     tag/.forward to=/chronos/#1/tag+,
1898     testun'/.code={\chronos@cadw@nodweddion{#1}{@testun}{##1}},
1899     testun+/.code={\chronos@ychwanegu@nodweddion{#1}{@testun}{##1}},
1900     testun/.forward to=/chronos/#1/testun',
1901     cysylltwyr+/.code={%^^A rhan o /chronos/#1; paid â ddileu fe!! | part of /chronos/#1;
don't delete it!!
1902         \csname chronos@#1@cysylltiadtheoritrue\endcsname
1903         \IfExistTF \chronos@cysylltwyr {%
1904             \expandafter\def\expandafter\chronos@cysylltwyr\expandafter{%
1905                 \chronos@cysylltwyr,##1}%
1906             }\def \chronos@cysylltwyr{##1}%

```

```

1907     },
1908     cysylltwyr'/.code={%
1909         \csname chronos@#1@cysylltiadtheoritrue\endcsname
1910         \def \chronos@cysylltwyr{##1}%
1911     },
1912     cysylltwyr/.forward to=/chronos/#1/cysylltwyr+,
1913     testun yn unig/.code={%
1914         \chronos@ychwanegu@nodweddion{#1}{@tag}{/chronos/testun yn unig}},
1915     troi lliwiau/.code={%
1916         \chronos@ychwanegu@nodweddion{#1}{@tag}{/chronos/troi lliwiau=##1}},
1917     troi lliwiau/.default=true,
1918     phantom/.code={%
1919         \chronos@ychwanegu@nodweddion{#1}{@tag}{/chronos/phantom=##1}},
1920     phantom/.default=true,
1921     cynnwys testun/.store in=\chronos@cynnwys@testun,
1922     cynnwys enw/.store in=\chronos@cynnwys@enw,
1923     cynnwys dyddiadau/.store in=\chronos@cynnwys@dyddiadau,
1924     yshift/.store in=\chronos@yshift,
1925     yshift/.forward to=yshift,
1926     testun yshift/.code={%
1927         \chronos@ychwanegu@nodweddion{#1}{@tag}{/chronos/testun yshift=##1}},
1928     testun yshift'/.code={%
1929         \chronos@ychwanegu@nodweddion{#1}{@tag}{/chronos/testun yshift'=##1}},
1930     testun yshift+/.code={%
1931         \chronos@ychwanegu@nodweddion{#1}{@tag}{/chronos/testun yshift+=##1}},
1932     testun yshift-/.code={%
1933         \chronos@ychwanegu@nodweddion{#1}{@tag}{/chronos/testun yshift-=##1}},
1934     testun yshift'+/.code={%
1935         \chronos@ychwanegu@nodweddion{#1}{@tag}{/chronos/testun yshift'+=##1}},
1936     testun yshift'-/.code={%
1937         \chronos@ychwanegu@nodweddion{#1}{@tag}{/chronos/testun yshift'-=##1}},

```

begin saesneg: /chronos/#1

```

1938     name/.forward to=/chronos/#1/enw,
1939     as is/.forward to=/chronos/#1/fel y mae,
1940     colour/.forward to=/chronos/#1/lliw,
1941     color/.forward to=/chronos/#1/lliw,
1942     default colour/.forward to=/chronos/#1/lliw rhagosodedig,
1943     default color/.forward to=/chronos/#1/lliw rhagosodedig,
1944     colours above/.forward to=/chronos/#1/lliwiau uchod,
1945     colours below/.forward to=/chronos/#1/lliwiau isod,
1946     colors above/.forward to=/chronos/#1/lliwiau uchod,
1947     colors below/.forward to=/chronos/#1/lliwiau isod,
1948     colours above from clist/.forward to=/chronos/#1/lliwiau uchod o clist,
1949     colours below from clist/.forward to=/chronos/#1/lliwiau isod o clist,
1950     colors above from clist/.forward to=/chronos/#1/lliwiau uchod o clist,
1951     colors below from clist/.forward to=/chronos/#1/lliwiau isod o clist,
1952     place below/.forward to=/chronos/#1/isod,
1953     place above/.forward to=/chronos/#1/uchod,
1954     tag anchor/.forward to=/chronos/#1/angor,
1955     connect/.forward to=/chronos/#1/cysylltu,
1956     connection/.forward to=/chronos/#1/cysylltiad,
1957     connection'/.forward to=/chronos/#1/cysylltiad',
1958     connection+/.forward to=/chronos/#1/cysylltiad+,
1959     connectors/.forward to=/chronos/#1/cysylltwyr,
1960     connectors+/.forward to=/chronos/#1/cysylltwyr+,
1961     connectors'/.forward to=/chronos/#1/cysylltwyr',
1962     text font/.forward to=/chronos/#1/ffont testun,
1963     text tag connector+/.forward to=/chronos/#1/cysylltwr testun+,
1964     text tag connector'/.forward to=/chronos/#1/cysylltwr testun',

```

```

1965 text tag connector/.forward to=/chronos/#1/cysylltwr testun,
1966 main text tag connector+/.forward to=/chronos/#1/prif gysylltwr testun+,
1967 main text tag connector'/.forward to=/chronos/#1/prif gysylltwr testun',
1968 main text tag connector/.forward to=/chronos/#1/prif gysylltwr testun,
1969 chronos connector+/.forward to=/chronos/#1/cysylltwr chronos+,
1970 chronos connector'/.forward to=/chronos/#1/cysylltwr chronos',
1971 chronos connector/.forward to=/chronos/#1/cysylltwr chronos,
1972 colour rotation/.forward to=/chronos/#1/troi lliwiau,
1973 color rotation/.forward to=/chronos/#1/troi lliwiau,
1974 line/.forward to=/chronos/#1/llynell,
1975 line'/.forward to=/chronos/#1/llynell',
1976 line+/.forward to=/chronos/#1/llynell+,
1977 line add yshift/.chronos dimen=\chronos@llynell@add@yshift,
1978 only text/.forward to=/chronos/#1/testun yn unig,
1979 text tag/.forward to=/chronos/#1/testun,
1980 text tag'/.forward to=/chronos/#1/testun',
1981 text tag+/.forward to=/chronos/#1/testun+,
1982 text tag yshift/.forward to=/chronos/#1/testun yshift,
1983 text tag yshift'/.forward to=/chronos/#1/testun yshift',
1984 text tag yshift+/.forward to=/chronos/#1/testun yshift+,
1985 text tag yshift-/.forward to=/chronos/#1/testun yshift-,
1986 text tag yshift'+/.forward to=/chronos/#1/testun yshift'+,
1987 text tag yshift'-/.forward to=/chronos/#1/testun yshift'-,
1988 text content/.forward to=/chronos/#1/cynnwys testun,
1989 name content/.forward to=/chronos/#1/cynnwys enw,
1990 dates content/.forward to=/chronos/#1/cynnwys dyddiadau,

end saesneg: /chronos/#1

begin shortcuts

1991 /chronos/.cd,
1992 cysylltiad #1+/.forward to=/chronos/#1/cysylltiad+,
1993 cysylltiad #1'/.forward to=/chronos/#1/cysylltiad',
1994 cysylltiad #1/.forward to=/chronos/#1/cysylltiad,
1995 cysylltwr chronos #1+/.forward to=/chronos/#1/cysylltwr chronos+,
1996 cysylltwr chronos #1'/.forward to=/chronos/#1/cysylltwr chronos',
1997 cysylltwr chronos #1/.forward to=/chronos/#1/cysylltwr chronos,
1998 cysylltwr testun #1+/.forward to=/chronos/#1/cysylltwr testun+,
1999 cysylltwr testun #1'/.forward to=/chronos/#1/cysylltwr testun',
2000 cysylltwr testun #1/.forward to=/chronos/#1/cysylltwr testun,
2001 prif gysylltwr testun #1+/.forward to=/chronos/#1/prif gysylltwr testun+,
2002 prif gysylltwr testun #1'/.forward to=/chronos/#1/prif gysylltwr testun',
2003 prif gysylltwr testun #1/.forward to=/chronos/#1/prif gysylltwr testun,
2004 llynell #1+/.forward to=/chronos/#1/llynell+,
2005 llynell #1'/.forward to=/chronos/#1/llynell',
2006 llynell #1/.forward to=/chronos/#1/llynell,
2007 testun #1+/.forward to=/chronos/#1/testun+,
2008 testun #1'/.forward to=/chronos/#1/testun',
2009 testun #1/.forward to=/chronos/#1/testun,

2010 #2 connection+/.forward to=/chronos/#1/cysylltiad+,
2011 #2 connection'/.forward to=/chronos/#1/cysylltiad',
2012 #2 connection/.forward to=/chronos/#1/cysylltiad,
2013 #2 chronos connector+/.forward to=/chronos/#1/cysylltwr chronos+,
2014 #2 chronos connector'/.forward to=/chronos/#1/cysylltwr chronos',
2015 #2 chronos connector/.forward to=/chronos/#1/cysylltwr chronos,
2016 #2 text tag connector+/.forward to=/chronos/#1/cysylltwr testun+,
2017 #2 text tag connector'/.forward to=/chronos/#1/cysylltwr testun',
2018 #2 text tag connector/.forward to=/chronos/#1/cysylltwr testun,
2019 #2 main text tag connector+/.forward to=/chronos/#1/prif gysylltwr testun+,
2020 #2 main text tag connector'/.forward to=/chronos/#1/prif gysylltwr testun',
2021 #2 main text tag connector/.forward to=/chronos/#1/prif gysylltwr testun,

```

```

2022     #2 line+/.forward to=/chronos/#1/llinell+,
2023     #2 line'/.forward to=/chronos/#1/llinell',
2024     #2 line/.forward to=/chronos/#1/llinell,
2025     #2 text tag+/.forward to=/chronos/#1/testun+,
2026     #2 text tag'/.forward to=/chronos/#1/testun',
2027     #2 text tag/.forward to=/chronos/#1/testun,

2028     /chronos/#2/.chronos search=#1,
2029     /chronos/#1/.chronos search=#2,% heb bwrpas | pointless
2030     /chronos/#1/.code={\pgfqkeys{/chronos/#1}{##1}},
2031     /chronos/#2/.forward to=/chronos/#1,
2032     }%
2033 },

2034 /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).

```

2035     \pgfkeys{\pgfkeyscurrentpath/.cd,
2036     dyddiadau/.code args={##1:##2}{% ^A angen y llinell nesaf am y saesneg yn unig
2037     \pgfqkeys{/chronos/#1}{#2=##1}% ^A needed only for the english ?? (why?)
2038     \edef\tempa{##2}\edef\tempb{}%
2039     \ifx\tempa\tempb
2040     \else
2041     \pgfqkeys{/chronos/#1}{#3=##2}%
2042     \fi
2043     },
2044     #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

```

2045     #2/.style={/chronos/set date aux/.expanded={##1-01-01-0@#6}},
2046     #3/.style={/chronos/set date aux/.expanded={##1-12-31-0@#7},/chronos/#1/#4=true},
2047     #3={\year-\month-\day},
2048     label #2/.store in/.expand once=\csname chronos@#1@label#2\endcsname,
2049     label #3/.store in/.expand once=\csname chronos@#1@label#3\endcsname,
2050     fformatiau dyddiadau/.style args={##1:##2:##3}{%
2051     /chronos/#1/fformat #2 yr un gyfnod={##1},
2052     /chronos/#1/fformat #2 cyfnodau gwahanol={##2},
2053     /chronos/#1/fformat #3={##3},
2054     },
2055     fformatiau dyddiadau/.chronos track={@#1@fformatiau@dyddiadau,@#1@cyfnodau,@#1@llawn},
2056     fformat #2 yr un gyfnod/.code={%
2057     \expandafter\def\csname chronos@#1@fformat#2@cyfnod\endcsname{##1}%
2058     \chronos@ychwanegu@nodweddion{#1}{@tag}{/chronos/#1/fformat #2 yr un gyfnod={##1}}%
2059     },
2060     fformat #2 cyfnodau gwahanol/.code={%
2061     \expandafter\def\csname chronos@#1@fformat#2@cyfnodau\endcsname{##1}%
2062     \chronos@ychwanegu@nodweddion{#1}{@tag}{%
2063     /chronos/#1/fformat #2 cyfnodau gwahanol={##1}}%
2064     },
2065     fformat #2/.forward to=/chronos/#1/fformat #2 yr un gyfnod,
2066     fformat #2/.forward to=/chronos/#1/fformat #2 cyfnodau gwahanol,
2067     fformat #3/.code={%
2068     \expandafter\def\csname chronos@#1@fformat#3\endcsname{##1}%
2069     \chronos@ychwanegu@nodweddion{#1}{@tag}{/chronos/#1/fformat #3={##1}}%
2070     },

```

```

2071 fformat #2 yr un gyfnod/.chronos track={%
2072   @#1@fformatiau@dyddiadau,@#1@cyfnodau,@#1@llawn},
2073 fformat #2 cyfnodau gwahanol/.chronos track={%
2074   @#1@fformatiau@dyddiadau,@#1@cyfnodau,@#1@llawn},
2075 fformat #2/.chronos track={%
2076   @#1@fformatiau@dyddiadau,@#1@cyfnodau,@#1@llawn},
2077 fformat #3/.chronos track={%
2078   @#1@fformatiau@dyddiadau,@#1@cyfnodau,@#1@llawn},
2079 dangos cyfnodau/@blynyddoedd yn unig/.code={%^^A show eras + only years formats
2080   \expandafter\def\csname chronos@#1@fformat#2@cyfnod\endcsname{!Y}%
2081   \expandafter\def\csname chronos@#1@fformat#2@cyfnodau\endcsname{
2082     !Y\thinspace !E}%
2083   \expandafter\def\csname chronos@#1@fformat#3\endcsname{!Y\thinspace !E}%
2084 },
2085 dangos cyfnodau/@llawn/.code={% show eras + full dates formats
2086   \expandafter\def\csname chronos@#1@fformat#2@cyfnod\endcsname{!d/!m/!Y}%
2087   \expandafter\def\csname chronos@#1@fformat#2@cyfnodau\endcsname{
2088     !d/!m/!Y\thinspace !E}%
2089   \expandafter\def\csname chronos@#1@fformat#3\endcsname{
2090     !d/!m/!Y\thinspace !E}%
2091 },
2092 dangos cyfnodau/llawn/.code n args=3{%^^A show eras + full dates set formats
2093   \pgfqkeys{/chronos/#1/dangos cyfnodau}{%
2094     @llawn/.code={%
2095       \expandafter\def\csname chronos@#1@fformat#2@cyfnod\endcsname{##1}%
2096       \expandafter\def\csname chronos@#1@fformat#2@cyfnodau\endcsname{##2}%
2097       \expandafter\def\csname chronos@#1@fformat#3\endcsname{##3}%
2098     }%
2099   }%
2100 },
2101 dangos cyfnodau/@blynyddoedd yn unig/.code n args=3{%^^A show eras + only years set
formats
2102   \pgfqkeys{/chronos/#1/dangos cyfnodau}{%
2103     @blynyddoedd yn unig/.code={%
2104       \expandafter\def\csname chronos@#1@fformat#2@cyfnod\endcsname{##1}%
2105       \expandafter\def\csname chronos@#1@fformat#2@cyfnodau\endcsname{##2}%
2106       \expandafter\def\csname chronos@#1@fformat#3\endcsname{##3}%
2107     }%
2108   }%
2109 },
2110 heb gyfnodau/@blynyddoedd yn unig/.code={%^^A w/o eras + only years formats
2111   \expandafter\def\csname chronos@#1@fformat#2@cyfnod\endcsname{!Y}%
2112   \expandafter\def\csname chronos@#1@fformat#2@cyfnodau\endcsname{!Y}%
2113   \expandafter\def\csname chronos@#1@fformat#3\endcsname{!Y}%
2114 },
2115 heb gyfnodau/@llawn/.code={%^^A w/o eras + full dates formats
2116   \expandafter\def\csname chronos@#1@fformat#2@cyfnod\endcsname{!d/!m/!Y}%
2117   \expandafter\def\csname chronos@#1@fformat#2@cyfnodau\endcsname{!d/!m/!Y}%
2118   \expandafter\def\csname chronos@#1@fformat#3\endcsname{!d/!m/!Y}%
2119 },
2120 heb gyfnodau/llawn/.code n args=3{%^^A w/o eras + full dates set formats
2121   \pgfqkeys{/chronos/#1/heb gyfnodau}{%
2122     @llawn/.code={%
2123       \expandafter\def\csname chronos@#1@fformat#2@cyfnod\endcsname{##1}%
2124       \expandafter\def\csname chronos@#1@fformat#2@cyfnodau\endcsname{##2}%
2125       \expandafter\def\csname chronos@#1@fformat#3\endcsname{##3}%
2126     }%
2127   }%
2128 },
2129 heb gyfnodau/@blynyddoedd yn unig/.code n args=3{%^^A w/o eras + only years set formats
2130   \pgfqkeys{/chronos/#1/heb gyfnodau}{%

```

```

2131         @blynyddoedd yn unig/.code={%
2132             \expandafter\def\csname chronos@#1@fformat#2@cyfnod\endcsname{##1}%
2133             \expandafter\def\csname chronos@#1@fformat#2@cyfnodau\endcsname{##2}%
2134             \expandafter\def\csname chronos@#1@fformat#3\endcsname{##3}%
2135         }%
2136     }%
2137 },

```

english translations below

```

2138     blynyddoedd yn unig/.code={%
2139         \chronos@ychwanegu@nodweddion{#1}{@tag}{/chronos/blynyddoedd yn unig}},
2140     dyddiadau llawn/.code={%
2141         \chronos@ychwanegu@nodweddion{#1}{@tag}{/chronos/dyddiadau llawn}},
2142     dangos cyfnodau/.code={%
2143         \chronos@ychwanegu@nodweddion{#1}{@tag}{/chronos/dangos cyfnodau}},
2144     heb gyfnodau/.code={%
2145         \chronos@ychwanegu@nodweddion{#1}{@tag}{/chronos/heb gyfnodau}},
2146     dangos cyfnodau/.chronos track=@#1@cyfnodau},
2147     dyddiadau llawn/.chronos track=@#1@llawn},
2148     heb gyfnodau/.chronos track=@#1@cyfnodau},
2149     blynyddoedd yn unig/.chronos track=@#1@llawn},
2150     ffont dyddiad/.code={%
2151         \expandafter\def\csname chronos@#1@ffontdyddiad\endcsname{##1}},
2152     ffont dyddiad=,

```

begin saesneg: /chronos/#1

```

2153     dates/.forward to=/chronos/#1/dyddiadau,
2154     #8/.forward to=/chronos/#1/#2,
2155     #9/.forward to=/chronos/#1/#3,
2156     date formats/.forward to=/chronos/#1/fformatiau dyddiadau,
2157     #8 format/.forward to=/chronos/#1/fformat #2,
2158     same era #8 format/.forward to=/chronos/#1/fformat #2 yr un gyfnod,
2159     different eras #8 format/.forward to=/chronos/#1/fformat #2 cyfnodau gwahanol,
2160     #9 format/.forward to=/chronos/#1/fformat #3,
2161     show eras/full/.forward to=/chronos/#1/dangos cyfnodau/llawn,
2162     show eras/only years/.forward to=/chronos/#1/dangos cyfnodau/blynyddoedd yn unig,
2163     without eras/full/.forward to=/chronos/#1/heb gyfnodau/llawn,
2164     without eras/only years/.forward to=/chronos/#1/heb gyfnodau/blynyddoedd yn unig,
2165     #8 label/.forward to=/chronos/#1/label #2,
2166     #9 label/.forward to=/chronos/#1/label #3,
2167     only years/.forward to=/chronos/#1/blynyddoedd yn unig,
2168     full dates/.forward to=/chronos/#1/dyddiadau llawn,
2169     without eras/.forward to=/chronos/#1/heb gyfnodau,
2170     show eras/.forward to=/chronos/#1/dangos cyfnodau,
2171     date font/.forward to=/chronos/#1/ffont dyddiad,

```

end saesneg: /chronos/#1

```

2172     }%
2173 },

2174 /handlers/.chronos key maker/.code n args=3{%
2175     \chronos@keymaker{#1}{#2}{#3}%
2176 },

2177 chronos/.code={\PackageError{chronos}{%
2178     The key chronos is deprecated.\MessageBreak
2179     Use the environment chronos instead.}},

2180 byw/.code={\chronos@cyd@destun@init@craidd{byw}{#1}},
2181 byw/.default={},

```

```

2182 digwyddiad/.code={\chronos@cyd@destun@init@craidd{digwyddiad}{#1}},
2183 digwyddiad/.default={},

2184 parhad/.code={\chronos@cyd@destun@init@craidd{parhad}{#1}},
2185 parhad/.default={},

2186 theori/.code={\chronos@cyd@destun@init@sylfaenol{theori}{#1}\chronos@tag@cysylltufalse},
2187 theori/.default={},

2188 cylch theori/.code={%
2189   \chronos@cyd@destun@init@sylfaenol@aux{theori/cylchau}{theori}{#1}%
2190   \chronos@tag@cysylltufalse},
2191 cylch theori/.default={},

2192 gwybodaeth/.code={%
2193   \chronos@cyd@destun@init@sylfaenol{gwybodaeth}{#1}\chronos@tag@cysylltufalse},
2194 gwybodaeth/.default={},

2195 prif/.code={\chronos@cyd@destun@init@star{prif}{#1}},
2196 prif/.default={},

2197 hawlfraint/.code={\chronos@cyd@destun@init@star{hawlfraint}{#1}},
2198 hawlfraint/.default={},

2199 life/.forward to=/tikz/byw,
2200 event/.forward to=/tikz/digwyddiad,
2201 period/.forward to=/tikz/parhad,
2202 theory/.forward to=/tikz/theori,
2203 theory circle/.forward to=/tikz/cylch theori,
2204 main/.forward to=/tikz/prif,
2205 copyright/.forward to=/tikz/hawlfraint,
2206 copyleft/.forward to=/tikz/hawlfraint,

2207 chronos connect/.style args={#1:#2}{#1,/chronos/@cysylltiad=lliw #2},
2208 chronos create chronos connector/.style args={#1:#2}{%
2209   #1,/chronos/@cysylltwr@chronos=lliw #2},
2210 chronos create text tag connector/.style args={#1:#2}{%
2211   #1,/chronos/@cysylltwr@testun=lliw #2},
2212 chronos mark line/.style args={#1:#2}{#1,/chronos/@llinell=lliw #2},
2213 chronos text tag/.style args={#1:#2}{#1,/chronos/@testun=lliw #2},
2214 chronos tikz'/.code={\pgfkeysdef{/chronos/@tikz}{#1}},
2215 chronos tikz+/.code={\pgfkeys{/chronos}{@tikz/.append code={#1}}},
2216 chronos tikz/.forward to=/chronos tikz+,
2217 chronos tikz outside bb'/.code={\pgfkeysdef{/chronos/@@tikz}{#1}},
2218 chronos tikz outside bb+/.code={\pgfkeys{/chronos}{@@tikz/.append code={#1}}},
2219 chronos tikz outside bb/.forward to=/chronos tikz outside bb+,

2220 /chronos/.search also={/chronos/llinell amser,/tikz,/pgf},
2221 /chronos/llinell amser/.search also={/chronos,/tikz,/pgf},
2222 /chronos/byw/.search also={/chronos,/tikz,/pgf},
2223 /chronos/digwyddiad/.search also={/chronos,/tikz,/pgf},
2224 /chronos/parhad/.search also={/chronos,/tikz,/pgf},
2225 /chronos/theori/.search also={/chronos,/tikz,/pgf},
2226 /chronos/theori/cylchau/.search also={/chronos/theori,/chronos,/tikz,/pgf},

2227 /chronos/.cd,
2228 @before@headings/.code={},
2229 before headings+/.code={\pgfkeys{/chronos}{@before@headings/.append code={#1}}},
2230 before headings'/.code={\pgfkeys{/chronos}{@before@headings/.code={#1}}},
2231 before headings/.forward to=/chronos/before headings+,
2232 @before@frame/.code={},
2233 before drawing frame+/.code={%
2234   \pgfkeys{/chronos}{@before@frame/.append code={#1}}},
2235 before drawing frame'/.code={\pgfkeys{/chronos}{@before@frame/.code={#1}}},

```

```

2236 before drawing frame/.forward to=/chronos/before drawing frame+,
2237 tikz'/.forward to=/tikz/chronos tikz',
2238 tikz+/.forward to=/tikz/chronos tikz+,
2239 tikz/.forward to=/tikz/chronos tikz,
2240 tikz outside bb'/.forward to=/tikz/chronos tikz outside bb',
2241 tikz outside bb+/.forward to=/tikz/chronos tikz outside bb+,
2242 tikz outside bb/.forward to=/tikz/chronos tikz outside bb,

```

@tikz is for standard ; @@tikz ignores bb ; for both user code and chronos

```

2243 @tikz/.style={},
2244 @@tikz/.style={},

```

@timeline@config is for indirect user code or overwritable chronos ; @@ is reserved for chronos

```

2245 @timeline@config/.code={},
2246 @@timeline@config/.code={%
2247   \chronos@if@gosodF {@byw@cyfnodau}
2248     {\pgfqkeys{/chronos/byw}{dangos cyfnodau}}%
2249   \chronos@if@gosodF {@parhad@cyfnodau}
2250     {\pgfqkeys{/chronos/parhad}{dangos cyfnodau}}%
2251   \chronos@if@gosodF {@digwyddiad@cyfnodau}
2252     {\pgfqkeys{/chronos/digwyddiad}{dangos cyfnodau}}%
2253   \chronos@if@gosodF {@byw@llawn}
2254     {\pgfqkeys{/chronos/byw}{blynyddoedd yn unig}}%
2255   \chronos@if@gosodF {@parhad@llawn}
2256     {\pgfqkeys{/chronos/parhad}{blynyddoedd yn unig}}%
2257   \chronos@if@gosodF {@digwyddiad@llawn}
2258     {\pgfqkeys{/chronos/digwyddiad}{dyddiadau llawn}}%
2259   \chronos@if@gosodF{timeline@years}
2260     {\pgfqkeys{/chronos/llinell amser}{blynyddoedd=ar y llinell}}%
2261   \ifchronos@yearsonline
2262     \chronos@ychwanegu@nodweddion@rhestr{byw,parhad}{@llinell}%
2263     {fill=####1,fill opacity=.25,draw=none}%
2264     \chronos@ychwanegu@nodweddion@rhestr{digwyddiad}{@llinell}%
2265     {draw=####1,fill=none,opacity=.25}%
2266   \else
2267     \chronos@ychwanegu@nodweddion@rhestr{byw,parhad}{@llinell}%
2268     {draw=####1,thick,fill opacity=.75}%
2269     \chronos@ychwanegu@nodweddion@rhestr{digwyddiad}{@llinell}%
2270     {draw=####1,draw opacity=.75,fill=none}%
2271   \fi

```

efail lai bod yn anghywir tan inni ailosod yn hwyrach!! | maybe wrong until we reset later!!

```

2272   \let\timelineht\chronos@height
2273 },
2274 @style/.style={},
2275 @@timeline@config@diwedd/.style={},
2276 @@timeline@config@dechrau/.style={},
2277 chronos tweak/.code={\pgfqkeys{/chronos}{@style/.append style={#1}}},
2278 chronos opacity/.code={%
2279   \ifchronos@preset\chronos@temptrue\else\chronos@tempfalse\fi
2280   \chronos@presettrue
2281   \pgfqkeys{/chronos}{%
2282     @style/.append style={transparency group,opacity=#1},
2283     every cysylltiadau+={opacity=#1},
2284     every cysylltwyr chronos+={opacity=#1},
2285     /chronos/prif/@frame/.append style={opacity=#1},
2286     /chronos/llinell amser/.cd,
2287     llinell+={draw opacity=#1,fill opacity=#1},
2288     timeline@bare@mark@on@line/.append style={opacity=#1},
2289     timeline@minor@mark@on@line/.append style={opacity=#1},

```

```

2290     timeline@mark@on@line/.append style={opacity=#1},
2291     timeline@bare@mark@off@line/.append style={opacity=#1},
2292     timeline@minor@mark@off@line/.append style={opacity=#1},
2293     timeline@mark@off@line/.append style={opacity=#1},
2294     timeline@year@on@line/.append style={opacity=#1},
2295     timeline@year@off@line/.append style={opacity=#1},
2296     border+={opacity=#1}}%
2297     \ifchronos@temp\chronos@presettrue\else\chronos@presetfalse\fi
2298   },

2299   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 ...
2300     \chronos@set@date@aux{#1}%
2301   },

2302   headings+/.code={%
2303     \chronos@headingstrue
2304     \chronos@to@clist@append{headings}{#1}%
2305   },
2306   heading+/.code n args=3{% name/content; start ; end
2307     \chronos@headingstrue
2308     \chronos@to@clist@append{headings}{#1/#2/#3}%
2309   },
2310   subheading+/.code n args=4{% name/content; start ; end; pos
2311     \chronos@headingstrue
2312     \chronos@to@clist@append{subheadings}{#1/#2/#3/#4}%
2313   },
2314   subheadings+/.code={% name/content; start ; end; pos
2315     \chronos@headingstrue
2316     \chronos@to@clist@append{subheadings}{#1}%
2317   },
2318   heading'/.code n args=3{%
2319     \chronos@headingstrue
2320     \chronos@to@clist{headings}{#1/#2/#3}%
2321   },
2322   headings'/.code={%
2323     \chronos@headingstrue
2324     \chronos@to@clist{headings}{#1}%
2325   },
2326   subheading'/.code n args=4{%
2327     \chronos@headingstrue
2328     \chronos@to@clist{subheadings}{#1/#2/#3/#4}%
2329   },
2330   subheadings'/.code={%
2331     \chronos@headingstrue
2332     \chronos@to@clist{subheadings}{#1}%
2333   },
2334   century subheading+/.code 2 args={% name/content; start ; end; pos
2335     \chronos@headingstrue
2336     \chronos@global@to@clist@append{century_subheadings}{#1/#2}%
2337   },
2338   century subheadings+/.code 2 args={% name/content; start ; end; pos
2339     \chronos@headingstrue
2340     \foreach \i in {#1} {\chronos@global@to@clist@append{century_subheadings}{\i/#2}}%
2341   },
2342   century subheading'/.code 2 args={% name/content; start ; end; pos
2343     \chronos@headingstrue
2344     \chronos@global@to@clist{century_subheadings}{#1/#2}%
2345   },
2346   century subheadings'/.code 2 args={% name/content; start ; end; pos
2347     \chronos@headingstrue
2348     \chronos@global@clear@to@clist{century_subheadings}%

```

```

2349   \foreach \i in {#1} {\chronos@global@to@clist{century_subheadings}{\i/#2}}%
2350   },
2351   heading/.forward to=/chronos/heading+,
2352   headings/.forward to=/chronos/headings+,
2353   subheading/.forward to=/chronos/subheading+,
2354   subheadings/.forward to=/chronos/subheadings+,
2355   century subheading/.forward to=/chronos/century subheading+,
2356   century subheadings/.forward to=/chronos/century subheadings+,
2357   subheadings drops/.chronos 2 dimens={\chronos@subheading@drop@uchod}%
2358   {\chronos@subheading@drop@isod},
2359   heading drop/.chronos dimen=\chronos@heading@drop,
2360   headings drops'/.code args={#1:#2:#3}{%
2361     \chronos@heading@drop=#1
2362     \chronos@subheading@drop@uchod=#2
2363     \chronos@subheading@drop@isod=#3%
2364   },
2365   headings drops'+/.code args={#1:#2:#3}{%
2366     \advance \chronos@heading@drop by #1
2367     \advance \chronos@subheading@drop@uchod by #2
2368     \advance\chronos@subheading@drop@isod by #3%
2369   },
2370   headings drops'-/.code args={#1:#2:#3}{%
2371     \advance \chronos@heading@drop by -#1
2372     \advance \chronos@subheading@drop@uchod by -#2
2373     \advance\chronos@subheading@drop@isod by -#3%
2374   },
2375   headings drops'=Opt:Opt:Opt,
2376   chronos coords'/.code={\chronos@to@clist{dyddiadau_coords}{#1}},
2377   chronos coords+/.code={\chronos@to@clist@append{dyddiadau_coords}{#1}},
2378   chronos coords/.forward to=/chronos/chronos coords+,
2379   frame/.is if=chronos@frame,
2380   frame/.default=true,
2381   frame uses bb/.is if=chronos@framedefnyddiobb,
2382   frame/.default=true,
2383 }
2384 \ExplSyntaxOn

```

set up every byw, every byw', every byw+, every life, every life', every life+ etc.; #3 gives default (' or +)

```

2385 \__chronos_kexpandtotags:nnn { byw } { life } { + }
2386 \__chronos_kexpandtotags:nnn { digwyddiad } { event } { + }
2387 \__chronos_kexpandtotags:nnn { parhad } { period } { + }
2388 \__chronos_kexpandtotags:nnn { theori } { theory } { + }
2389 \__chronos_kexpandtotags:nnn { gwybodaeth } { info } { + }

```

like kexpander but without every keys

```

2390 \__chronos_kextripler:nnnnn { every ~ cylch ~ cylch ~ theori }
2391 { every ~ theory ~ circle ~ text } { every@cylch ~ cylch ~ theori } { + }
2392 { style }
2393 \__chronos_kextripler:nnnnn { every ~ testun ~ cylch ~ theori }
2394 { every ~ theory ~ circle ~ circle } { every@testun ~ cylch ~ theori }
2395 { + } { style }
2396 \__chronos_kextripler:nnnnn { llinell ~ amser / llinell } { timeline ~ line }
2397 { llinell ~ amser / timeline@line } { ' } { style }
2398 \__chronos_kextripler:nnnnn { llinell ~ amser / border } { timeline ~ border }
2399 { llinell ~ amser / timeline@border } { ' } { style }
2400 \__chronos_kextripler:nnnnn { prif / teitl } { prif / title } { prif / @teitl }
2401 { ' } { style }
2402 \__chronos_kextripler:nnnnn { amserau } { subheadings ~ style } { @amserau }
2403 { ' } { style }

```

```

2404 \_chronos_kextripler:nnnn { amseraumawr } { headings ~ style }
2405 { @amseraumawr } { ' } { style }
2406 \_chronos_kextripler:nnnn { hawlfraint } { copyright } { @hawlfraint }
2407 { ' } { style }
2408 \_chronos_kextripler:nnnn { hawlfraint } { copyright } { @hawlfraint } { ' }
2409 { style }
2410 \_chronos_kexforwardtriple:mn { hawlfraint } { copleft }
2411 \_chronos_kextripler:nnnn { timeline ~ config } {@timeline@config} { + } { code }
2412 \_chronos_kextripler:nnnn { gwybodaeth / label } { gwybodaeth / @label } { ' }
2413 { style }
2414 \_chronos_kextripler:nnnn { prif / frame } { prif / @frame } { ' } { style }
2415 \_chronos_kextripler:nnnn { theori / cylchau / label }
2416 { theori / cylchau / @label } { ' } { style }
2417 \ExplSyntaxOff
2418 \pgfqkeys{/chronos}{%

2419 every@cylch cylch theori/.style={%
2420   fill=chronos@prifliw, draw=chronos@prifliw, even odd rule},
2421 every@testun cylch theori/.style={%
2422   decoration={text effects along path, text={#1}, text effects/.cd,%
2423     fit text to path, text=chronos@prifliw@cefndir,%
2424     characters={text along path, font=\scriptsize\scshape}}, decorate},
2425 every byw isod/.code={%
2426   \chronos@every@byw@isodtrue
2427   \chronos@every@byw@uchodfalse
2428   \chronos@byw@isodtrue
2429 },
2430 every digwyddiad isod/.code={%
2431   \chronos@every@digwyddiad@isodtrue
2432   \chronos@every@digwyddiad@uchodfalse
2433   \chronos@digwyddiad@isodtrue
2434 },
2435 every parhad isod/.code={%
2436   \chronos@every@parhad@isodtrue
2437   \chronos@every@parhad@uchodfalse
2438   \chronos@parhad@isodtrue
2439 },
2440 every byw uchod/.code={%
2441   \chronos@every@byw@uchodtrue
2442   \chronos@every@byw@isodfalse
2443   \chronos@byw@isodfalse
2444 },
2445 every digwyddiad uchod/.code={%
2446   \chronos@every@digwyddiad@uchodtrue
2447   \chronos@every@digwyddiad@isodfalse
2448   \chronos@digwyddiad@isodfalse
2449 },
2450 every parhad uchod/.code={%
2451   \chronos@every@parhad@uchodtrue
2452   \chronos@every@parhad@isodfalse
2453   \chronos@parhad@isodfalse
2454 },

2455 every life below/.forward to=/chronos/every byw isod,
2456 every period below/.forward to=/chronos/every parhad isod,
2457 every event below/.forward to=/chronos/every digwyddiad isod,
2458 every life above/.forward to=/chronos/every byw uchod,
2459 every period above/.forward to=/chronos/every parhad uchod,
2460 every event above/.forward to=/chronos/every digwyddiad uchod,

2461 }
2462 \tikzset{%

```

```

2463 /chronos/llinell amser/.code={\pgfqkeys{/chronos/llinell amser}{#1}},
2464 /chronos/timeline/.forward to=/chronos/llinell amser,
2465 /chronos/timeline/.chronos search=llinell amser,
2466 /chronos/llinell amser/.cd,
2467 timeline arrow/.is if=chronostimelinearrow,
2468 timeline arrow/.default=true,
2469 no timeline arrow/.code={\chronostimelinearrowfalse},
2470 timeline@arrow/.style={},
2471 no@timeline@arrow/.style={},
2472 do timeline arrow/.code={},
2473 conditional timeline arrow/.code 2 args={%
2474   \pgfqkeys{/chronos}{%
2475     llinell amser/.cd,
2476     timeline@arrow/.style={/chronos/.cd,#1},
2477     no@timeline@arrow/.style={/chronos/.cd,#2},
2478     do timeline arrow/.add code={%
2479       \ifchronostimelinearrow
2480         \tikzset{/chronos/llinell amser/timeline@arrow}%
2481       \else
2482         \tikzset{/chronos/llinell amser/no@timeline@arrow}%
2483       \fi
2484     },
2485   }%
2486 },

2487 ffont camau mawr/.store in=\chronos@ffont@camaumawr,
2488 ffont camau bach/.store in=\chronos@ffont@camaubach,
2489 ffont cyfnodau/.store in=\chronos@ffont@cyfnodau,
2490 ffont/.forward to=/chronos/llinell amser/ffont cyfnodau,
2491 ffont/.forward to=/chronos/llinell amser/ffont camau bach,
2492 ffont/.forward to=/chronos/llinell amser/ffont camau mawr,

2493 major step font/.forward to=/chronos/llinell amser/ffont camau mawr,
2494 minor step font/.forward to=/chronos/llinell amser/ffont camau bach,
2495 eras font/.forward to=/chronos/llinell amser/ffont cyfnodau,
2496 timeline font/.forward to=/chronos/llinell amser/ffont,

2497 border ar/.chronos layer choice=border,
2498 border ar=background,
2499 llinell amser ar/.chronos layer choice=llinell amser,
2500 llinell amser ar=foreground,

2501 border on/.forward to=/chronos/llinell amser/border ar,
2502 timeline on/.forward to=/chronos/llinell amser/llinell amser ar,

2503 dyddiad diwedd/.style={%
2504   /chronos/@@timeline@config@diwedd/.code={%
2505     \pgfqkeys{/chronos}{set date aux/.expanded={#1-12-31-0@end}}%
2506   },
2507 },
2508 dyddiad dechrau/.style={%
2509   /chronos/@@timeline@config@dechrau/.code={%
2510     \pgfqkeys{/chronos}{set date aux/.expanded={#1-01-01-0@start}}%
2511   },
2512 },
2513 dyddiadau/.code args={#1:#2}{%^A angen y llinell nesaf am y saesneg yn unig <= ???!!
2514   \pgfqkeys{/chronos/llinell amser}{dyddiad dechrau=#1,dyddiad diwedd=#2}%
2515 },

2516 cam blwyddyn fawr/.store in=\chronos@cam@blwyddyn@fawr, %^A oedd cam mawr
2517 cam blwyddyn fach/.store in=\chronos@cam@blwyddyn@fach, %^A oedd cam bach
2518 rhaniadau cam/.store in=\chronos@camrhaniadau,%^A cam rhaniadau %^A oedd camau bach
/ \chronos@minorsteps

```

```

2519 camu o flwyddyn/.store in=\chronos@stepfrom,
2520 cam blwyddyn/.code={%
2521     \pgfqkeys{/chronos/llynell amser}{cam blwyddyn fawr=#1}%
2522     \Undefined\chronos@cam@blwyddyn@fach
2523 },

2524 lliw mewnol y border/.chronos lliw=borderinner,
2525 timeline border inner colour/.forward to=/chronos/llynell amser/liiw mewnol y border,
2526 timeline border inner color/.forward to=/chronos/llynell amser/liiw mewnol y border,
2527 lliw allanol y border/.chronos lliw=borderouter,
2528 timeline border outer colour/.forward to=/chronos/llynell amser/liiw allanol y border,
2529 timeline border outer color/.forward to=/chronos/llynell amser/liiw allanol y border,
2530 lliw canol y border/.chronos lliw=bordermiddle,
2531 timeline border middle colour/.forward to=/chronos/llynell amser/liiw canol y border,
2532 timeline border middle color/.forward to=/chronos/llynell amser/liiw canol y border,
2533 cefndir/.chronos lliw=lliw@cefndir@llynell,
2534 blaendir/.chronos lliw=lliw@llynell,
2535 timeline background/.forward to=/chronos/llynell amser/cefndir,
2536 timeline foreground/.forward to=/chronos/llynell amser/blaendir,
2537 background/.forward to=/chronos/llynell amser/cefndir,
2538 foreground/.forward to=/chronos/llynell amser/blaendir,

2539 nodi cyfnodau/.is if=chronos@markeras,% cyfnodau ar y llynell amser
2540 @nodi cyfnodau/.code={\chronos@ychwanegu@gosod{markeras}},
2541 nodi cyfnodau/.forward to=/chronos/llynell amser/@nodi cyfnodau,
2542 timeline mark eras/.forward to=/chronos/llynell amser/nodi cyfnodau,
2543 mark eras/.forward to=/chronos/llynell amser/nodi cyfnodau,
2544 timeline years set/.store in=\chronos@timelinyears,
2545 blynyddoedd/.is choice,
2546 timeline years/.forward to=/chronos/llynell amser/blynyddoedd,

2547 blynyddoedd/.forward to=/chronos/llynell amser/timeline years set,
2548 blynyddoedd/dim/.code={%
2549     \chronos@timeline@showyearsfalse
2550     \chronos@blynyddoedduchodfalse
2551     \chronos@blynyddoeddisodfalse
2552     \pgfqkeys{/chronos/llynell amser}{%
2553         timeline@years/.style={},
2554         angor blynyddoedd=base,
2555     }%
2556 },% oedd /chronos/llynell amser/heb flynyddoedd
2557 blynyddoedd/none/.forward to=/chronos/llynell amser/blynyddoedd/dim,%^^A oedd /chronos/tim
no years
2558 blynyddoedd/uchod/.code={%
2559     \chronos@yearsonlinefalse
2560     \chronos@blynyddoedduchodtrue
2561     \chronos@blynyddoeddisodfalse
2562     \pgfqkeys{/chronos/llynell amser}{%
2563         timeline@years/.style={%
2564             above, anchor=\chronos@timelinyearsanchor, yshift=.5*\chronos@height},
2565             angor blynyddoedd=south,
2566         }%
2567 },
2568 blynyddoedd/above/.forward to=/chronos/llynell amser/blynyddoedd/uchod,
2569 blynyddoedd/isod/.code={%
2570     \chronos@yearsonlinefalse
2571     \chronos@blynyddoedduchodfalse
2572     \chronos@blynyddoeddisodtrue
2573     \pgfqkeys{/chronos/llynell amser}{%
2574         timeline@years/.style={%
2575             below, anchor=\chronos@timelinyearsanchor, yshift=-.5*\chronos@height},
2576             angor blynyddoedd=north,

```

```

2577     }%
2578   },
2579   blynyddoedd/below/.forward to=/chronos/llinell amser/blynyddoedd/isod,
2580   blynyddoedd/ar y llinell/.code={%
2581     \chronos@yearsonlinetrue
2582     \chronos@blynyddoedduchodfalse
2583     \chronos@blynyddoeddisodfalse
2584     \pgfqkeys{/chronos/llinell amser}{%
2585       timeline@years/.style={anchor=\chronos@timelineyearsanchor},
2586       angor blynyddoedd=center,
2587     }%
2588   },
2589   blynyddoedd/on line/.forward to=/chronos/llinell amser/blynyddoedd/ar y llinell,
2590   blynyddoedd/off line/.code={%
2591     \IfBooleanExprTF {%
2592       ! ( \LegacyBoolean {chronos@blynyddoedduchod} %
2593         || \LegacyBoolean {chronos@blynyddoeddisod} )
2594     }{%
2595       \pgfqkeys{/chronos/llinell amser}{blynyddoedd=uchod}%
2596     }{%
2597       \chronos@yearsonlinefalse
2598     }%
2599   },
2600   blynyddoedd/.chronos track=timeline@years,
2601   angor blynyddoedd/.store in=\chronos@timelineyearsanchor,
2602   angor blynyddoedd/.chronos track={angor@blynyddoedd},
2603   timeline years anchor/.forward to=/chronos/llinell amser/angor blynyddoedd,
2604   blwyddyn sero/.is if=chronos@yearzero,
2605   year zero/.forward to=/chronos/llinell amser/blwyddyn sero,
2606   mark at era switch/.is if=chronos@markateraswitch,
2607   mark at era switch/.default=true,
2608   @mark at era switch/.code={\chronos@ychwanegu@gosod{markateraswitch}},
2609   mark at era switch/.forward to=/chronos/llinell amser/@mark at era switch,
2610   year at era switch/.code={%
2611     \chronos@legacy@if@set{chronos@temp}{#1}%
2612     \ifchronos@temp
2613       \chronos@markateraswitchfalse
2614     \else
2615       \chronos@markateraswitchtrue
2616     \fi
2617     \chronos@ychwanegu@gosod{markateraswitch}},
2618   year at era switch/.default=true,
2619   blynyddoedd bychain/.is if=chronos@minoryears,
2620   blynyddoedd bychain/.default=true,
2621   minor years/.forward to=/chronos/llinell amser/blynyddoedd bychain,
2622   nodau/.is if=chronos@marks,
2623   nodau/.default=true,
2624   timeline marks/.forward to=/chronos/llinell amser/nodau,
2625   nodau bach/.is if=chronos@marks@minor,
2626   nodau bach/.default=true,
2627   timeline minor marks/.forward to=/chronos/llinell amser/nodau bach,
2628   dangos blynyddoedd/.is if=chronos@timeline@showyears,
2629   dangos blynyddoedd/.default=true,
2630   timeline show years/.forward to=/chronos/llinell amser/dangos blynyddoedd,
2631   nodau noeth/.is if=chronos@marks@bare,
2632   nodau noeth/.default=true,
2633   nodau noeth/.chronos track={@bare},
2634   timeline bare marks/.forward to=/chronos/llinell amser/nodau noeth,
2635   timeline@year@off@line/.style={%
2636     text=chronos@lliw@llinell, text opacity=1, align=center, %
2637     fill opacity=.75, anchor=\chronos@timelineyearsanchor},

```

```

2638 timeline@mark@off@line/.style={draw=chronos@lliw@llinell,%
2639   {Triangle[width=0pt 3,reversed,length=0pt 1.5]}-, thin, shorten >=-2.5pt},
2640 timeline@minor@mark@off@line/.style={draw=chronos@lliw@llinell,%
2641   {Triangle[width=0pt 3,reversed,length=0pt 1.5]}-, very thin,%
2642   shorten >=-2.5pt},
2643 era switch off line/.style={thick, shorten >=0pt},
2644 timeline@bare@mark@off@line/.style={draw=chronos@lliw@llinell,%
2645   {Triangle[width=0pt 3,reversed,length=0pt 1.5]}-, very thin,%
2646   shorten >=-1.5pt},
2647 timeline@year@on@line/.style={text=chronos@lliw@llinell, anchor=center},
2648 timeline@mark@on@line/.style={draw=chronos@lliw@llinell},
2649 timeline@minor@mark@on@line/.style={draw=chronos@lliw@llinell, thin},
2650 timeline@bare@mark@on@line/.style={draw=chronos@lliw@llinell, thick},
2651 timeline mark@too/.code={%
2652   \pgfqkeys{/chronos/llinell amser}{%
2653     timeline@mark@on@line/.append style={#1},
2654     timeline@mark@off@line/.append style={#1},
2655   }%
2656 },
2657 timeline minor mark@too/.code={%
2658   \pgfqkeys{/chronos/llinell amser}{%
2659     timeline minor marks,
2660     timeline@minor@mark@on@line/.append style={#1},
2661     timeline@minor@mark@off@line/.append style={#1},
2662   }%
2663 },
2664 timeline bare mark@too/.code={%
2665   \pgfqkeys{/chronos/llinell amser}{%
2666     timeline bare marks,
2667     timeline@bare@mark@on@line/.append style={#1},
2668     timeline@bare@mark@off@line/.append style={#1},
2669   }%
2670 },
2671 timeline year@too/.code={%
2672   \pgfqkeys{/chronos/llinell amser}{%
2673     timeline@year@on@line/.append style={#1},
2674     timeline@year@off@line/.append style={#1},
2675   }%
2676 },
2677 }
2678 \ExplSyntaxOn

```

forward each key in #3 to the key in #2; all keys on /chronos/#1

```

2679 \__chronos_kexforwarder:nnn { llinell ~ amser } { timeline ~ mark@too }
2680 { timeline ~ mark, timeline ~ all ~ marks }
2681 \__chronos_kexforwarder:nnn { llinell ~ amser } { timeline ~ minor ~ mark@too }
2682 { timeline ~ minor ~ mark, timeline ~ all ~ marks }
2683 \__chronos_kexforwarder:nnn { llinell ~ amser } { timeline ~ bare ~ mark@too }
2684 { timeline ~ bare ~ mark, timeline ~ all ~ marks }
2685 \__chronos_kexforwarder:nnn { llinell ~ amser } { timeline ~ year@too }
2686 { timeline ~ year, timeline ~ all ~ marks }
2687 \__chronos_kexforwarder:nnn { llinell ~ amser } { dyddiadau } { dates }
2688 \__chronos_kexforwarder:nnn { llinell ~ amser } { dyddiad ~ dechrau }
2689 { dechrau, start ~ date, start }
2690 \__chronos_kexforwarder:nnn { llinell ~ amser } { dyddiad ~ diwedd }
2691 { diwedd, end ~ date, end }
2692 \__chronos_kexforwarder:nnn { llinell ~ amser } { cam ~ blwyddyn ~ fawr }
2693 { step ~ major ~ years, step ~ major ~ year, cam ~ blwyddyn ~ mawr }
2694 \__chronos_kexforwarder:nnn { llinell ~ amser } { cam ~ blwyddyn ~ fach }
2695 { cam ~ blynyddoedd ~ bach, step ~ minor ~ years, step ~ minor ~ year }

```

```

2696 \__chronos_kexforwarder:nnn { llinell ~ amser } {rhaniadau ~ cam }
2697 { step ~ divisions } %^A oedd camau bach, minor steps
2698 \__chronos_kexforwarder:nnn { llinell ~ amser } {cam ~ blwyddyn }
2699 { cam ~ blynyddoedd, step ~ years, step ~ year }
2700 \__chronos_kexforwarder:nnn { llinell ~ amser } {camu ~ o ~ flwyddyn }
2701 { step ~ from ~ year }
2702 \ExplSyntaxOff
2703 \pgfqkeys{/chronos}{%

2704 ce year label/.store in=\chronos@yearce,
2705 bce year label/.store in=\chronos@yearbce,
2706 timeline ce label/.store in=\chronos@ce,
2707 timeline bce label/.store in=\chronos@bce,

2708 cefndir/.chronos lliw=prifliw@cefndir,
2709 background/.forward to=/chronos/cefndir,
2710 blaendir/.chronos lliw=prifliw,
2711 foreground/.forward to=/chronos/blaendir,
2712 troi lliwiau/.code={%
2713   \chronos@ychwanegu@nodweddion@rhag{@tag}{/chronos/troi lliwiau=#1}%
2714   \chronos@legacy@if@set{chronos@troilliwiau}{#1}%
2715 },
2716 troi lliwiau/.default=true,
2717 colour rotation/.forward to=/chronos/troi lliwiau,
2718 color rotation/.forward to=/chronos/troi lliwiau,
2719 heb droi lliwiau/.code={%
2720   \chronos@ychwanegu@nodweddion@rhag{@tag}{/chronos/troi lliwiau=false}%
2721   \chronos@troilliwiaufalse
2722 },
2723 no colour rotation/.forward to=/chronos/heb droi lliwiau,
2724 no color rotation/.forward to=/chronos/heb droi lliwiau,
2725 troi pob liw/.style={/chronos/.cd, byw/troi lliwiau=true,%
2726   digwyddiad/troi lliwiau=true, parhad/troi lliwiau=true, %
2727   theori/troi lliwiau=true, troi lliwiau=true},
2728 rotate all colours/.forward to=/chronos/troi pob liw,
2729 rotate all colors/.forward to=/chronos/troi pob liw,
2730 troi dim lliwiau/.style={/chronos/.cd, byw/troi lliwiau=false,%
2731   digwyddiad/troi lliwiau=false, parhad/troi lliwiau=false,%
2732   theori/troi lliwiau=false, heb droi lliwiau},
2733 rotate no colours/.forward to=/chronos/troi dim lliwiau,
2734 rotate no colors/.forward to=/chronos/troi dim lliwiau,

2735 lefelau/.style args={#1:#2}{
2736 /chronos/uchod=#1,
2737 /chronos/isod=#2,
2738 },
2739 lefelau at/.store in=\chronos@lefelau@at,
2740 lefelau at=chronos mid,
2741 uchod/.store in=\chronos@uchod,
2742 isod/.store in=\chronos@isod,

2743 fformat dyddiad/.code={\chronos@setdateformat{#1}},
2744 date format/.forward to=/chronos/fformat dyddiad,
2745 year format/.code={\chronos@setyearformat{#1}},
2746 minor year format/.code={\chronos@setminoryearformat{#1}},
2747 dangos cyfnodau/@blynyddoedd yn unig/.code={%
2748   \chronos@setdateformat{!Y\thinspace !E}%
2749 },
2750 dangos cyfnodau/@llawn/.code={\chronos@setdateformat{!d/!m/!Y\thinspace !E}},
2751 dangos cyfnodau/llawn/.code={%
2752   \pgfqkeys{/chronos/dangos cyfnodau}{%
2753     @llawn/.code={\chronos@setdateformat{#1}}%
2754   }%

```

```

2755 },
2756 dangos cyfnodau/blynyddoedd yn unig/.code={%
2757   \pgfqkeys{/chronos/dangos cyfnodau}{%
2758     @blynyddoedd yn unig/.code={\chronos@setdateformat{#1}}%
2759   }%
2760 },
2761 heb gyfnodau/@blynyddoedd yn unig/.code={\chronos@setdateformat{!Y}},
2762 heb gyfnodau/@llawn/.code={\chronos@setdateformat{!d!/!m!/!Y}},
2763 heb gyfnodau/llawn/.code={%
2764   \pgfqkeys{/chronos/heb gyfnodau}{@llawn/.code={\chronos@setdateformat{#1}}}%
2765 },
2766 heb gyfnodau/blynyddoedd yn unig/.code={%
2767   \pgfqkeys{/chronos/heb gyfnodau}{%
2768     @blynyddoedd yn unig/.code={\chronos@setdateformat{#1}}%
2769   }%
2770 },
2771 blynyddoedd yn unig/.code={%
2772   \chronos@ychwanegu@nodweddion@rhag{@tag}{/chronos/blynyddoedd yn unig}%
2773   \chronos@ychwanegu@nodweddion{byw}{@tag}{/chronos/blynyddoedd yn unig}%
2774   \chronos@ychwanegu@nodweddion{digwyddiad}{@tag}{/chronos/blynyddoedd yn unig}%
2775   \chronos@ychwanegu@nodweddion{parhad}{@tag}{/chronos/blynyddoedd yn unig}%
2776   \chronos@dimondblynyddoeddtrue
2777   \ifchronos@dangoscyfnodau
2778     \pgfqkeys{/chronos}{%
2779       dangos cyfnodau/@blynyddoedd yn unig,
2780     }%
2781   \else
2782     \pgfqkeys{/chronos}{%
2783       heb gyfnodau/@blynyddoedd yn unig,
2784     }%
2785   \fi
2786 },
2787 only years/.forward to=/chronos/blynyddoedd yn unig,
2788 dyddiadau llawn/.code={%
2789   \chronos@ychwanegu@nodweddion@rhag{@tag}{/chronos/dyddiadau llawn}%
2790   \chronos@ychwanegu@nodweddion{byw}{@tag}{/chronos/dyddiadau llawn}%
2791   \chronos@ychwanegu@nodweddion{digwyddiad}{@tag}{/chronos/dyddiadau llawn}%
2792   \chronos@ychwanegu@nodweddion{parhad}{@tag}{/chronos/dyddiadau llawn}%
2793   \chronos@dimondblynyddoeddfalse
2794   \ifchronos@dangoscyfnodau
2795     \pgfqkeys{/chronos}{%
2796       dangos cyfnodau/@llawn,
2797     }%
2798   \else
2799     \pgfqkeys{/chronos}{%
2800       heb gyfnodau/@llawn,
2801     }%
2802   \fi
2803 },
2804 full dates/.forward to=/chronos/dyddiadau llawn,
2805 dangos cyfnodau/.code={%
2806   \chronos@ychwanegu@nodweddion@rhag{@tag}{/chronos/dangos cyfnodau}%
2807   \chronos@ychwanegu@nodweddion{byw}{@tag}{/chronos/dangos cyfnodau}%
2808   \chronos@ychwanegu@nodweddion{digwyddiad}{@tag}{/chronos/dangos cyfnodau}%
2809   \chronos@ychwanegu@nodweddion{parhad}{@tag}{/chronos/dangos cyfnodau}%
2810   \chronos@dangoscyfnodautrue
2811   \ifchronos@dimondblynyddoedd
2812     \pgfqkeys{/chronos}{%
2813       dangos cyfnodau/@blynyddoedd yn unig,
2814     }%
2815   \else

```

```

2816     \pgfqkeys{/chronos}{%
2817         dangos cyfnodau/@llawn,
2818     }%
2819     \fi
2820 },
2821 show eras/.forward to=/chronos/dangos cyfnodau,
2822 heb gyfnodau/.code={%
2823     \chronos@ychwanegu@nodweddion@rhag{@tag}{/chronos/heb gyfnodau}%
2824     \chronos@ychwanegu@nodweddion{byw}{@tag}{/chronos/heb gyfnodau}%
2825     \chronos@ychwanegu@nodweddion{digwyddiad}{@tag}{/chronos/heb gyfnodau}%
2826     \chronos@ychwanegu@nodweddion{parhad}{@tag}{/chronos/heb gyfnodau}%
2827     \chronos@dangoscyfnodaufalse
2828     \ifchronos@dimondblynyddoedd
2829     \pgfqkeys{/chronos}{%
2830         heb gyfnodau/@blynyddoedd yn unig,
2831     }%
2832     \else
2833     \pgfqkeys{/chronos}{%
2834         heb gyfnodau/@llawn,
2835     }%
2836     \fi
2837 },
2838 without eras/.forward to=/chronos/heb gyfnodau,
2839 show eras/only years/.forward to=/chronos/dangos cyfnodau/blynyddoedd yn unig,
2840 show eras/full dates/.forward to=/chronos/dangos cyfnodau/dyddiadau llawn,
2841 without eras/only years/.forward to=/chronos/heb gyfnodau/blynyddoedd yn unig,
2842 without eras/full dates/.forward to=/chronos/heb gyfnodau/dyddiadau llawn,
2843 heb gyfnodau/.chronos track={@digwyddiad@cyfnodau,@byw@cyfnodau,@parhad@cyfnodau},
2844 dangos cyfnodau/.chronos track={@digwyddiad@cyfnodau,@byw@cyfnodau,@parhad@cyfnodau},
2845 dyddiadau llawn/.chronos track={@digwyddiad@llawn,@byw@llawn,@parhad@llawn},
2846 blynyddoedd yn unig/.chronos track={@digwyddiad@llawn,@byw@llawn,@parhad@llawn},

2847 every date format/.code={%^^A defnyddio macros yn lle allweddau rhag ofn , yn #1 =>
    pam ar ddaear?
2848     \chronos@setdateformat{#1}%
2849     \pgfqkeys{/chronos}{%
2850         digwyddiad/fformat dyddiad={#1},
2851         parhad/fformatiau dyddiadau={#1:#1:#1},
2852         byw/fformatiau dyddiadau={#1:#1:#1},
2853     }%
2854 },
2855 every date format/.chronos track={%
2856     @digwyddiad@fformatiau@dyddiadau,@digwyddiad@cyfnodau,@digwyddiad@llawn},
2857 every date format/.chronos track={%
2858     @byw@fformatiau@dyddiadau,@byw@cyfnodau,@byw@llawn},
2859 every date format/.chronos track={%
2860     @parhad@fformatiau@dyddiadau,@parhad@cyfnodau,@parhad@llawn},
2861 testun yn unig/.code={%
2862     \chronos@ychwanegu@nodweddion@rhag{@tag}{/chronos/testun yn unig}%
2863     \chronos@setdateformat}%
2864     \chronos@onlytexttrue
2865 },
2866 only text/.forward to=/chronos/testun yn unig,
2867 event years on line/.code={%
2868     \chronos@eventyearsonlinetrue
2869     \chronos@timeline@showyearsfalse
2870     \pgfqkeys{/chronos/digwyddiad}{blynyddoedd yn unig,heb gyfnodau}%
2871     \chronos@onlytexttrue
2872 },
2873 event year on line/.style={%
2874     /chronos/llinell amser/timeline@years,%

```

```

2875 /chronos/llinell amser/timeline@year@on@line,%
2876 font=\chronos@ffont@camaumawr%
2877 },
2878 event year on line skip/.code={\gdef\chronos@specialdate{}},
2879 event dates split/.is if=chronos@eventdatessplit,
2880 event date split/.style={},
2881 testun yshift/.code={%
2882 \pgfmathparse{#1}%
2883 \chronos@ychwanegu@nodweddion@rhag{tag}{/chronos/testun yshift=\pgfmathresult pt}%
2884 \chronos@testun@yshift=\pgfmathresult pt
2885 },
2886 testun yshift'/.code={%
2887 \chronos@ychwanegu@nodweddion@rhag{tag}{/chronos/testun yshift=#1}%
2888 \chronos@testun@yshift=#1
2889 },
2890 testun yshift+/.code={%
2891 \pgfmathparse{#1}%
2892 \chronos@ychwanegu@nodweddion@rhag{tag}{/chronos/testun yshift'+=\pgfmathresult pt}%
2893 \advance \chronos@testun@yshift by \pgfmathresult pt
2894 },
2895 testun yshift'+/.code={%
2896 \chronos@ychwanegu@nodweddion@rhag{tag}{/chronos/testun yshift'+=#1}%
2897 \advance \chronos@testun@yshift by #1
2898 },
2899 text tag yshift/.forward to=/chronos/testun yshift,
2900 text tag yshift'/.forward to=/chronos/testun yshift,
2901 text tag yshift'+/.forward to=/chronos/testun yshift,
2902 text tag yshift+/.forward to=/chronos/testun yshift,
2903 special date/.code={\gdef\chronos@specialdate{#1}},

saesneg: /chronos (mwy uchod)

2904 levels/.forward to=/chronos/lefelau,
2905 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

2906 discard node/.code={% ^^A
2907 \setbox\pgfutil@tempboxa\box\pgfutil@voidbox % empty out box
2908 \def\tikz@whichbox{\pgfutil@tempboxa}%
2909 },

ateb Qrrbrbirlbel uchod ac ateb arall fe: https://tex.stackexchange.com/a/688111/ ; de-
fnyddio yn lle \chronosphantom

2910 phantom node/.code=\tikz@addoption{%
2911 \expandafter\let\csname pgf@sh@boxes@\tikz@shape\endcsname\pgfutil@empty},

sylwad Qrrbrbirlbel: https://tex.stackexchange.com/questions/694799/how-can-i-disable-shad-noredirect=1#comment1724762\_694799

2912 zap preactions/.code=\let\tikz@preactions\@empty,
2913 zap postactions/.code=\let\tikz@postactions\@empty,
2914 placeholders/.is choice,
2915 placeholders/off/.code={%
2916 \chronos@placeholdersfalse
2917 \pgfqkeys{/chronos}{%
2918 placeholder/.style={fill=none, draw=none,/chronos/discard node},%^^A phantom node,zap
preactions,zap postactions},
2919 }%
2920 },

```

```

2921 placeholders/on/.code={%
2922   \pgfqkeys{/chronos}{%
2923     placeholder/.style={on chronos middle ground layer,fill opacity=.1,%
2924       draw opacity=.25,text opacity=.5,/chronos/.cd,zap preactions,%
2925       zap postactions},
2926   }%
2927 },
2928 placeholders/.default=on,
2929 placeholders=off,
2930 placeholder lines/.style={help lines,%
2931   every node/.append style={rotate=-90,anchor=south,pos=.25,inner sep=0pt}},

2932 show coords/.is if=chronos@showcoords,
2933 show coords/.default=true,
2934 show nodes/.is if=chronos@shownodes,
2935 show nodes/.default=true,
2936 show coordinate/.style n args=5{fill=#1, circle, anchor=center,%
2937   inner sep=1pt, text=#1, pin={[#1, inner sep=0pt, pin edge={draw=#1},%
2938   pin distance=#4, #5]#2:#3}},
2939 show coord/.style 2 args={%
2940   /chronos/show coordinate={chronos@lliw@coord}{#1}{#2}{30pt}{}},
2941 show node coord/.style 2 args={%
2942   /chronos/show coordinate={chronos@lliw@node}{#1}{#2}{30pt}{}},
2943 show node/.style={},
2944 show bounding box/.is if=chronos@showbb,
2945 show bounding box/.default=true,
2946 show node colour/.chronos lliw=lliw@node,
2947 show bb colour/.chronos lliw=lliw@bb,
2948 show coordinate colour/.chronos lliw=lliw@coord,
2949 show node color/.forward to=/chronos/show node colour,
2950 show coordinate color/.forward to=/chronos/show coordinate colour,
2951 show bb color/.forward to=/chronos/show bb colour,
2952 show node colour=blue,
2953 show coordinate colour=red,
2954 show bb colour=chronosGreen,

2955 dadfygio/.code={%
2956   \pgfqkeys{/chronos}{%
2957     placeholders,show coords,show node colour=blue,show coordinate colour=red,%
2958     show bounding box,show nodes,show node/.style={draw=chronos@lliw@node}},
2959 debug/.forward to=/chronos/dadfygio,

2960 enwau lliw syml/.is if=chronos@enwaulliwsyml,
2961 enwau lliw syml/.default=true,
2962 dim enwau lliw syml/.code={\chronos@enwaulliwsymlfalse},
2963 tags/.code={%
2964   \pgfqkeys{/chronos}{@tag/.style={#1}}%
2965   \chronos@cadw@nodweddion@rhag{@tag}{#1}},
2966 tags+/.code={%
2967   \pgfqkeys{/chronos}{@tag/.append style={#1}}%
2968   \chronos@ychwanegu@nodweddion@rhag{@tag}{#1}},
2969 tags={},
2970 cysylltiad ar/.chronos layer choice=cysylltiad,
2971 cysylltiadau ar/.forward to=/chronos/cysylltiad ar,
2972 cysylltiad ar=main,
2973 llinell ar/.chronos layer choice=llinell,
2974 llinellau ar/.forward to=/chronos/llinell ar,
2975 llinell ar=middle ground,

2976 cysylltwyr theori/.forward to=/chronos/theori/cysylltwr testun,

2977 theori dash/.style={},
2978 lliwiau uchod/.code={\chronos@lliwiau@uchod{#1}},

```

```

2979 lliwiau isod/.code={\chronos@lliwiau@isod{#1}},
2980 lliwiau uchod o clist/.code={\chronos@global@eq@clist{lliwiau_uchod}{#1}},
2981 lliwiau isod o clist/.code={\chronos@global@eq@clist{lliwiau_isod}{#1}},
2982 }
2983 \ExplSyntaxOn

```

set up /chronos/#1 with ' and + variants to set default #3; set up every #1 with ' and + variants to set default #1 and corresponding keys for tags in #5 ; use #4 as the default ; set up keys for forwarding using #2 as alias for #1

```

2984 \__chronos_kexpander:nnnnn { llinellau } { lines } { @llinell } { ' }
2985 { byw, digwyddiad, parhad }
2986 \__chronos_kexpander:nnnnn { cysylltwyr ~ chronos } { chronos ~ connectors }
2987 { @cysylltwr@chronos } { + } { byw, digwyddiad, parhad }
2988 \__chronos_kexpander:nnnnn { cysylltwyr ~ testun } { text ~ tag ~ connectors }
2989 { @cysylltwr@testun } { + } { byw, digwyddiad, parhad, theori }
2990 \__chronos_kexpander:nnnnn { prif ~ gysylltwyr ~ testun }
2991 { main ~ text ~ tag ~ connectors } { @cysylltwr@testun@prif } { ' }
2992 { byw, digwyddiad, parhad, theori }
2993 \__chronos_kexpander:nnnnn { cysylltiadau } { connections } { @cysylltiad }
2994 { ' } { byw, digwyddiad, parhad, theori }
2995 \__chronos_kexpander:nnnnn { testunau } { text ~ tags } { @testun }
2996 { ' } { byw, digwyddiad, parhad, theori, gwybodaeth }
2997 \__chronos_kexpander:nnnnn { fformat ~ dyddiad } { date ~ format }
2998 { @fformat@dyddiad } { ' } { byw, digwyddiad, parhad, theori, gwybodaeth }
2999 \ExplSyntaxOff
3000 \pgfqkeys{/chronos}{%
3001 llinell amser/.cd,
3002 lled/.chronos dimen=\chronos@width,
3003 uchder/.chronos dimen=\chronos@height,
3004 uchder y border/.chronos dimen=\chronos@borderheight,
3005 timeline era margin/.chronos dimen=\chronos@eramargin,
3006 timeline margin/.chronos dimen=\chronos@timelinemargin,
3007 timeline width/.chronos dimen=\chronos@width,
3008 width/.chronos dimen=\chronos@width,
3009 timeline height/.chronos dimen=\chronos@height,
3010 height/.chronos dimen=\chronos@height,
3011 timeline border height/.chronos dimen=\chronos@borderheight,
3012 /chronos/.cd,
3013 llinell yshift/.chronos dimen=\chronos@llinell@yshift,
3014 line yshift/.chronos dimen=\chronos@llinell@yshift,
3015 border penawdau/.chronos dimen=\chronos@border@penawdau,
3016 border pen/.chronos dimen=\chronos@border@pen,
3017 border gwaelod/.chronos dimen=\chronos@border@gwaelod,
3018 border de/.chronos dimen=\chronos@border@de,
3019 border chwith/.chronos dimen=\chronos@border@chwith,
3020 border allanol/.chronos dimen=\chronos@border@allanol,
3021 headings border/.chronos dimen=\chronos@border@penawdau,
3022 top border/.chronos dimen=\chronos@border@penawdau,
3023 bottom border/.chronos dimen=\chronos@border@gwaelod,
3024 right border/.chronos dimen=\chronos@border@de,
3025 left border/.chronos dimen=\chronos@border@chwith,
3026 outer border/.chronos dimen=\chronos@border@allanol,
3027 }
3028 \tikzset{/chronos/.cd,
3029 no connections/.code={%
3030 \chronos@byw@cysylltiadfals
3031 \chronos@digwyddiad@cysylltiadfals
3032 \chronos@parhad@cysylltiadfals
3033 },
3034 no connectors/.code={%
3035 \pgfqkeys{/chronos}{every cysylltwyr testun'={coordinate},%

```

```

3036     every cysylltwyr chronos'={coordinate}}},
3037 no text tag connectors/.code={%
3038     \pgfqkeys{/chronos}{every cysylltwyr testun'={coordinate}}},
3039 simple colour names/.forward to=/chronos/enwau lliw syml,
3040 simple color names/.forward to=/chronos/enwau lliw syml,
3041 no simple colour names/.forward to=/chronos/dim enwau lliw syml,
3042 no simple color names/.forward to=/chronos/dim enwau lliw syml,
3043 connection/.forward to=/chronos/@cysylltiad,
3044 connection on/.forward to=/chronos/cysylltiad ar,
3045 connections on/.forward to=/chronos/cysylltiadau ar,
3046 colours above/.forward to=/chronos/lliwiau uchod,
3047 colours below/.forward to=/chronos/lliwiau isod,
3048 colors above/.forward to=/chronos/lliwiau uchod,
3049 colors below/.forward to=/chronos/lliwiau isod,
3050 colours above from clist/.forward to=/chronos/lliwiau uchod o clist,
3051 colours below from clist/.forward to=/chronos/lliwiau isod o clist,
3052 colors above from clist/.forward to=/chronos/lliwiau uchod o clist,
3053 colors below from clist/.forward to=/chronos/lliwiau isod o clist,
3054 lines on/.forward to=/chronos/llinell ar,
3055 line on/.forward to=/chronos/llinell ar,
3056 }
3057 \tikzset{%
3058 /chronos/byw/.chronos tag init={byw}{life},
3059 /chronos/byw/.chronos tag dyddiadau init=byw:geni:marw:bu farw:bufarw:geni:marw:birth:deat
3060 /chronos/byw/.cd,
3061 /chronos/digwyddiad/.chronos tag init={digwyddiad}{event},
3062 /chronos/digwyddiad/.cd,
3063 dyddiad/.style={/chronos/set date aux/.expanded={#1-01-01-0@dig}},
3064 ffont dyddiad/.code={\def\chronos@digwyddiad@ffontdyddiad{#1}},
3065 ffont dyddiad=,
3066 fformat dyddiad/.code={%
3067     \def\chronos@digwyddiad@fformatdyddiad{#1}%
3068     \chronos@ychwanegu@nodweddion{digwyddiad}{@tag}%
3069     {/chronos/digwyddiad/fformat dyddiad={#1}}%
3070 },
3071 fformat dyddiad/.chronos track={%
3072     @digwyddiad@fformatiau@dyddiadau,@digwyddiad@cyfnodau,@digwyddiad@llawn},
3073 dangos cyfnodau/@blynyddoedd yn unig/.code={%
3074     \def\chronos@digwyddiad@fformatdyddiad{!Y\thinspace !E}},
3075 dangos cyfnodau/@llawn/.code={%
3076     \def\chronos@digwyddiad@fformatdyddiad{!d!/m!/Y\thinspace !E}},
3077 dangos cyfnodau/llawn/.code={%
3078     \pgfqkeys{/chronos/digwyddiad/dangos cyfnodau}{%
3079         @llawn/.code={\def\chronos@digwyddiad@fformatdyddiad{#1}}}},
3080 dangos cyfnodau/blynyddoedd yn unig/.code={%
3081     \pgfqkeys{/chronos/digwyddiad/dangos cyfnodau}{%
3082         @blynyddoedd yn unig/.code={\def\chronos@digwyddiad@fformatdyddiad{#1}}}},
3083 heb gyfnodau/@blynyddoedd yn unig/.code={\def\chronos@digwyddiad@fformatdyddiad{!Y}},
3084 heb gyfnodau/@llawn/.code={\def\chronos@digwyddiad@fformatdyddiad{!d!/m!/Y}},
3085 heb gyfnodau/llawn/.code={%
3086     \pgfqkeys{/chronos/digwyddiad/heb gyfnodau}{%
3087         @llawn/.code={\def\chronos@digwyddiad@fformatdyddiad{#1}},@llawn/.show code}},
3088 heb gyfnodau/blynyddoedd yn unig/.code={%
3089     \pgfqkeys{/chronos/digwyddiad/heb gyfnodau}{%
3090         @blynyddoedd yn unig/.code={\def\chronos@digwyddiad@fformatdyddiad{#1}}}},
3091 dangos cyfnodau/.code={%
3092     \chronos@ychwanegu@nodweddion{digwyddiad}{@tag}{/chronos/dangos cyfnodau}},
3093 heb gyfnodau/.code={%
3094     \chronos@ychwanegu@nodweddion{digwyddiad}{@tag}{/chronos/heb gyfnodau}},

```

```

3095 dyddiadau llawn/.code={%
3096   \chronos@ychwanegu@nodweddion{digwyddiad}{@tag}{/chronos/dyddiadau llawn}},
3097 blynyddoedd yn unig/.code={%
3098   \chronos@ychwanegu@nodweddion{digwyddiad}{@tag}{/chronos/blynyddoedd yn unig}},
3099 dangos cyfnodau/.chronos track={@digwyddiad@cyfnodau},
3100 dyddiadau llawn/.chronos track={@digwyddiad@llawn},
3101 heb gyfnodau/.chronos track={@digwyddiad@cyfnodau},
3102 blynyddoedd yn unig/.chronos track={@digwyddiad@llawn},

3103 date/.forward to=/chronos/digwyddiad/dyddiad,
3104 date font/.forward to=/chronos/digwyddiad/ffont dyddiad,
3105 date format/.forward to=/chronos/digwyddiad/fformat dyddiad,
3106 show eras/.forward to=/chronos/digwyddiad/dangos cyfnodau,
3107 only years/.forward to=/chronos/digwyddiad/blynyddoedd yn unig,
3108 full dates/.forward to=/chronos/digwyddiad/dyddiadau llawn,
3109 without eras/.forward to=/chronos/digwyddiad/heb gyfnodau,
3110 show eras/only years/.forward to=/chronos/digwyddiad/dangos cyfnodau/blynyddoedd yn
unig,
3111 show eras/full dates/.forward to=/chronos/digwyddiad/dangos cyfnodau/dyddiadau llawn,
3112 without eras/only years/.forward to=/chronos/digwyddiad/heb gyfnodau/blynyddoedd yn
unig,
3113 without eras/full dates/.forward to=/chronos/digwyddiad/heb gyfnodau/dyddiadau llawn,

3114 /chronos/parhad/.chronos tag init={parhad}{period},
3115 /chronos/parhad/.chronos tag dyddiadau init=parhad:dechrau:diwedd:gorffenedig:gorffenedig:
3116 /chronos/parhad/.cd,

3117 /chronos/theori/.chronos tag init={theori}{theory},
3118 /chronos/theori/.cd,

3119 /chronos/theori/cylchau/.cd,
3120 enw/.store in=\chronos@cylchtheori@enw,

3121 chronos@tikzname/.code={%
3122   \chronos@creu@tikzname {cylchtheori}{#1}
3123 },
3124 enw/.forward to=/chronos/theori/cylchau/chronos@tikzname,

3125 at/.code={\coordinate (chronos@cylchtheori@at) at (#1);},

3126 meintiau/.chronos 2 dimens={\chronos@cylchtheori@mawr}{\chronos@cylchtheori@bach},
3127 mawr/.chronos dimen=\chronos@cylchtheori@mawr,
3128 bach/.chronos dimen=\chronos@cylchtheori@bach,
3129 labeli/.style args={#1:#2}{
3130 /chronos/theori/cylchau/label uchod=#1,
3131 /chronos/theori/cylchau/label isod=#2,
3132 },
3133 label uchod/.store in=\chronos@cylchtheori@label@uchod,
3134 label isod/.store in=\chronos@cylchtheori@label@isod,
3135 testunau cylch/.style args={#1:#2}{
3136 /chronos/theori/cylchau/testun cylch uchod=#1,
3137 /chronos/theori/cylchau/testun cylch isod=#2,
3138 },
3139 testun cylch uchod/.store in=\chronos@cylchtheori@circletext@uchod,
3140 testun cylch isod/.store in=\chronos@cylchtheori@circletext@isod,

3141 /chronos/theory/circles/.chronos search=theori/cylchau,
3142 name/.forward to=/chronos/theori/cylchau/enw,

3143 sizes/.chronos 2 dimens={\chronos@cylchtheori@mawr}{\chronos@cylchtheori@bach},

3144 circle texts/.forward to=/chronos/theori/cylchau/testunau cylch,
3145 labels/.forward to=/chronos/theori/cylchau/labeli,

```

```

3146 /chronos/gwybodaeth/.cd,
3147 enw/.store in=\chronos@gwybodaeth@enw,
3148 chronos@tikzname/.code={%
3149   \chronos@creu@tikzname {gwybodaeth}{#1}
3150 },
3151 enw/.forward to=/chronos/gwybodaeth/chronos@tikzname,
3152 angor/.store in=\chronos@gwybodaeth@angor,
3153 at/.store in=\chronos@gwybodaeth@at,
3154 capsiwn/.store in=\chronos@gwybodaeth@capsiw,
3155 lliw/.store in=\chronos@gwybodaeth@lliw,
3156 lliw rhagosodedig/.store in=\chronos@gwybodaeth@lliw@rhagosodedig,
3157 lliw rhagosodedig=chronos@lliw@gwybodaeth,
3158 tag'/.code={%
3159   \chronos@cadw@nodweddion{gwybodaeth}{@tag}{#1}%
3160 },
3161 tag+/.code={%
3162   \chronos@ychwanegu@nodweddion{gwybodaeth}{@tag}{#1}%
3163 },
3164 testun'/.code={%
3165   \chronos@cadw@nodweddion{gwybodaeth}{@testun}{#1}%
3166 },
3167 testun+/.code={%
3168   \chronos@ychwanegu@nodweddion{gwybodaeth}{@testun}{#1}%
3169 },
3170 testun/.forward to=/chronos/gwybodaeth/testun',
3171 tag/.forward to=/chronos/gwybodaeth/tag+,
3172 cynnwys testun/.store in=\chronos@cynnwys@testun,
3173 cynnwys enw/.store in=\chronos@cynnwys@enw,

3174 /chronos/info/.chronos search=gwybodaeth,
3175 name/.forward to=/chronos/gwybodaeth/enw,
3176 caption/.forward to=/chronos/gwybodaeth/capsiw,
3177 colour/.forward to=/chronos/gwybodaeth/lliw,
3178 color/.forward to=/chronos/gwybodaeth/lliw,
3179 default colour/.forward to=/chronos/gwybodaeth/lliw rhagosodedig,
3180 default color/.forward to=/chronos/gwybodaeth/lliw rhagosodedig,
3181 text tag/.forward to=/chronos/gwybodaeth/testun,
3182 text tag'/.forward to=/chronos/gwybodaeth/testun',
3183 text tag+/.forward to=/chronos/gwybodaeth/testun+,
3184 tag anchor/.forward to=/chronos/gwybodaeth/angor,
3185 text content/.forward to=/chronos/gwybodaeth/cynnwys testun,
3186 name content/.forward to=/chronos/gwybodaeth/cynnwys enw,

3187 /chronos/prif/.cd,
3188 enw/.store in=\chronos@prifdeitl@enw,
3189 chronos@tikzname/.code={%
3190   \chronos@creu@tikzname {prifdeitl}{#1}
3191 },
3192 enw/.forward to=/chronos/prif/chronos@tikzname,
3193 angor/.store in=\chronos@prifdeitl@angor,
3194 angor/.forward to=/tikz/anchor,
3195 at/.code={\coordinate (chronos@prifdeitl@at) at (#1);},
3196 cynnwys enw/.store in=\chronos@prifdeitl@cynnwys,
3197 llinellau teitl/.style={%
3198   /tikz/.cd,draw=chronos@prifliw,inner xsep=Opt,#1,%
3199   append after command={%
3200     (main title.north west)--(main title.north east) (main title.south west)%
3201     --(main title.south east)},draw=none},

3202 /chronos/main/.chronos search=prif,
3203 name/.forward to=/chronos/prif/enw,
3204 tag anchor/.forward to=/chronos/prif/angor,

```

```

3205 name content/.forward to=/chronos/prif/cynnwys enw,
3206 title lines/.forward to=/chronos/prif/llynellau teitl,

3207 /chronos/hawlfraint/.cd,
3208 enw/.store in=\chronos@hawlfraint@enw,
3209 chronos@tikzname/.code={%
3210   \chronos@creu@tikzname {hawlfraint}{#1}
3211 },
3212 enw/.forward to=/chronos/hawlfraint/chronos@tikzname,
3213 angor/.store in=\chronos@hawlfraint@angor,
3214 angor/.forward to=/tikz/anchor,
3215 at/.code={\coordinate (chronos@hawlfraint@at) at (#1);},
3216 awdur/.store in=\chronos@hawlfraint@awdur,
3217 blwyddyn/.store in=\chronos@hawlfraint@blwyddyn,
3218 cynnwys enw/.store in=\chronos@hawlfraint@cynnwys,
3219 cylchdroi/.store in=\chronos@hawlfraint@cylchdroi,
3220 notis/.code={\def\chronos@hawlfraint@notis##1##2{#1}\show\chronos@hawlfraint@notis},
3221 copyleft/.is if=chronos@copyleft,
3222 copyleft/.default=true,

3223 /chronos/copyright/.chronos search=hawlfraint,
3224 /chronos/copyleft/.chronos search=hawlfraint,
3225 author/.forward to=/chronos/hawlfraint/awdur,
3226 name/.forward to=/chronos/hawlfraint/enw,
3227 name content/.forward to=/chronos/hawlfraint/cynnwys enw,
3228 notice/.forward to=/chronos/hawlfraint/notis,
3229 rotate/.forward to=/chronos/hawlfraint/cylchdroi,
3230 tag anchor/.forward to=/chronos/hawlfraint/angor,
3231 year/.forward to=/chronos/hawlfraint/blwyddyn,

3232 /chronos/.cd,

3233 borders'/.code args={#1:#2:#3:#4:#5:#6}{%^^A penawdau:pen:de:gwaelod:chwith:allanol
3234   \chronos@border@penawdau=#1
3235   \chronos@border@pen=#2
3236   \chronos@border@de=#3
3237   \chronos@border@gwaelod=#4
3238   \chronos@border@chwith=#5
3239   \chronos@border@allanol=#6
3240 },
3241 borders'+/.code args={#1:#2:#3:#4:#5:#6}{%^^A penawdau:pen:de:gwaelod:chwith:allanol
3242   \advance\chronos@border@penawdau by #1
3243   \advance\chronos@border@pen by #2
3244   \advance\chronos@border@de by #3
3245   \advance\chronos@border@gwaelod by #4
3246   \advance\chronos@border@chwith by #5
3247   \advance\chronos@border@allanol by #6
3248 },
3249 borders'-/.code args={#1:#2:#3:#4:#5:#6}{%^^A penawdau:pen:de:gwaelod:chwith:allanol
3250   \advance\chronos@border@penawdau by -#1
3251   \advance\chronos@border@pen by -#2
3252   \advance\chronos@border@de by -#3
3253   \advance\chronos@border@gwaelod by -#4
3254   \advance\chronos@border@chwith by -#5
3255   \advance\chronos@border@allanol by -#6
3256 },
3257 cysylltwyr chronos={anchor=center,inner sep=0pt,outer sep=0pt},%^^A oedd cylch chronos
3258 cysylltwyr testun={anchor=center,inner sep=0pt,outer sep=0pt},%^^A oedd cylch
3259 prif gysylltwyr testun={},
3260 @llynell/.style={},
3261 testunau+={outer sep=0pt,text=#1!75!black},%^^A every eisiau ##
3262 cysylltiadau={draw=#1},

```

```

3263 cynllun lliwiau/.code={\csname chronos@lliwiau@#1\endcsname},
3264 colour scheme/.forward to=/chronos/cynllun lliwiau,
3265 color scheme/.forward to=/chronos/cynllun lliwiau,
3266 lliwiau cronoleg/.code={%
3267   \chronos@lliwiau@cronoleg
3268   \@ifpackageloaded{memoize}{%
3269     \mmzset{csname meaning to context={chronos@lliwiau@cronoleg}}%
3270   }{}%
3271 },
3272 lliwiau rhagosodedig/.code={\chronos@lliwiau@rhagosodedig},

3273 }
3274

3275 \pgfqkeys{/chronos}{%
3276   cronoleg/.style={% mewnol | internal
3277     /chronos/.cd,
3278     cronoleg/.meaning to context,
3279     cynllun lliwiau=cronoleg,
3280     byw/troi lliwiau=true,
3281     digwyddiad/troi lliwiau=true,
3282     parhad/troi lliwiau=true,
3283     theori/troi lliwiau=false,
3284     theori/lliw rhagosodedig=chronos@lliw@theori,
3285     digwyddiad/lliw rhagosodedig=chronos@prifliw!75!chronos@prifliw@cefndir,
3286     parhad/lliw rhagosodedig=chronos@prifliw!75!chronos@prifliw@cefndir,
3287     gwybodaeth/lliw rhagosodedig=chronos@lliw@gwybodaeth,
3288     cefndir=chronos@prifliw@cefndir,
3289     blaendir=chronos@prifliw,
3290     blynyddoedd yn unig,
3291     llinell amser={%
3292       timeline years=on line,
3293       llinell={chronos@lliw@cefndir@llinell, opacity=.8},
3294       ffont camau mawr=\normalfont\bfseries,
3295       ffont camau bach=\normalfont\bfseries\footnotesize,
3296       ffont cyfnodau=\normalfont\normalsize\bfseries,
3297       timeline year={text=chronos@lliw@llinell, align=center},
3298       timeline mark={draw=chronos@lliw@llinell, ultra thick, shorten >=1.5pt},
3299       timeline minor mark={draw=chronos@lliw@llinell, thick, shorten >=3pt},
3300       timeline height'=10mm,
3301       timeline border height'=2.5mm,
3302       width=235mm,
3303       cam blwyddyn fawr=500,
3304       cam blwyddyn fach=100,
3305       timeline border outer colour=chronos@prifliw@cefndir,
3306       timeline border inner colour=chronos@lliw@cefndir@llinell!80!chronos@borderouter,
3307       timeline border middle colour=chronos@lliw@cefndir@llinell!20!chronos@borderouter,
3308       timeline mark eras,
3309       timeline marks,
3310       minor years,
3311       llinell amser ar=foreground,
3312       border ar=background,
3313       start date={-500},
3314       end date=2050,
3315       timeline margin'=10pt,
3316       timeline era margin'=15pt,
3317     },
3318     timeline ce label={CE},
3319     timeline bce label={BCE},
3320     cysylltiadau={draw=##1, opacity=.75, thick},
3321     cysylltwyr testun={fill=##1, fill opacity=1, circle, minimum size=5pt, %
3322       anchor=center, inner sep=0pt, outer sep=0pt},

```

```

3323 cyffredin/cysylltiad/.style={draw=##1, opacity=.5, thick},
3324 every cysylltwyr chronos={fill=####1, opacity=.75, circle, %
3325     minimum size=2.5pt, anchor=center, inner sep=0pt, outer sep=0pt},
3326 cyffredin/testun/.style={outer xsep=0pt, rounded corners=2pt, thick, %
3327     text opacity=1, draw opacity=1, inner sep=2pt, fill opacity=.25,%
3328     font=\scshape\footnotesize},
3329 digwyddiad/cysylltiad={/chronos/cyffredin/cysylltiad=##1},
3330 byw/cysylltiad={/chronos/cyffredin/cysylltiad=##1, opacity=.75},
3331 parhad/cysylltiad={/chronos/cyffredin/cysylltiad=##1},
3332 theori/cysylltiad={thick, draw=chronos@prifliw, double=chronos@prifliw@cefndir},

3333 theori/cysylltwr testun={fill=chronos@prifliw@cefndir, circle, %
3334     minimum size=5pt, anchor=center, inner sep=0pt, outer sep=0pt, thick, %
3335     draw=chronos@prifliw},
3336 byw/testun={/chronos/cyffredin/testun, align=left, text=##1!50!black, %
3337     fill=##1, draw=##1},

3338 digwyddiad/testun={/chronos/cyffredin/testun, align=left, text=##1!50!black, %
3339     fill=##1, draw=##1},
3340 parhad/testun={/chronos/cyffredin/testun, align=left, text=##1!50!black, %
3341     fill=##1, draw=##1},
3342 theori/testun={/chronos/cyffredin/testun, align=center, inner sep=3pt, %
3343     text=chronos@lliw@theori, fill=chronos@lliw@cefndir@theori, %
3344     fill opacity=.8, draw=chronos@prifliw, double=chronos@prifliw@cefndir, %
3345     font=\bfseries},
3346 byw/llinell={fill=##1, fill opacity=.25, draw=none},
3347 digwyddiad/llinell={draw=##1, draw opacity=.25, fill=none},
3348 parhad/llinell={fill=##1, fill opacity=.25, draw=none},
3349 llinell ar=main,
3350 cysylltiad ar=middle ground,

3351 theori/cylchau/label={align=center, inner sep=0pt, outer sep=0pt,%
3352     font=\scriptsize\scshape, text=chronos@prifliw},
3353 every cylch cylch theori'={fill=chronos@prifliw, draw=chronos@prifliw, %
3354     thick, even odd rule, fill opacity=.8},
3355 every testun cylch theori'={decoration={text effects along path, text={##1}, %
3356     text effects/.cd, fit text to path, text=chronos@prifliw@cefndir, %
3357     characters={text along path, font=\scriptsize\scshape}}, decorate},
3358 theori/cylchau/labels=: ,
3359 theori/cylchau/circle texts=: ,
3360 theori/cylchau/meintiau'=15pt:9pt,
3361 gwybodaeth/label={/chronos/@amserau, font=\itshape\footnotesize, %
3362     anchor=north, yshift=-2.5pt},% oedd pethau
3363 gwybodaeth/testun={/chronos/cyffredin/testun, align=left, text=##1, %
3364     outer sep=0pt, fill=chronos@lliw@cefndir@gwybodaeth, draw opacity=.8, %
3365     text opacity=.8, font=\scriptsize, draw=chronos@prifliw},% oedd ee ? oedd testun
ee?

3366 theori dash/.style={chronos@prifliw, opacity=.75, thick, densely dashed},
3367 theory dash/.link=/chronos/theori dash,
3368 amserau={align=center, anchor=base, inner sep=0pt, outer sep=0pt, %
3369     color=chronos@prifliw!75!chronos@prifliw@cefndir, opacity=.8, %
3370     font=\bfseries\itshape\footnotesize},
3371 amseraumawr={align=center, anchor=base, inner sep=0pt, outer sep=0pt, %
3372     color=chronos@prifliw, opacity=.8, font=\bfseries},
3373 prif/frame={inner sep=5pt, ultra thick, draw=chronos@prifliw, %
3374     double=chronos@prifliw@cefndir, fill=none},% oedd chronos@prifliw@cefndir
3375 prif/teitl={/chronos/prif/@frame, font=\Huge\bfseries, text=chronos@prifliw,%
3376     anchor=center, align=center, rounded corners=5pt},
3377 borders'=55pt:0pt:105pt:15pt:7.5pt:5pt,
3378 headings drops'=10pt:10pt:7.5pt,
3379 hawlfraint={font=\footnotesize\bfseries, inner sep=0pt, outer sep=0pt, %
3380     chronos@prifliw, fill=chronos@prifliw@cefndir},

```

```

3381   llinellau={color=black!50, opacity=.5},
3382   lefelau=10:10,
3383   special date=none,
3384   ce year label={\textsc{ce}},
3385   bce year label={\textsc{bce}},
3386   testun yshift=10pt,
3387   frame uses bb=false,
3388   frame,
3389 },
3390 }

3391 \RequirePackage{chronos-lib-colschemes,chronos-lib-styles}

```

**chronos** Main environment. Avoid expl3 syntax here.

```

3392 \NewDocumentEnvironment {chronos} { > { \TrimSpaces } 0 {} }
3393 {% https://tex.stackexchange.com/a/159856/ - Claudio Fiandrino
3394   \chronos@env@begin
3395   \begin{tikzpicture}[%
3396     align=center,
3397     anchor=mid,
3398     fixed point arithmetic,
3399     /chronos/.cd,
3400     prif/frame/.append code={\chronos@frametrue},
3401     prif/frame+/.append code={\chronos@frametrue},
3402     prif/frame'/.append code={\chronos@frametrue},
3403     #1,
3404     @@timeline@config@diwedd,
3405     @@timeline@config@dechrau,
3406     @@timeline@config@diwedd/.code={},
3407     @@timeline@config@dechrau/.code={},
3408     @@timeline@config,
3409     @@timeline@config/.code={},
3410     @timeline@config,
3411     @timeline@config/.code={},
3412     name prefix=\chronos@tikzprefix,
3413   ]%

3414   \IfBooleanExprT { \CSFreeBoolean \chronos@startyear || \CSFreeBoolean \chronos@endyear
3415   }
3416   {%
3417     \PackageError{chronos}{%
3418       Missing start and/or end date for timeline.
3419       I will attempt to fathom the concept of a timeline without time,
3420       but I predict unpredictable results}%
3421     {%
3422       You must specify both a start and end date.
3423       If I try to start at the beginning or finish at the end,
3424       I exceed TeX's maximum dimension.
3425       Besides, what if time is cyclical?
3426       My author didn't tell me how to draw a 3D timeline.}%
3427     \IfFreeT \chronos@startyear {\chronos@set@date{1800}{01}{01}{start}}%
3428     \IfFreeT \chronos@endyear {\chronos@set@date{2050}{12}{31}{end}}%
3429   }%
3430   \ifnum\thechronos@startdate>\thechronos@enddate
3431   \PackageWarning{chronos}{%
3432     Sorry, but I cannot reverse time.
3433     Perhaps you could ask a metaphysician?
3434     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

```

3434     \setcounter{chronos@tempcnta}{\thechronos@startdate}%
3435     \setcounter{chronos@startdate}{\thechronos@enddate}%
3436     \setcounter{chronos@enddate}{\thechronos@tempcnta}%
3437     \let\chronos@tmpstartyear\chronos@startyear
3438     \let\chronos@tmpstartmonth\chronos@startmonth
3439     \let\chronos@tmpstartday\chronos@startday
3440     \let\chronos@startyear\chronos@endyear
3441     \let\chronos@startmonth\chronos@endmonth
3442     \let\chronos@startday\chronos@endday
3443     \let\chronos@endyear\chronos@tmpstartyear
3444     \let\chronos@endmonth\chronos@tmpstartmonth
3445     \let\chronos@endday\chronos@tmpstartday
3446 \fi
3447 \begin{scope}[/chronos/@style]
3448     \extractcolorspec{chronos@lliw@llinell}{\chronos@templlll}%^^A \show\chronos@templlll
3449     \extractcolorspec{chronos@lliw@cefndir@llinell}{\chronos@templlllc}%^^A \show\chronos@
3450     \extractcolorspec{white}{\chronos@templllw}%^^A \show\chronos@templllw
3451     \extractcolorspec{chronos@prifliw}{\chronos@templllpl}%^^A \show\chronos@templllpl
3452     \extractcolorspec{chronos@prifliw@cefndir}{\chronos@templllplc}%^^A \show\chronos@templ
3453     \ifchronos@yearsonline % BEGIN
3454         \chronos@if@gosodF{border}{\pgfqkeys{/chronos}{border ar=middle ground}}%
3455         \chronos@if@gosodF{llinell}{\pgfqkeys{/chronos}{llinell ar=middle ground}}%
3456         \chronos@if@gosodF{llinell amser}{\pgfqkeys{/chronos}{llinell amser ar=main}}%
3457         \chronos@if@gosodF{cysylltiad}{\pgfqkeys{/chronos}{cysylltiad ar=background}}%

```

rhag: llunio ar y border | default: draw on the border

```

3458     \ifdim\chronos@llinell@yshift=\pi pt
3459         \chronos@llinell@yshift=0pt %
3460     \fi
3461     \ifchronostimelinearrow
3462         \chronostimelinearrowfalse
3463         \PackageWarning{chronos}{%
3464             A timeline arrow requires a suitable off line style}
3465     \fi
3466 \else
3467     \chronos@if@gosodF{border}{\pgfqkeys{/chronos}{border ar=middle ground}}%
3468     \chronos@if@gosodF{llinell}{\pgfqkeys{/chronos}{llinell ar=main}}%
3469     \chronos@if@gosodF{llinell amser}{\pgfqkeys{/chronos}%
3470         {llinell amser ar=main}}%
3471     \chronos@if@gosodF{cysylltiad}{\pgfqkeys{/chronos}%
3472         {cysylltiad ar=background}}%
3473     \ifx\chronos@templlll\chronos@templllc
3474         \ifx\chronos@templlll\chronos@templllw
3475             \colorlet{chronos@lliw@llinell}{chronos@prifliw}%
3476             \colorlet{chronos@lliw@cefndir@llinell}{chronos@prifliw@cefndir}%
3477         \fi
3478     \fi
3479 \fi
3480 \providecolor{chronos main colour}{named}{chronos@prifliw}%
3481 \providecolor{chronos main background colour}{named}%
3482     {chronos@prifliw@cefndir}%
3483 \providecolor{chronos main color}{named}{chronos@prifliw}%
3484 \providecolor{chronos main background color}{named}%
3485     {chronos@prifliw@cefndir}%
3486 \providecolor{chronos prifliw}{named}{chronos@prifliw}%
3487 \providecolor{chronos prifliw cefndir}{named}%
3488     {chronos@prifliw@cefndir}%
3489 \providecolor{chronos timeline foreground colour}{named}%
3490     {chronos@lliw@llinell}%

```

```

3491 \providecolor{chronos timeline background colour}{named}%
3492 {chronos@lliw@cefndir@llinell}%
3493 \providecolor{chronos timeline foreground color}{named}%
3494 {chronos@lliw@llinell}%
3495 \providecolor{chronos timeline background color}{named}%
3496 {chronos@lliw@cefndir@llinell}%
3497 \providecolor{chronos lliw llinell amser blaendir}{named}%
3498 {chronos@lliw@llinell}%
3499 \providecolor{chronos lliw llinell amser cefndir}{named}%
3500 {chronos@lliw@cefndir@llinell}%
3501 \providecolor{chronos timeline border inner colour}{named}%
3502 {chronos@borderinner}%
3503 \providecolor{chronos timeline border outer colour}{named}%
3504 {chronos@borderouter}%
3505 \providecolor{chronos timeline border middle colour}{named}%
3506 {chronos@bordermiddle}%
3507 \providecolor{chronos timeline border inner color}{named}
3508 {chronos@borderinner}%
3509 \providecolor{chronos timeline border outer color}{named}
3510 {chronos@borderouter}%
3511 \providecolor{chronos timeline border middle color}{named}
3512 {chronos@bordermiddle}%
3513 \providecolor{chronos lliw llinell amser border mew nol}{named}
3514 {chronos@borderinner}%
3515 \providecolor{chronos lliw llinell amser border allan ol}{named}
3516 {chronos@borderouter}%
3517 \providecolor{chronos lliw llinell amser border can ol}{named}
3518 {chronos@bordermiddle}%
3519 \colorlet{chronos current tag colour}{chronos@prifliw}%
3520 \colorlet{chronos current tag color}{chronos@prifliw}%
3521 \ifdim\chronos@height=\pi pt %^A BEGIN
3522 \PackageInfo{chronos}{Timeline height unset.
3523 Guessing an appropriate value.}%
3524 \ifchronos@yearsonline
3525 \chronos@height=10mm
3526 \ifdim\chronos@borderheight=\pi pt
3527 \PackageInfo{chronos}{%
3528 Timeline border height unset. Guessing an appropriate value.}%
3529 \chronos@borderheight=2.5mm
3530 \fi
3531 \else % off line
3532 \ifdim\chronos@borderheight=\pi pt
3533 \PackageInfo{chronos}{%
3534 Timeline border height unset. Guessing an appropriate value.}%
3535 \chronos@height=1pt
3536 \chronos@borderheight=0pt
3537 \else
3538 \pgfmathsetlength \chronos@height {4*\chronos@borderheight}%
3539 \fi
3540 \fi
3541 \fi % END \ifdim\chronos@height=\pi pt
3542 \ifdim\chronos@borderheight=\pi pt %^A angen height am hwn ; angen hwn am llinell
yshift
3543 \PackageInfo{chronos}{%
3544 Timeline border height unset. Guessing an appropriate value.}%
3545 \ifchronos@yearsonline
3546 \pgfmathsetlength \chronos@borderheight {\chronos@height/4}
3547 \else
3548 \chronos@borderheight=0pt
3549 \fi
3550 \fi

```

```

3551 \ifchronos@yearsonline %^^A BEGIN \ifchronos@yearsonline
3552 \else
3553 \pgfqkeys{/chronos/timeline}{do timeline arrow}%
3554 \ifdim\chronos@llinell@yshift=\pi pt %^^A BEGIN
3555 \ifdim\chronos@height<5pt %^^A BEGIN
3556 \ifdim\chronos@borderheight<.5pt %^^A BEGIN
3557 \ifchronos@blynyddoeddisod%^^A BEGIN
3558 \chronos@llinell@yshift=5pt
3559 \else
3560 \ifchronos@blynyddoedduchod%^^A BEGIN
3561 \chronos@llinell@yshift=-5pt
3562 \fi %^^A END \ifchronos@blynyddoedduchod
3563 \fi %^^A END \ifchronos@blynyddoeddisod
3564 \else
3565 \ifchronos@blynyddoeddisod %^^A BEGIN
3566 \chronos@llinell@yshift=\chronos@borderheight
3567 \else
3568 \ifchronos@blynyddoedduchod %^^A BEGIN
3569 \chronos@llinell@yshift=-\chronos@borderheight
3570 \fi %^^A END \ifchronos@blynyddoedduchod
3571 \fi %^^A END % \ifchronos@blynyddoeddisod
3572 \fi %^^A END \ifdim\chronos@borderheight<.5pt
3573 \else
3574 \ifchronos@blynyddoeddisod %^^A BEGIN
3575 \chronos@llinell@yshift=2pt
3576 \else
3577 \ifchronos@blynyddoedduchod %^^A BEGIN
3578 \chronos@llinell@yshift=-2pt
3579 \fi %^^A END \ifchronos@blynyddoedduchod
3580 \fi %^^A END \ifchronos@blynyddoeddisod
3581 \fi %^^A END \ifdim\chronos@height<5pt
3582 \fi %^^A END \ifdim\chronos@llinell@yshift=\pi pt
3583 \fi %^^A END \ifchronos@yearsonline
3584 \chronos@llinell@yshift@base=\chronos@llinell@yshift
3585 \ifx\chronos@templpl\chronos@templplc \PackageWarning{chronos}{%
3586 You've set the main colour and the main background colour to the same.}\fi
3587 \ifnum\chronos@startyear=0\relax
3588 \chronos@yearzerotrue
3589 \else
3590 \ifnum\chronos@endyear=0\relax
3591 \chronos@yearzerotrue
3592 \fi
3593 \fi
3594 \IfExistT \chronos@camrhaniadau {\chronos@if@gosodF{@bare}}{%
3595 \ifnum\chronos@camrhaniadau>1
3596 \chronos@marks@baretrue
3597 \fi
3598 }%
3599 }%
3600 \setlength\chronos@diwedd@diwedd{0pt}%
3601 \setlength\chronos@dechrau@dechrau{0pt}%
3602 \chronos@if@gosodF{markeras}{%
3603 \ifnum\chronos@startyear<0
3604 \ifnum\chronos@endyear>0
3605 \chronos@markerastrue
3606 \fi
3607 \fi
3608 }% \chronos@if@gosodF{markeras}
3609 \ifchronos@markeras % BEGIN

```

angen c d Martin Scharrer uchod - needs the above code by Martin Scharrer

Rmano: <https://chat.stackexchange.com/transcript/message/64273912#64273912>

```

3610     \ifnum\chronos@endyear>0
3611         \settowidth\chronos@diwedd@diwedd{\chronos@ffont@cyfnodau\chronos@ce}%
3612         \addtolength{\chronos@diwedd@diwedd}{\chronos@eramargin}%
3613     \else
3614         \let\chronos@ce\relax
3615     \fi

```

Rmano: <https://chat.stackexchange.com/transcript/message/64273912#64273912>

```

3616     \ifnum\chronos@startyear<0
3617         \settowidth\chronos@dechrau@dechrau{\chronos@ffont@cyfnodau\chronos@bce}%
3618         \addtolength{\chronos@dechrau@dechrau}{\chronos@eramargin}%
3619     \else
3620         \let\chronos@bce\relax
3621     \fi
3622 \fi % END \ifchronos@marker

```

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 ...)

```

3623     \pgfmathsetmacro\chronos@unit{%
3624         (\chronos@width-2*\chronos@timelinemargin-\chronos@dechrau@dechrau-
3625         \chronos@diwedd@diwedd)/(\thechronos@enddate-\thechronos@startdate)%
3626     }%

3627     \pgfmathsetmacro{\chronos@amser@diwedd}{%
3628         (\thechronos@enddate-\thechronos@startdate)*\chronos@unit}%
3629     \addtolength{\chronos@dechrau@dechrau}{\chronos@timelinemargin}%
3630     \addtolength{\chronos@diwedd@diwedd}{\chronos@timelinemargin}%
3631     \path (Opt,Opt) ++(-\chronos@dechrau@dechrau,Opt) coordinate (chronos pre);%^^A
    oedd chronos@dechrau
3632     \path (\chronos@amser@diwedd pt,Opt) ++(\chronos@diwedd@diwedd,Opt)
3633         coordinate (chronos post);%^^A oedd chronos@diwedd
3634     \chronos@inner@halfheight \dimexpr0.5\dimexpr\chronos@height\relax%
3635     \chronos@outer@halfheight \dimexpr\chronos@inner@halfheight+\dimexpr\chronos@borderhei
3636     \coordinate (chronos top) at (Opt,\chronos@inner@halfheight);%^^A oedd chronos@height
3637     \coordinate (chronos base) at (Opt,-\chronos@inner@halfheight);%^^A oedd chronos@depth
3638     \coordinate (chronos foot) at (Opt,-\chronos@outer@halfheight);
3639     \coordinate (chronos head) at (Opt,\chronos@outer@halfheight);

```

chronos pre-top, chronos post-top, chronos pre-base, chronos post-base

```

3640     \foreach \i/\j in {%
3641         pre/top,post/top,pre/base,post/base,pre/head,post/head,pre/foot,post/foot%
3642     } \coordinate (chronos \i-\j) at (chronos \i |- chronos \j);
3643     \coordinate (chronos start) at (Opt,Opt);% dal yn gywir?
3644     \coordinate (chronos origin) at (chronos start);% newid isod efaillai
3645     \coordinate (chronos end) at (\chronos@amser@diwedd pt,Opt);
3646     \coordinate (chronos mid) at ($(chronos pre)!.5!(chronos post)$);
3647     \coordinate (chronos mid-time) at ($(chronos start)!.5!(chronos end)$);

```

styles which rotate labels need this earlier; reset here in case altered

```

3648     \let\timelineht\chronos@height
3649     \begin{scope}[/chronos/chronos@border@haenen]
3650         \ifdim\chronos@borderheight>0pt
3651             \path [%

```

```

3652         top color=chronos@borderouter,%
3653         bottom color=chronos@borderinner,%
3654         middle color=chronos@bordermiddle,%
3655         /chronos/lilinell amser/timeline@border%
3656     ] (chronos pre-top) rectangle (chronos post-head);
3657     \path [%
3658         bottom color=chronos@borderouter,%
3659         top color=chronos@borderinner,%
3660         middle color=chronos@bordermiddle,%
3661         /chronos/lilinell amser/timeline@border%
3662     ] (chronos post-base) rectangle (chronos pre-foot);
3663     \fi
3664     \end{scope}% [/chronos/chronos@border@haenen]
3665     \begin{scope}[/chronos/chronos@llilinell amser@haenen]
3666         \ifchronos@yearsonline

```

fill the timeline if putting the years etc. onto it

```

3667         \fill [%
3668             chronos@lliw@cefndir@llilinell,%
3669             /chronos/lilinell amser/timeline@line%
3670         ] (chronos pre-top) rectangle (chronos post-base);
3671     \else

```

fel arall, draw

```

3672         \draw [%
3673             chronos@lliw@llilinell,%
3674             line width=\chronos@height,%
3675             /chronos/lilinell amser/timeline@line%
3676         ] (chronos pre) -- (chronos post);

```

gweler ateb Qrrbrbirbel: <https://tex.stackexchange.com/a/701524/> i fy nghwestiwn: <https://tex.stackexchange.com/q/701518/>

```

3677         \coordinate (tmpa) at (current bounding box.north);
3678         \coordinate (tmpb) at (current bounding box.south);
3679         \pgfresetboundingbox
3680         \path (chronos pre) -- (chronos post) -- (tmpa) -- (tmpb);
3681     \fi % \ifchronos@yearsonline

```

prif label - main label lau cyfnodau - eras

```

3682     \ifchronos@markeras % BEGIN
3683     \ifchronos@yearsonline
3684         \node (chronos bce) [%
3685             text=chronos@lliw@llilinell,%
3686             font=\chronos@ffont@cyfnodau,%
3687             inner xsep=0pt,%
3688             xshift=-\chronos@eramargin,%
3689             anchor=east%
3690         ] at (chronos start) {\chronos@bce};
3691     \node (chronos ce) [%
3692         text=chronos@lliw@llilinell,%
3693         font=\chronos@ffont@cyfnodau,%
3694         inner xsep=0pt,%
3695         xshift=\chronos@eramargin,%
3696         anchor=west%
3697     ] at (chronos end) {\chronos@ce};
3698     \else
3699         \settowidth \chronos@templgthc {\chronos@ffont@cyfnodau\chronos@bce}%
3700         \node (chronos bce) [%
3701             /chronos/lilinell amser/timeline@years,%

```

```

3702         /chronos/l1inell amser/timeline@year@off@line,%
3703         text=chronos@l1iw@l1inell,%
3704         font=\chronos@ffont@cyfnodau,%
3705         inner xsep=0pt,%
3706         xshift=-\chronos@eramargin-.5\chronos@templgthc%
3707     ] at (chronos start) {\chronos@bce};
3708     \settowidth \chronos@templgthc {\chronos@ffont@cyfnodau\chronos@ce}%
3709     \node (chronos ce) [%
3710         /chronos/l1inell amser/timeline@years,%
3711         /chronos/l1inell amser/timeline@year@off@line,%
3712         text=chronos@l1iw@l1inell,%
3713         font=\chronos@ffont@cyfnodau,%
3714         inner xsep=0pt,%
3715         xshift=\chronos@eramargin+.5\chronos@templgthc%
3716     ] at (chronos end) {\chronos@ce};
3717 \fi
3718 \fi % END \ifchronos@markeras
3719 \ifchronos@timeline@showyears % BEGIN
3720     \pgfmathsetcounter{chronos@startyear}{\chronos@startyear}%
3721     \pgfmathsetcounter{chronos@startmarkyear}{\chronos@startyear}%
3722     \pgfmathsetcounter{chronos@endyear}{\chronos@endyear}%
3723     \def\tempa{none}%
3724     \setcounter{chronos@tempcnta}{\value{chronos@endyear}}%
3725     \stepcounter{chronos@tempcnta}%
3726     \addtocounter{chronos@tempcnta}{-\value{chronos@startyear}}%
3727     \IfExistTF \chronos@cam@blwyddyn@fawr {%
3728         \IfExistTF \chronos@cam@blwyddyn@fach {%
3729             \ifnum\chronos@cam@blwyddyn@fach>\chronos@cam@blwyddyn@fawr
3730                 \def\chronos@cam@blwyddyn@fach{0}%
3731                 \PackageWarning{chronos}{Setting minor step year to zero}%
3732             \else
3733                 \IfBooleanExprT {%
3734                     (\IntCompareBoolean {\chronos@cam@blwyddyn@fach} > {0}) &&
3735                     ! (\LegacyBoolean {chronos@minoryears}) &&
3736                     ! (\LegacyBoolean {chronos@marks@minor}) &&
3737                     (\LegacyBoolean {chronos@marks@bare})
3738                 }{%
3739                     \PackageWarning{chronos}{%
3740                         Setting minor step year to zero so your marks are evenly spaced%
3741                     }%
3742                     \def\chronos@cam@blwyddyn@fach{0}%
3743                 }%
3744             \fi
3745         }{\def\chronos@cam@blwyddyn@fach{0}}%
3746     }{%
3747         \IfExistTF \chronos@cam@blwyddyn@fach {%
3748             \let\chronos@cam@blwyddyn@fawr\chronos@cam@blwyddyn@fach
3749             \def\chronos@cam@blwyddyn@fach{0}%
3750             \PackageWarning{chronos}{%
3751                 Using minor step year as step year and setting minor step %
3752                 year to zero%
3753             }%
3754         }{%
3755             \PackageWarning{chronos}{%
3756                 You have not specified how frequently years should be marked %
3757                 on the timeline.
3758                 Guessing appropriate values.
3759                 Set step major year and/or step minor year to specify%
3760             }%
3761             \ifnum\value{chronos@tempcnta}>1500
3762                 \def\chronos@cam@blwyddyn@fawr{500}%

```

```

3763         \def\chronos@cam@blwyddyn@fach{100}%
3764     \else\ifnum\value{chronos@tempcnta}>1000
3765         \def\chronos@cam@blwyddyn@fawr{250}%
3766     \def\chronos@cam@blwyddyn@fach{50}%
3767     \else\ifnum\value{chronos@tempcnta}>300
3768         \def\chronos@cam@blwyddyn@fawr{100}%
3769         \def\chronos@cam@blwyddyn@fach{50}%
3770     \else\ifnum\value{chronos@tempcnta}>150
3771         \def\chronos@cam@blwyddyn@fawr{100}%
3772         \def\chronos@cam@blwyddyn@fach{25}%
3773     \else\ifnum\value{chronos@tempcnta}>100
3774         \def\chronos@cam@blwyddyn@fawr{50}%
3775         \def\chronos@cam@blwyddyn@fach{10}%
3776     \else\ifnum\value{chronos@tempcnta}>50
3777         \def\chronos@cam@blwyddyn@fawr{20}%
3778         \def\chronos@cam@blwyddyn@fach{10}%
3779     \else\ifnum\value{chronos@tempcnta}>20
3780         \def\chronos@cam@blwyddyn@fawr{10}%
3781         \def\chronos@cam@blwyddyn@fach{2}%
3782     \else\ifnum\value{chronos@tempcnta}>10
3783         \def\chronos@cam@blwyddyn@fawr{5}%
3784         \def\chronos@cam@blwyddyn@fach{1}%
3785     \else\def\chronos@cam@blwyddyn@fawr{1}%
3786         \def\chronos@cam@blwyddyn@fach{0}%
3787         \fi % >10
3788         \fi % >20
3789         \fi % >50
3790         \fi % > 100
3791         \fi % > 150
3792         \fi % >300
3793         \fi % >1000
3794     \fi % >1500
3795 }%
3796 }% \IfExistTF \chronos@cam@blwyddyn@fawr
3797 \chronos@if@gosodF{markateraswitch}{%
3798     \ifnum\chronos@cam@blwyddyn@fach=1
3799         \chronos@markateraswitchfalse
3800     \else
3801         \ifnum\chronos@cam@blwyddyn@fawr=1
3802             \chronos@markateraswitchfalse
3803         \else
3804             \chronos@markateraswitchtrue
3805         \fi
3806     \fi
3807 }%
3808 \ifnum\chronos@cam@blwyddyn@fach=0
3809     \let\chronos@tempv\chronos@cam@blwyddyn@fawr
3810 \else
3811     \let\chronos@tempv\chronos@cam@blwyddyn@fach
3812 \fi
3813 \IfExistF \chronos@camrhaniadau {%~A rhaid \chronos@marks@baretrue o achos
y còd uchod
3814     \ifnum\value{chronos@tempcnta}<5
3815         \chronos@marks@baretrue
3816         \PackageInfo{chronos}{%
3817             I'm guessing you want bare marks on your timeline.
3818             If I'm wrong, specify step divisions=0 to override my decision}%
3819     \ifnum\value{chronos@tempcnta}>2
3820         \def\chronos@camrhaniadau{4}%
3821     \else
3822         \ifnum\value{chronos@tempcnta}>1

```

```

3823         \def\chronos@camrhaniadau{6}%
3824     \else
3825         \def\chronos@camrhaniadau{12}%
3826     \fi % >1
3827 \fi % >2
3828 \else
3829     \ifchronos@marks@bare\relax
3830 \else
3831     \chronos@marks@barefalse
3832     \PackageInfo{chronos}{%
3833         I'm guessing you don't want bare marks on your timeline.
3834         If I'm wrong, specify step divisions to override my decision}%
3835 \fi
3836 \fi % <5
3837 }% \chronos@camrhaniadau
3838 \ifchronos@marks@bare
3839     \IfExistF \chronos@camrhaniadau {%
3840         \PackageInfo{chronos}{%
3841             You have requested bare marks but not specified how many.
3842             Guessing 4 per minor step. Set step divisions to specify}%
3843         \def\chronos@camrhaniadau{4}%
3844     }% \IfExistT \chronos@camrhaniadau
3845 \fi % \ifchronos@marks@bare
3846 \IfFreeTF \chronos@stepfrom {%
3847     \ifnum\thechronos@startyear=\thechronos@endyear
3848 \else
3849     \def\tempa{01}%
3850     \ifx\chronos@startmonth\tempa
3851     \ifx\chronos@startday\tempa
3852     \else
3853         \stepcounter{chronos@startmarkyear}%
3854     \fi % \ifx\chronos@startday\tempa
3855     \else
3856         \stepcounter{chronos@startmarkyear}%
3857     \fi % \ifx\chronos@startmonth\tempa
3858 \fi % \ifnum\thechronos@startyear=\thechronos@endyear
3859 \pgfmathsetmacro\chronos@tempremainder{%
3860     int(mod(\thechronos@startmarkyear,\chronos@tempv))}%
3861 \ifnum\chronos@tempremainder=0\relax
3862 \else
3863     \IfBooleanExprTF {%
3864         ! (\LegacyBoolean{chronos@yearzero}) &&
3865         (\IntCompareBoolean{\thechronos@startmarkyear}{=}{1}) %
3866     }{%
3867         \setcounter{chronos@startmarkyear}{0}% => 1 fel chronos@startmarkyear
3868     }{%
3869         \ifnum\chronos@tempremainder<0
3870         \pgfmathsetcounter{chronos@startmarkyear}{%
3871             int(\thechronos@startmarkyear-\chronos@tempremainder)}%
3872     \else
3873         \pgfmathparse{%
3874             int(\thechronos@startmarkyear-\chronos@tempremainder+\chronos@tempv)}%
3875         }%
3876         \ifnum\pgfmathresult>\thechronos@endyear
3877         \PackageWarning{chronos}{Ignoring steps}%
3878     \else
3879         \setcounter{chronos@startmarkyear}{\pgfmathresult}%
3880     \fi
3881 \fi
3882 }%
3883 \fi

```

```

3884 }{%
3885   \pgfmathsetcounter{chronos@startmarkyear}{\chronos@stepfrom}%
3886   \pgfmathparse{int(mod(\thechronos@startmarkyear,\chronos@tempv))}%
3887   \ifnum\pgfmathresult=0\relax
3888   \else
3889     \PackageWarning{chronos}{%
3890       You have explicitly requested years marked on your timeline %
3891       which are not modulo the steps you have specified.
3892       I'm setting the year format to show full years, which should %
3893       make the result a bit more intelligible.%
3894     }%
3895     \chronos@setminoryearformat{!Y}%
3896   \fi
3897 }% \IfFreeTF \chronos@stepfrom
3898 \ifnum\chronos@cam@blwyddyn@fach=0
3899   \pgfmathsetmacro\chronos@nextstep{%
3900     int(((\thechronos@startmarkyear+\chronos@cam@blwyddyn@fawr)>\thechronos@endyea
3901     ? \thechronos@endyear :
3902     (\thechronos@startmarkyear+\chronos@cam@blwyddyn@fawr))%
3903   }%
3904 \else
3905   \pgfmathsetmacro\chronos@nextstep{%
3906     int(((\thechronos@startmarkyear+\chronos@cam@blwyddyn@fach)>\thechronos@endyea
3907     ? \thechronos@endyear :
3908     (\thechronos@startmarkyear+\chronos@cam@blwyddyn@fach))%
3909   }%
3910 \fi
3911 \chronos@global@clear@to@clist{tmpa}{}%
3912 \IfExistT \chronos@camrhaniadau
3913   {\pgfmathsetmacro \chronos@tempml{int(\chronos@camrhaniadau-1)}}%
3914 \ifchronos@yearzero
3915   \setcounter{chronos@tempcnta}{1}
3916 \else
3917   \setcounter{chronos@tempcnta}{0}%
3918 \fi
3919 \IfBooleanExprTF {%
3920   (\IntCompareBoolean{\chronos@nextstep}{=}{\thechronos@startmarkyear})
3921   || ! (\IntCompareBoolean{\chronos@nextstep}{<}{\thechronos@endyear})
3922   || ( ( \IntCompareBoolean{\chronos@nextstep}{=} {0} ) ||
3923   (\IntCompareBoolean{\thechronos@startmarkyear}{=} {0} ) ) &&
3924   (\IntCompareBoolean{\thechronos@startmarkyear}{<}{-\thechronos@endyear})
3925   && ! \LegacyBoolean {chronos@yearzero} )
3926 }{%^^A osgoi infinite loop yn pgf \foreach isod
3927   \setcounter{chronos@tempcntb}{\thechronos@endyear}%
3928   \addtocounter{chronos@tempcntb}{-\thechronos@startyear}%
3929   \IfBooleanExprT {%
3930     ! \LegacyBoolean {chronos@yearzero} &&
3931     (\IntCompareBoolean{\thechronos@startmarkyear}{>}{-\thechronos@endyear})
3932     && ( \IntCompareBoolean{\chronos@nextstep}{=} {0} ) ||
3933     (\IntCompareBoolean{\thechronos@startmarkyear}{=} {0} ) )
3934   } {\addtocounter{chronos@tempcntb}{-1}}%
3935 \ifnum\thechronos@tempcntb<2
3936   \IfExistTF \chronos@camrhaniadau
3937   {%
3938     \pgfmathparse{int(mod(12,\chronos@camrhaniadau))}%
3939     \ifnum\pgfmathresult=0\relax
3940     \else
3941       \PackageWarning{%
3942         Since your timeline spans fewer than two years, %
3943         step divisions must be a factor of 12.
3944         I will use 4 if you requested 5 and 6 otherwise}%

```

```

3945         \ifnum\pgfmathresult=5
3946             \def\chronos@camrhaniadau{4}%
3947         \else
3948             \ifnum\pgfmathresult>6
3949                 \def\chronos@camrhaniadau{6}%
3950             \fi % \fnum\pgfmathresult>6 hynny yw 7,8,9,10,11
3951         \fi % \ifnum\pgfmathresult=5
3952     \fi % \ifnum\pgfmathresult=0
3953     \setcounter{chronos@tempcntb}{\chronos@startmonth}%
3954     \ifnum\chronos@startday>1 \stepcounter{chronos@tempcntb}\fi
3955     \edef\chronos@tmpstartmonth{\thechronos@tempcntb}%
3956     \IfBooleanExprF {%
3957         (\IntCompareBoolean{\chronos@tmpstartmonth}={}\chronos@endmonth})
3958         &&
3959         (\IntCompareBoolean{\thechronos@startyear}={}\thechronos@endyear})
3960     }
3961     {%
3962         \pgfmathsetcounter{chronos@tempcntc}{int{12/\chronos@camrhaniadau}}%
3963         \addtocounter{chronos@tempcntb}{\thechronos@tempcntc}%
3964         \ifnum\thechronos@tempcntb>11
3965             \edef\chronos@tempu{\chronos@tmpstartmonth,12}%
3966         \else
3967             \edef\chronos@tempu{%
3968                 \chronos@tmpstartmonth,\thechronos@tempcntb,...,12}%
3969         \fi
3970         \foreach \m [expand list] in {\chronos@tempu}%
3971             {%
3972                 \chronos@set@date {\thechronos@startyear}{\m}{01}{tempa}%
3973                 \ifnum\thechronos@tempadate>\thechronos@enddate
3974                     \breakforeach
3975                 \else
3976                     \ifnum\m=1
3977                         \chronos@global@to@clist@star@append{tempa}{%
3978                             \thechronos@tempadate/\thechronos@startyear/\thechronos@startyear%
3979                         }%
3980                     \else
3981                         \chronos@global@to@clist@star@append{tempa}{%
3982                             \thechronos@tempadate/-5000/\thechronos@startyear%
3983                         }%
3984                     \fi % \m=1
3985                 \fi % \thechronos@tempadate>\thechronos@enddate
3986             }% \foreach \m in {\chronos@tmpstartmonth,...,12}
3987         \ifnum\thechronos@startyear<\thechronos@endyear
3988             \stepcounter{chronos@tempcntc}%
3989             \ifnum\thechronos@tempcntc<\chronos@endmonth
3990                 \edef\chronos@tempu{1,\thechronos@tempcntc,...,\chronos@endmonth}%
3991             \else
3992                 \edef\chronos@tempu{1,\thechronos@tempcntc}%
3993             \fi
3994         \foreach \m [expand list] in {\chronos@tempu} %^A {1,...,\chronos@endmo
3995             {%
3996                 \chronos@set@date {\thechronos@endyear}{\m}{01}{tempa}%^A awto-cywiro
3997         am flwyddyn sero
3998         \ifnum\thechronos@tempadate>\thechronos@enddate
3999             \breakforeach
4000         \else
4001             \ifnum\m=1
4002                 \chronos@global@to@clist@star@append{tempa}{%
4003                     \thechronos@tempadate/\thechronos@endyear/\thechronos@endyear%
4004                 }%
4005             \else

```

```

4005             \chronos@global@to@clist@star@append{tmpa}{%
4006             \thechronos@tempdate/-5000/\thechronos@endyear%
4007             }%
4008             \fi %%^A \m=1
4009             \fi %%^A \thechronos@tempdate>\thechronos@enddate
4010             }%%^A \foreach \m in {1,...,\chronos@endmonth}
4011             \fi % \thechronos@startyear<\thechronos@endyear
4012             }%%^A \ifboolexpr { test {\ifnum\thechronos@tmpstartmonth=\thechronos@endm
and test {\ifnum\thechronos@startyear=\thechronos@endyear} }
4013             }%%^A \IfExistTF \chronos@camrhaniadau F
4014             \chronos@global@to@clist@star@append{tmpa}{%
4015             \thechronos@startdate/\thechronos@startmarkyear/\thechronos@startmarkyear,%
4016             \thechronos@enddate/\thechronos@endyear/\thechronos@endyear%
4017             }%
4018             }%%^A \IfExistTF \chronos@camrhaniadau
4019             \chronos@marks@barefalse
4020         \else
4021         \foreach \b [%
4022         evaluate=\b as \i using {%
4023         ((\b==0)&&(\thechronos@tempcnta==0)) ? 1 : int(\b)}%
4024         ] in {\thechronos@startmarkyear,\thechronos@endyear} {%
4025         \chronos@set@date{\i}{01}{01}{year}%^A awto-cywiro am flwyddyn sero
4026         \chronos@global@to@clist@star@append{tmpa}{\thechronos@yeardate/\b/\i}%
4027         }%
4028         \fi % \ifnum\thechronos@tempcntb<2
4029     }{%
4030     \foreach \b [%
4031     evaluate=\b as \i using {%
4032     ((\b==0)&&(\thechronos@tempcnta==0)) ? 1 : int(\b)}%
4033     ] in {%
4034     \thechronos@startmarkyear,\chronos@nextstep,...,\thechronos@endyear%
4035     } {%
4036     \chronos@set@date{\i}{01}{01}{year}% awto-cywiro am flwyddyn sero
4037     \chronos@global@to@clist@star@append{tmpa}{\thechronos@yeardate/\b/\i}%
4038     }%
4039     }%%^A \ifboolexpr { test {\ifnumcomp{\chronos@nextstep}={}\thechronos@startyear}}
or test {\ifnumcomp{\chronos@nextstep}={}\thechronos@endyear}} }
4040     \foreach \d/\b/\chronosyeari [%
4041     expand list,%
4042     remember=\chronosyeari as \ilast (initially \pi),%
4043     remember=\d as \dlast (initially \pi)%
4044     ] in {\chronos@global@from@clist{tmpa}}
4045     {% BEGIN \foreach \b ...
4046     \ifnum\d=\dlast\relax % BEGIN
4047     \else
4048     \pgfmathsetmacro\chronos@tempa{(\d-\thechronos@startdate)*\chronos@unit}%
4049     \coordinate (chronos date \d) at (\chronos@tempa pt,Opt);
4050     \pgfqkeys{/chronos}{% defnyddio am nodau noeth beth bynnag ac am marciau
cyffredinol os y llinell amser yn fyr
4051     temp@on/.style={/chronos/llinell amser/timeline@minor@mark@on@line},
4052     temp@off/.style={/chronos/llinell amser/timeline@minor@mark@off@line},
4053     }%
4054     \ifnum\dlast=\pi
4055     \let\chronos@tempff\chronos@ffont@camaubach
4056     \ifchronos@yearsonline
4057     \node (chronos phantom year) [%
4058     rotate around/.style={},%
4059     rotate/.style={},%
4060     /chronos/llinell amser/timeline@years,%
4061     /chronos/llinell amser/timeline@year@on@line,%

```

```

4062         font=\chronos@tempff%
4063     ] at (chronos start) {\phantom{1}};
4064     \else
4065     \node (chronos phantom year) [%
4066         rotate around/.style={},%
4067         rotate/.style={},%
4068         /chronos/lilinell amser/timeline@years,%
4069         /chronos/lilinell amser/timeline@year@off@line,%
4070         font=\chronos@tempff,%
4071         fill=none%
4072     ] at (chronos start)
4073         {\phantom{\chronos@showyear[\chronos@minoryearformat]{1}}};
4074     \fi
4075 \fi % \ifnum\dlast=\pi
4076 \ifnum\b=-5000
4077     \ifchronos@yearsonline
4078         \path [/chronos/temp@on]
4079             (chronos phantom year.south -| chronos date \d) --
4080             (chronos phantom year.north -| chronos date \d);
4081     \else
4082         \path [/chronos/temp@off] (chronos date \d) --
4083             (chronos date \d |- chronos phantom year.\chronos@timelineyearsanchor)
4084             ;
4085     \fi
4086 \else % \ifnum\b=-5000
4087     \coordinate (chronos year \chronosyeari) at (\chronos@tempa pt,0pt);
4088     \ifnum\b=\thechronos@startmarkyear
4089         \xdef\chronos@firstmarkedyeardate{\d}%
4090         \coordinate (chronos first marked year) at (chronos year \chronosyeari);
4091     \ifnum\chronosyeari=0
4092         \coordinate (chronos origin) at (\chronos@tempa pt,0pt);
4093     \fi
4094     \else
4095         \ifnum\chronosyeari=1
4096             \ifchronos@yearzero\relax
4097         \else
4098             \coordinate (chronos origin) at (\chronos@tempa pt,0pt);

```

make \foreach loops work straightforwardly (not used in main code)

```

4099         \coordinate (chronos year 0) at (chronos year 1);
4100     \fi % \ifchronos@yearzero
4101     \fi % \ifnum\chronosyeari=1
4102 \fi % \ifnum\b=\thechronos@startmarkyear
4103 \ifnum\b=\chronos@nextstep
4104     \ifchronos@marks@bare
4105         \pgfmathsetmacro\chronos@tempg{%
4106             ((\d-\chronos@firstmarkedyeardate)*\chronos@unit)/\chronos@camrhaniada
4107         }%
4108         \global\let\chronos@tempg\chronos@tempg
4109     \fi
4110 \fi % \ifnum\b=\chronos@nextstep
4111 \ifnum\chronos@cam@blwyddyn@fach=0
4112     \chronos@cam@modtrue
4113 \else
4114     \pgfmathparse{int(mod(\chronosyeari,\chronos@cam@blwyddyn@fawr))}%
4115     \ifnum\pgfmathresult=0\relax
4116         \chronos@cam@modtrue
4117     \else
4118         \IfBooleanExprT {%
4119             ! \LegacyBoolean {chronos@yearzero} &&
4120             \IntCompareBoolean {\chronosyeari}={1}

```

```

4121         }-%
4122         \pgfmathparse{int(mod((\chronosyeari-1),\chronos@cam@blwyddyn@fawr))}%
4123         \ifnum\pgfmathresult=0\relax
4124         \chronos@cam@modtrue
4125         \fi
4126     }%
4127     \fi % \ifnum\pgfmathresult=0
4128 \fi % \ifnum\chronos@cam@blwyddyn@fach=0
4129 \ifchronos@cam@mod
4130     \pgfqkeys{/chronos}{%
4131         temp@on/.style={%
4132             /chronos/l1inell amser/timeline@mark@on@line},
4133         temp@off/.style={%
4134             /chronos/l1inell amser/timeline@mark@off@line},
4135     }%
4136     \let\chronos@tempff\chronos@ffont@camaumawr
4137     \def\chronos@tempf{%
4138 \else
4139     \pgfqkeys{/chronos}{%
4140         temp@on/.style={%
4141             /chronos/l1inell amser/timeline@minor@mark@on@line},
4142         temp@off/.style={%
4143             /chronos/l1inell amser/timeline@minor@mark@off@line},
4144     }%
4145     \let\chronos@tempff\chronos@ffont@camaubach
4146     \xdef\chronos@tempf{\chronos@minoryearformat}%
4147     \ifchronos@marks@minor
4148         \chronos@markstrue
4149     \else
4150         \chronos@marksfalse
4151     \fi
4152     \fi %^^A \ifchronos@cam@mod

\ifchronos@temp tracks whether we draw a node (T) or coordinate (F)

4153     \ifchronos@markateraswitch %
4154     \ifnum\b=0
4155     \chronos@tempfalse
4156     \else
4157     \chronos@temptrue
4158     \fi
4159     \ifchronos@minoryears \else \ifchronos@cam@mod \else \chronos@tempfalse
\fi\fi

4160     \else
4161     \chronos@temptrue
4162     \fi

BEGIN \ifchronos@yearsonline ...

4163     \ifchronos@yearsonline

if labelling era switch or not switching here, use a node

4164     \ifchronos@temp
4165     \node (chronos year \chronosyeari) [%
4166         /chronos/l1inell amser/timeline@years,%
4167         /chronos/l1inell amser/timeline@year@on@line,%
4168         font=\chronos@tempff%
4169     ] at (chronos year \chronosyeari)
4170         {\chronos@showyear[\chronos@tempf]{\chronosyeari}};
4171     \fi %^^A END \ifchronos@temp
4172     \ifchronos@marks %^^A BEGIN
4173     \path [/chronos/temp@on] (chronos year \chronosyeari.south) --

```

```

4174      (chronos year \chronosyeari |- chronos base);%^^A rhag ofn rotate
      (pwy sy'n gwybod?)
4175      \path [/chronos/temp@on] (chronos year \chronosyeari.north) --
4176      (chronos year \chronosyeari |- chronos top);%^^A rhag ofn rotate
      (pwy sy'n gwybod?)
4177      \ifchronos@marks@bare % BEGIN
4178      \ifnum\dlast=\pi\relax % BEGIN
4179      \else
4180      \ifnum\chronos@camrhaniadau>1 % BEGIN
4181      \foreach \m [evaluate=\m as \n using {int(\m-1)}]
4182      in {2,...,\chronos@camrhaniadau}
4183      {%
4184      \path [%
4185      /chronos/llinell amser/timeline@bare@mark@on@line%
4186      ] ([xshift={-\n*\chronos@tempg pt}]chronos year
4187      \chronosyeari |- chronos phantom year.south)
4188      -- ([xshift={-\n*\chronos@tempg pt}]chronos year
4189      \chronosyeari |- chronos phantom year.north);
4190      }%
4191      \ifnum\b=\chronos@nextstep % BEGIN
4192      \path (chronos year \ilast);
4193      \pgfgetlastxy{\chronos@tempgx}{\chronos@tempgy}%
4194      \setlength \chronos@templgtha{%
4195      \chronos@tempgx-\chronos@tempg pt}%
4196      \ifdim\chronos@templgtha<Opt\relax % BEGIN
4197      \else
4198      \foreach \n in {1,...,\chronos@tempml}
4199      {%
4200      \coordinate (a) at (\chronos@templgtha,Opt);
4201      \path [%
4202      /chronos/llinell amser/timeline@bare@mark@on@line%
4203      ] (a |- chronos phantom year.south) --
4204      (a |- chronos phantom year.north);
4205      \addtolength \chronos@templgtha{-\chronos@tempg pt}%
4206      \ifdim\chronos@templgtha<Opt
4207      \breakforeach
4208      \fi
4209      \global\chronos@templgtha\chronos@templgtha
4210      }%
4211      \fi % END \ifdim\chronos@templgtha<Opt
4212      \fi % END \ifnum\b=\chronos@nextstep
4213      \edef\chronos@tempy{\thechronos@endyear}%
4214      \pgfmathsetmacro\chronos@tempny{int(\b+\chronos@tempv)}%
4215      \ifnum\chronos@tempny>\thechronos@endyear % BEGIN
4216      \path (chronos year \chronosyeari);
4217      \pgfgetlastxy{\chronos@tempgx}{\chronos@tempgy}%
4218      \setlength \chronos@templgtha{%
4219      \chronos@tempgx+\chronos@tempg pt}%
4220      \path (chronos end);
4221      \pgfgetlastxy{\chronos@tempgx}{\chronos@tempgy}%
4222      \ifdim\chronos@templgtha>\chronos@tempgx\relax % BEGIN
4223      \else
4224      \foreach \n in {1,...,\chronos@tempml}
4225      {%
4226      \coordinate (a) at (\chronos@templgtha,Opt);
4227      \path [%
4228      /chronos/llinell amser/timeline@bare@mark@on@line%
4229      ]
4230      (a |- chronos phantom year.south) --
4231      (a |- chronos phantom year.north);
4232      \addtolength \chronos@templgtha{\chronos@tempg pt}%

```

```

4233             \ifdim\chronos@templgtha>\chronos@tempgx
4234             \breakforeach
4235             \fi
4236             \global\chronos@templgtha\chronos@templgtha
4237             }%
4238             \fi % END \ifdim\chronos@templgtha<0pt
4239             \fi % END \ifnum\chronos@tempny>\thechronos@endyear
4240             \fi % END \ifnum\chronos@camrhaniadau>1
4241             \fi % END \ifnum\dlast=\pi
4242             \fi % END \ifchronos@marks@bare
4243             \fi % END \ifchronos@marks
4244             \else % chronos@yearsonline yw F

```

if labelling era switch or not switching here, use a node

```

4245             \ifchronos@temp
4246             \node (chronos node year \chronosyeari) [%
4247             /chronos/l1linell amser/timeline@years,%
4248             /chronos/l1linell amser/timeline@year@off@line,%
4249             font=\chronos@tempff%
4250             ] at (chronos year \chronosyeari)
4251             {\chronos@showyear[\chronos@temp]{\chronosyeari}};
4252             \else
4253             \node (chronos node year \chronosyeari) [%
4254             /chronos/l1linell amser/timeline@years,%
4255             /chronos/l1linell amser/timeline@year@off@line,%
4256             font=\chronos@ffont@camaumawr,%
4257             draw=none,%
4258             fill=none%
4259             ] at (chronos year \chronosyeari)
4260             {\phantom{\chronos@showyear[\chronos@temp]{\chronosyeari}}};
4261             \fi %^^A END % \ifchronos@temp
4262             \ifchronos@marks %^^A BEGIN
4263             \ifchronos@temp
4264             \else
4265             \ifnum\b=0
4266             \path [%
4267             shorten <=.5*\chronos@height,
4268             /chronos/temp@off,
4269             /chronos/l1linell amser/era switch off line%
4270             ] (\chronos@tempa pt,0pt) --
4271             (chronos node year \chronosyeari.center -| chronos year \chronosyeari)
4272             ;%^^A rhag ofn rotate
4273             \chronos@temptrue
4274             \fi
4275             \fi
4276             \path [shorten <=.5*\chronos@height, /chronos/temp@off]
4277             (\chronos@tempa pt,0pt) --
4278             (chronos node year \chronosyeari.\chronos@timelineyearsanchor
-| chronos year \chronosyeari) ;
4279             \ifnum\dlast=\pi\relax
4280             \else
4281             \ifchronos@marks@bare % BEGIN
4282             \ifnum\chronos@camrhaniadau>1
4283             \foreach \m [evaluate=\m as \n using {int(\m-1)}] in
4284             {2,...,\chronos@camrhaniadau}
4285             \path [%
4286             shorten <=.5*\chronos@height,
4287             /chronos/l1linell amser/timeline@bare@mark@off@line%
4288             ] ([xshift={-\n*\chronos@tempg pt}]\chronos@tempa pt,0pt)
4289             coordinate (\chronosyeari-\n) --
4290             (\chronosyeari-\n |- chronos node year \chronosyeari.\chronos@

```

```

4291 \ifnum\b=\chronos@nextstep % BEGIN
4292 \path (chronos year \ilast);
4293 \pgfgetlastxy{\chronos@tempgx}{\chronos@tempgy}%
4294 \setlength \chronos@templgtha{%
4295 \chronos@tempgx-\chronos@tempg pt}%
4296 \ifdim\chronos@templgtha<Opt\relax % BEGIN
4297 \else
4298 \foreach \n in {1,...,\chronos@tempml}
4299 {%
4300 \path [%
4301 shorten <=.5*\chronos@height,
4302 /chronos/lline11 amser/timeline@bare@mark@off@line%
4303 ] (\chronos@templgtha,Opt) coordinate (a) --
4304 (a |- chronos node year \chronosyeari.\chronos@timelinyea
4305 \addtolength \chronos@templgtha{-\chronos@tempg pt}%
4306 \ifdim\chronos@templgtha<Opt \breakforeach\fi
4307 \global\chronos@templgtha\chronos@templgtha
4308 }%
4309 \fi % \ifdim\chronos@templgtha<Opt
4310 \fi % \ifnum\b=\chronos@nextstep
4311 \edef\chronos@tempy{\thechronos@endyear}%
4312 \pgfmacthsetmacro\chronos@tempny{int(\b+\chronos@tempv)}%
4313 \ifnum\chronos@tempny>\thechronos@endyear % BEGIN
4314 \path (chronos year \chronosyeari);
4315 \pgfgetlastxy{\chronos@tempgx}{\chronos@tempgy}%
4316 \setlength \chronos@templgtha{%
4317 \chronos@tempgx+\chronos@tempg pt}%
4318 \path (chronos end);
4319 \pgfgetlastxy{\chronos@tempgx}{\chronos@tempgy}%
4320 \ifdim\chronos@templgtha>\chronos@tempgx\relax % BEGIN
4321 \else
4322 \foreach \n in {1,...,\chronos@tempml}
4323 {%
4324 \path [%
4325 shorten <=.5*\chronos@height,%
4326 /chronos/lline11 amser/timeline@bare@mark@off@line,%
4327 magenta%
4328 ] (\chronos@templgtha,Opt) coordinate (a) --
4329 (a |- chronos node year \chronosyeari.\chronos@timelinyea
4330 \addtolength \chronos@templgtha{\chronos@tempg pt}%
4331 \ifdim\chronos@templgtha>\chronos@tempgx
4332 \breakforeach
4333 \fi
4334 \global\chronos@templgtha\chronos@templgtha
4335 }%
4336 \fi % END \ifdim\chronos@templgtha<Opt
4337 \fi % END \ifnum\b=\thechronos@endyear
4338 \fi % END \ifnum\chronos@camrhaniadau>1below
4339 \fi % END \ifchronos@marks@bare
4340 \fi % END \ifnum\dlast=\pi
4341 \fi % END \ifchronos@marks
4342 \fi % END years on line
4343 \fi % \ifnum\b=-5000
4344 \fi % \ifnum\d=\dlast % END
4345 }% END \foreach \b ...
4346 \fi % END showing years
4347 \chronos@from@clist{dyddiadau_coords}{\chronos@coords}%
4348 \ifx\chronos@coords\empty\relax % BEGIN
4349 \else
4350 \foreach \i in \chronos@coords {%
4351 \chronos@set@date{\i}{01}{01}{tempa}% awto-cywiro am flwyddyn sero

```

```

4352     \pgfmathsetmacro\chronos@temph{%
4353         (\thechronos@tempdate-\thechronos@startdate)*\chronos@unit%
4354     }%
4355     \edef\chronos@tempa{\chronos@tempyear}\edef\chronos@tempb{\i}%
4356     \ifx\chronos@tempa\chronos@tempb
4357         \coordinate (chronos year \i) at (\chronos@temph pt,0pt);
4358     \else
4359         \coordinate (chronos date \i) at (\chronos@temph pt,0pt);
4360     \fi
4361 }%
4362 \fi% END
4363 \ifchronos@eventyearsonline
4364     \pgfqkeys{/chronos}{%
4365         timeline years=on line,
4366     }%
4367 \fi
4368 \end{scope}% [/chronos/chronos@llinell amser@haenen] ?

```

phantom nodes - haws i gosodi pethau | easy to install things

```

4369 \begin{scope}[%^A <<< byw,every node etc.
4370     byw,every node/.append style={%
4371         /chronos/@testun=chronos@prifliw,/chronos/placeholder%
4372     }%
4373 ]%
4374 \ifnum\chronos@uchod>0
4375     \node (u1) [%
4376         anchor=south west, yshift=\chronos@borderheight+2pt, alias=level 1%
4377     ] at (chronos top -| \chronos@lefelau@at)
4378     {\phantom{Enw}u1 \textbar{} level 1\\ \phantom{1234}};
4379     \ifnum\chronos@uchod>1
4380         \foreach \i [count=\ino] in {2,...,\chronos@uchod}
4381             \node (u\i) [anchor=south west, alias=level \i] at
4382                 (u\ino.north west) {%
4383                 \phantom{Enw}u\i{} \textbar{} level \i\\ \phantom{1234}%
4384             };
4385     \fi
4386 \fi
4387 \ifnum\chronos@isod>0
4388     \node (i1) [%
4389         anchor=north west, yshift=-\chronos@borderheight-2pt, alias=level -1%
4390     ] at (chronos base -| \chronos@lefelau@at)
4391     {\phantom{Enw}i1 \textbar{} level -1\\ \phantom{1234}};
4392     \ifnum\chronos@isod>1
4393         \foreach \i [count=\ino] in {2,...,\chronos@isod}
4394             \node (i\i) [anchor=north west, alias=level -\i] at
4395                 (i\ino.south west)
4396                 {\phantom{Enw}i\i{} \textbar{} level -\i\\ \phantom{1234}};
4397     \fi
4398 \fi
4399 \ifchronos@showcoords
4400     \begin{scope}[on chronos overlay layer]
4401         \ifnum\chronos@uchod>0
4402             \foreach \i in {1,...,\chronos@uchod}
4403                 \draw [help lines, draw=chronos@lliw@node] (u\i.north east)
4404                     -| (u\i.south west) -| cycle;
4405         \fi
4406         \ifnum\chronos@isod>0
4407             \foreach \i in {1,...,\chronos@isod}
4408                 \draw [help lines, draw=chronos@lliw@node]
4409                     (i\i.north east) -| (i\i.south west) -| cycle;
4410         \fi

```

```

4411     \end{scope}%[on chronos overlay layer]
4412     \fi
4413 \end{scope}%^^A >>> byw, every node etc.
4414 \let\ceyearlabel\chronos@yearce
4415 \let\bceyearlabel\chronos@yearbce
4416 \let\celabel\chronos@ce
4417 \let\bcelabel\chronos@bce
4418 \let\timelineborderht\chronos@borderheight
4419 \let\timelinewd\chronos@width
4420 \let\lineyshift\chronos@llinell@yshift

```

At the end of chronos ...

```

4421 }{%^^A oedd yn execute at end picture={...}
4422 \ifchronos@frame
4423     \ifchronos@headings\relax
4424     \else
4425         \ifchronos@framedefnyddiobb\relax
4426         \else
4427             \pgfqkeys{/chronos}{subheadings drops'=0pt:0pt}%
4428             \chronos@headingstrue
4429             \fi % \ifchronos@framedefnyddiobb
4430         \fi % \ifchronos@headings
4431     \fi % \ifchronos@frame
4432 \ifchronos@headings
4433     \ifdim\chronos@heading@drop=0pt
4434         \chronos@heading@drop=15pt
4435         \PackageWarning{chronos}{Setting headings drop to 15pt}%
4436     \fi
4437     \ifdim\chronos@subheading@drop@uchod=0pt
4438         \chronos@subheading@drop@uchod=12pt
4439         \PackageWarning{chronos}{Setting upper subheading drop to 12pt}%
4440     \fi
4441     \ifdim\chronos@subheading@drop@isod=0pt
4442         \chronos@subheading@drop@isod=10pt
4443         \PackageWarning{chronos}{Setting lower subheading drop to 10pt}%
4444     \fi
4445     \ifnum\chronos@uchod=0
4446         \coordinate (u0) at (current bounding box.north);
4447         \PackageWarning{chronos}{%
4448             Placing (u0) at (current bounding box.north) for headings placement.%
4449         }%
4450     \fi
4451     \ifdim\chronos@border@penawdau=\pi pt
4452         \IfIntCompareTF {\chronos@uchod > 0}
4453         {%
4454             \chronos@border@penawdau=15pt
4455             \PackageWarning{chronos}{%
4456                 Allowing 15pt plus headings and subheadings drops for headings.%
4457             }%
4458         }{%
4459             \chronos@border@penawdau=5pt
4460             \PackageWarning{chronos}{%
4461                 Allowing 5pt plus headings and subheadings drops for headings.%
4462             }%
4463         }%
4464         \advance \chronos@border@penawdau by \chronos@heading@drop
4465         \advance \chronos@border@penawdau by \chronos@subheading@drop@uchod
4466         \advance \chronos@border@penawdau by \chronos@subheading@drop@isod
4467     \fi
4468     \ifnum\chronos@isod=0
4469         \coordinate (i0) at (current bounding box.south);

```

```

4470     \PackageWarning{chronos}{%
4471         Placing (i0) at (current bounding box.south) for structural purposes.%
4472     }%
4473     \fi
4474     \chronos@templgtha=\chronos@border@penawdau
4475     \advance\chronos@templgtha by \chronos@border@pen
4476     \coordinate (chronos margin top) at
4477         ($(u\chronos@uchod.north -| chronos post) + (0pt,\chronos@templgtha)$);
4478     \chronos@templgtha=\chronos@border@pen
4479     \advance\chronos@templgtha by \chronos@heading@drop
4480     \coordinate (chronos main headings) at
4481         ($(chronos margin top) - (0pt,\chronos@templgtha)$);% oedd pen & gwahanol
4482     \coordinate (chronos bottom) at
4483         ($(i\chronos@isod.south) + (0pt,-\chronos@border@gwaelod)$);% oedd gwaelod
4484     \coordinate (chronos upper subheadings) at
4485         ($(chronos main headings) - (0pt,\chronos@subheading@drop@uchod)$);% oedd pwy1
4486     \coordinate (chronos lower subheadings) at
4487         ($(chronos upper subheadings) - (0pt,\chronos@subheading@drop@isod)$);% oedd
    pwy2
4488     \coordinate (chronos@de) at ($(chronos post) + (\chronos@border@de,0pt)$);% oedd
    de
4489     \coordinate (chronos@chwith) at
4490         ($(chronos pre) + (-\chronos@border@chwith,0pt)$);% oedd chwith

4491     \fi % \ifchronos@headings
4492     \pgfqkeys{/chronos}{@before@headings}%
4493     \chronos@at@end
4494     \pgfqkeys{/chronos}{@before@frame}%
4495     \ifchronos@frame
4496         \scoped[on chronos background layer]{%
4497             \ifchronos@framedefnyddiobb % if frame uses bb
4498                 \node (chronos frame) [%
4499                     fit=(current bounding box), /chronos/prif/@frame%
4500                 ] {};
4501             \else
4502                 \node (chronos frame) [fit=(chronos margin top -| chronos@de)
4503                     (chronos bottom -| chronos@chwith), /chronos/prif/@frame] {};
4504             \fi % \ifchronos@framedefnyddiobb
4505             \path (chronos frame.south west)
4506                 ++(-\chronos@border@allanol,-\chronos@border@allanol) |-
4507                 (chronos frame.north east) --
4508                 ++(\chronos@border@allanol,\chronos@border@allanol);
4509         }%
4510     \fi % \ifchronos@frame
4511     \pgfqkeys{/chronos}{@tikz}%
4512     \end{scope}% [/chronos/@style]
4513     \pgf@relevantforpicturesizefalse
4514     \pgfqkeys{/chronos}{@@tikz}%
4515     \ifchronos@showcoords
4516         \begin{scope}[on chronos overlay layer]
4517             \foreach \i/\j in {%
4518                 chronos foot/-55,%
4519                 chronos head/north,%
4520                 chronos base/-25,%
4521                 chronos top/120,%
4522                 chronos start/85,%
4523                 chronos end/85,%
4524                 chronos pre/west,%
4525                 chronos post/east,%
4526                 chronos pre-top/175,%
4527                 chronos post-top/15,%

```

```

4528     chronos pre-base/south west,%
4529     chronos post-base/south east,%
4530     chronos pre-head/155,%
4531     chronos post-head/north east,%
4532     chronos pre-foot/south,%
4533     chronos post-foot/south,%
4534     chronos origin/-85,%
4535     chronos mid/90,%
4536     chronos mid-time/-90%
4537   }
4538   \node [/chronos/show coord={\j}{\i}] at (\i) {};
4539   \ifchronos@timeline@showyears
4540     \node [/chronos/show coord={45}{chronos first marked year}] at
4541       (chronos first marked year) {};
4542   \fi
4543   \ifchronos@headings
4544     \foreach \i/\j in {%
4545       chronos main headings/east,%
4546       chronos bottom/north,%
4547       chronos upper subheadings/east,%
4548       chronos lower subheadings/east,%
4549       chronos margin top/north%
4550     }
4551     \node [/chronos/show coord={\j}{\i}] at (\i) {};
4552   \fi
4553   \node (chronos@gwybodaeth@coords) [%
4554     below=2.5pt of current bounding box.south west,%
4555     anchor=north west,%
4556     every pin,%
4557     text=chronos@lliw@coord%
4558   ] {\textbullet{} coordinates};
4559   \end{scope}%
4560 \fi % \ifchronos@showcoords
4561 \ifchronos@shownodes
4562   \begin{scope}[on chronos overlay layer]
4563     \ifchronos@markeras
4564       \foreach \i/\j in {chronos bce/south, chronos ce/-95}
4565         {%
4566           \draw [help lines, draw=chronos@lliw@node] (\i.north west) -|
4567             (\i.south east) -| cycle;
4568           \node [/chronos/show node coord={\j}{\i}] at (\i) {};
4569         }%
4570     \fi % \ifchronos@markeras
4571   \ifchronos@frame
4572     \draw [help lines, draw=chronos@lliw@node] (chronos frame.north west)
4573       -| (chronos frame.south east) -| cycle;
4574     \node [/chronos/show node coord={north}{chronos frame}] at
4575       (chronos frame.north) {};
4576   \fi % \ifchronos@frame
4577   \ifchronos@showcoords
4578     \node (chronos@gwybodaeth@nodes) [%
4579       right=of chronos@gwybodaeth@coords.base east,%
4580       anchor=base west,%
4581       every pin,%
4582       text=chronos@lliw@node%
4583     ] {\textbullet{} nodes};
4584   \else
4585     \node (chronos@gwybodaeth@nodes) [%
4586       below=2.5pt of current bounding box.south west,%
4587       anchor=north west,%
4588       every pin,%

```

```

4589         text=chronos@lliw@node%
4590     ] {\textbullet{} nodes};
4591     \fi % \ifchronos@showcoords
4592     \end{scope}%
4593 \fi % \ifchronos@shownodes
4594 \ifchronos@showbb
4595     \begin{scope}[on chronos overlay layer]
4596         \draw [help lines,draw=chronos@lliw@bb]
4597             (current bounding box.north east) -| (current bounding box.south west)
4598             -| cycle;
4599         \node [%
4600             /chronos/show coordinate={chronos@lliw@bb}{90}{bounding box}{15pt}{}%
4601         ] at (current bounding box.120) {};
4602     \ifchronos@shownodes
4603         \node (chronos@gwybodaeth@bb) [%
4604             right=of chronos@gwybodaeth@nodes.base east,%
4605             anchor=base west,%
4606             every pin,%
4607             text=chronos@lliw@bb%
4608         ] {\textbullet{} bounding box};
4609     \else
4610         \ifchronos@showcoords
4611             \node (chronos@gwybodaeth@bb) [%
4612                 right=of chronos@gwybodaeth@coords.base east,%
4613                 anchor=base west,%
4614                 every pin,%
4615                 text=chronos@lliw@bb%
4616             ] {\textbullet{} bounding box};
4617         \else
4618             \node (chronos@gwybodaeth@bb) [%
4619                 below=2.5pt of current bounding box.south west,%
4620                 anchor=north west,%
4621                 every pin,%
4622                 text=chronos@lliw@bb%
4623             ] {\textbullet{} bounding box};
4624         \fi % \ifchronos@showcoords
4625     \fi % \ifchronos@shownodes
4626     \end{scope}%
4627 \fi % \ifchronos@showbb
4628 \end{tikzpicture}%

```

ailosod pethau rhagosodedig sy'n gosod gyda \g neu \global

```

4629 \chronos@global@clear@to@clist{century_subheadings}%
4630 \chronos@lliwiau@clear
4631 \ifchronos@byw@isod@rhag
4632     \global\chronos@byw@isodtrue
4633 \else
4634     \global\chronos@byw@isodfalse
4635 \fi
4636 \ifchronos@digwyddiad@isod@rhag
4637     \global\chronos@digwyddiad@isodtrue
4638 \else
4639     \global\chronos@digwyddiad@isodfalse
4640 \fi
4641 \ifchronos@parhad@isod@rhag
4642     \global\chronos@parhad@isodtrue
4643 \else
4644     \global\chronos@parhad@isodfalse
4645 \fi
4646 \let\chronosset\@chronosset
4647 }

```

```

\chronosset Provide conditional interface for defining custom styles, schemes, settings etc. We don't want
\@chronosset this to do anything inside a
\@@chronosset
\@chronosset environment, so just issue a warning in that case.
\@chronos@set
4648 \protected\gdef\@chronosset{%
4649 \typeout{Setting for all clangers!}%
4650 \@ifstar\s@chronos@set\@chronos@set
4651 }
4652 \protected\gdef\@chronos@set#1{%
4653 \typeout{Starless Sneetches.}%
4654 \pgfqkeys{/chronos}{#1}%
4655 }
4656 \protected\gdef\s@chronos@set#1{%
4657 \typeout{Stars upon thars.}%
4658 \pgfqkeys{/chronos}{#1}%
4659 \ifchronos@byw@isod
4660 \chronos@byw@isod@rhagtrue
4661 \else
4662 \chronos@byw@isod@rhagfalse
4663 \fi
4664 \ifchronos@digwyddiad@isod
4665 \chronos@digwyddiad@isod@rhagtrue
4666 \else
4667 \chronos@digwyddiad@isod@rhagfalse
4668 \fi
4669 \ifchronos@parhad@isod
4670 \chronos@parhad@isod@rhagtrue
4671 \else
4672 \chronos@parhad@isod@rhagfalse
4673 \fi
4674 \chronos@lliwiau@cadw@rhag
4675 }
4676 \protected\gdef\@@chronosset{%
4677 \PackageWarning{chronos}{%
4678 \bs chronosset has no effect inside a chronos environment.
4679 Usage ignored %
4680 }%
4681 \@ifstar\@gobble\@gobble
4682 }
4683 \let\chronosset\@chronosset

```

`\byw` That is, `\chronoslife`.

```

4684 \NewDocumentCommand\byw { m }{%
4685 \begingroup
4686 \Undefine\chronos@byw@labelgeni
4687 \Undefine\chronos@byw@labelmarw
4688 \Undefine\chronos@byw@angor
4689 \Undefine\chronos@byw@at
4690 \Undefine\chronos@byw@invanchor
4691 \Undefine\chronos@cynnwys@testun
4692 \Undefine\chronos@cynnwys@dyddiadau
4693 \Undefine\chronos@cynnwys@enw
4694 \Undefine\chronos@cysylltwyr
4695 \chronos@byw@cysylltiadtheorifalse %^^A rhag ofn
4696 \tikzset{byw={enw={??},marw={\year-\month-\day},bu farw=false,#1}}%
4697 \ifchronos@eventdatessplit
4698 \PackageInfo{chronos}{Setting split false for non-event.}%
4699 \chronos@eventdatessplitfalse
4700 \fi
4701 \pgfmathsetmacro\chronos@temph{%

```

```

4702     (\thechronos@genidate-\thechronos@startdate)*\chronos@unit
4703 }%
4704 \pgfmathsetmacro\chronos@tempk{%
4705     (\thechronos@marwdate-\thechronos@startdate)*\chronos@unit
4706 }%
4707 \pgfmathsetmacro\chronos@templ{%
4708     (\chronos@temph+\chronos@tempk)*\chronos@unit/2%
4709 }%

```

temporary coordinate accurate only for x

```
4710 \coordinate (\chronos@byw@tikzname) at (\chronos@templ pt,0pt);
```

These are exposed publicly, as they are useful, but they are only correct for x during life creation.

```

4711 \coordinate [alias=birth \chronos@byw@tikzname] (geni \chronos@byw@tikzname) at (\chronos@
pt,0pt);
4712 \coordinate [alias=death \chronos@byw@tikzname] (marw \chronos@byw@tikzname) at (\chronos@
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}{birth}{dea

```

final coordinate accurate for x and y

Subtract additional line shift so reference coordinate is offset by standard distance from timeline (Opt or yshift). For most styles, `\chronos@llinell@add@yshift` is Opt.

```

4747 \coordinate [yshift=-\chronos@llinell@add@yshift] (\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@llinell@haenen]% finalise coordinate placement
4854 \path [/chronos/@llinell=\chronos@digwyddiad@lliw] ({\chronos@temph pt,0}
4855     |- \chronos@border@coord) -- +(Opt,\chronos@digwyddiad@border)
4856     coordinate (\chronos@digwyddiad@tikzname);

```

```

4857     \ifchronos@eventdatessplit
4858     \path [/chronos/@lline1=\chronos@digwyddiad@lliw]
4859     ({\chronos@temph pt,0} |- \chronos@border@coord@inv) --
4860     +(0pt,\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

don't use a group here or names won't survive tag creation

4865     \chronos@hollti@testun@tagtrue
4866     \chronos@creu@testun@tag{\digwyddiad}{\chronos@cynnwys@dyddiadau}%^A angen defnyddio
/chronos/event date split
4867     \chronos@hollti@testun@tagfalse
4868     \fi
4869     \chronos@creu@testun@tag{\digwyddiad}{\chronos@cynnwys@testun}%

```

dyddiad arbennig | special date

```

4870 \ifchronos@eventyearsonline
4871 \edef\chronos@tempa{none}%
4872 \edef\chronos@tempb{\chronos@specialdate}%
4873 \ifx\chronos@tempa\chronos@tempb
4874 \def\chronos@tempbd{%
4875 \chronos@showdate@cs[chronos@digwyddiad@fformatdyddiad]{dig}%
4876 }%
4877 \else
4878 \let\chronos@tempbd\chronos@specialdate\gdef\chronos@specialdate{none}%
4879 \fi
4880 \scoped[/chronos/chronos@lline1 amser@haenen]{%
4881 \node [/chronos/event year on line] at (\chronos@temph pt,0pt)
4882 {\chronos@tempbd};%
4883 }%
4884 \fi
4885 \ifchronos@digwyddiad@cysylltiadtheori
4886 \chronos@angorau@theori{testun \chronos@digwyddiad@tikzname}%
4887 {cysylltwr \chronos@digwyddiad@tikzname}%
4888 {connector \chronos@digwyddiad@tikzname}%
4889 [/chronos/@cysylltwr@testun=\chronos@digwyddiad@lliw}%

4890 \fi
4891 \ifchronos@every@digwyddiad@isod
4892 \global\chronos@digwyddiad@isodtrue
4893 \else\ifchronos@every@digwyddiad@uchod
4894 \global\chronos@digwyddiad@isodfalse
4895 \else
4896 \ifchronos@digwyddiad@isod
4897 \global\chronos@digwyddiad@isodfalse
4898 \else
4899 \global\chronos@digwyddiad@isodtrue
4900 \fi
4901 \fi
4902 \fi
4903 \chronos@ailosod@nodweddion
4904 \endgroup
4905 }

```

`\parhad` That is, `\chronosperiod`.

```

4906 \NewDocumentCommand\parhad { m }{%
4907   \begingroup
4908     \Undefine\chronos@parhad@labeldechrau
4909     \Undefine\chronos@parhad@labeldiwedd
4910     \Undefine\chronos@parhad@angor
4911     \Undefine\chronos@parhad@at
4912     \Undefine\chronos@parhad@invanchor
4913     \Undefine\chronos@cynnwys@testun
4914     \Undefine\chronos@cynnwys@dyddiadau
4915     \Undefine\chronos@cynnwys@enw
4916     \Undefine\chronos@cysylltwyr
4917     \chronos@parhad@cysylltiadtheorifalse %^A rhag ofn
4918     \tikzset{parhad={enw={??},diwedd={\year-\month-\day},gorffenedig=false,#1}}%
4919     \ifchronos@eventdatessplit
4920       \PackageInfo{chronos}{Setting split false for non-event.}%
4921       \chronos@eventdatessplitfalse
4922     \fi
4923     \pgfmathsetmacro\chronos@temph{%
4924       (\thechronos@thingdate-\thechronos@startdate)*\chronos@unit
4925     }%
4926     \pgfmathsetmacro\chronos@tempk{%
4927       (\thechronos@otherthingdate-\thechronos@startdate)*\chronos@unit
4928     }%
4929     \pgfmathsetmacro\chronos@templ{%
4930       (\chronos@temph+\chronos@tempk)*\chronos@unit/2%
4931     }%

```

temporary coordinates accurate only for x

```

4932   \coordinate (\chronos@parhad@tikzname) at (\chronos@templ pt,0pt);

```

These are exposed publicly, as they are useful, but they are only correct for x during period creation.

```

4933   \coordinate [alias=start \chronos@parhad@tikzname] (dechrau \chronos@parhad@tikzname)
4934   at (\chronos@temph pt,0pt);
4935   \coordinate [alias=end \chronos@parhad@tikzname] (diwedd \chronos@parhad@tikzname)
4936   at (\chronos@tempk pt,0pt);
4937   \chronos@troilliwiiau@tag{parhad}%
4938   \chronos@gosodangor@tag{parhad}%
4939   \chronos@gosodborder@tag{parhad}%
4940   \IfExistTF \chronos@cynnwys@testun{%
4941     \let\chronos@cynnwys@dyddiadau\relax
4942     \let\chronos@cynnwys@enw\relax
4943   }{%
4944     \IfExistF \chronos@cynnwys@enw {%
4945       \def \chronos@cynnwys@enw {\chronos@enw@priflythrennu{\chronos@parhad@enw}}%
4946     }%
4947     \IfExistTF \chronos@cynnwys@dyddiadau {%
4948       \apptocmd \chronos@cynnwys@dyddiadau {\}\{-}\{-}%
4949     }{%
4950       \ifchronos@onlytext\let\chronos@cynnwys@dyddiadau\relax
4951       \else
4952         \ifchronos@gorffenedig\relax\else\def\chronos@parhad@labeldiwedd{\fi
4953         \chronos@dyddiadau@tag{parhad}{thing}{dechrau}{otherthing}{diwedd}%
4954         \ifchronos@temp
4955           \def \chronos@cynnwys@dyddiadau {\chronos@parhad@labeldechrau\}%
4956         \else
4957           \def \chronos@cynnwys@dyddiadau {%
4958             \chronos@parhad@labeldechrau--\chronos@parhad@labeldiwedd\}%
4959         \fi

```

```

4958     \fi
4959     }%
4960     \def \chronos@cynnwys@testun {%
4961         \chronos@parhad@ffontdyddiad
4962         \chronos@cynnwys@dyddiadau
4963         \chronos@parhad@ffonttestun
4964         \chronos@cynnwys@enw
4965     }%
4966     }%
4967     \chronos@creu@llinell {parhad}{\chronos@temph pt}{\chronos@tempk pt}{dechrau}{diwedd}{st

```

final coordinate placement

Subtract additional line shift so reference coordinate is offset by standard distance from timeline (Opt or yshift). For most styles, `\chronos@llinell@add@yshift` is Opt.

```

4968     \coordinate [yshift=-\chronos@llinell@add@yshift] (\chronos@parhad@tikzname) at
4969         ($(\chronos@parhad@tikzname){} dechrau)!1/2!(\chronos@parhad@tikzname){} diwedd)$);

```

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

```

4970     \chronos@creu@testun@tag{}{parhad}{\chronos@cynnwys@testun}%
4971     \ifchronos@parhad@cysylltiadtheori
4972         \chronos@angorau@theori{testun \chronos@parhad@tikzname}%
4973         {cysylltwr \chronos@parhad@tikzname}{connector \chronos@parhad@tikzname}%
4974         {/chronos/@cysylltwr@testun=\chronos@parhad@lliw}%
4975     \fi
4976     \ifchronos@every@parhad@isod
4977         \global\chronos@parhad@isodtrue
4978     \else\ifchronos@every@parhad@uchod
4979         \global\chronos@parhad@isodfalse
4980     \else
4981         \ifchronos@parhad@isod
4982             \global\chronos@parhad@isodfalse
4983         \else
4984             \global\chronos@parhad@isodtrue
4985     \fi
4986     \fi
4987     \fi
4988     \chronos@ailosod@nodweddion
4989 \endgroup
4990 }

```

`\theori` That is, `\chronostheory`.

```

4991 \NewDocumentCommand\theori { m }{%
4992     \begingroup
4993     \Undefine\chronos@theori@angor
4994     \Undefine\chronos@theori@at
4995     \Undefine\chronos@theori@invanchor
4996     \Undefine\chronos@cynnwys@testun
4997     \Undefine\chronos@cynnwys@enw
4998     \Undefine\chronos@cynnwys@dyddiadau
4999     \Undefine\chronos@cysylltwyr
5000     \chronos@theori@cysylltiadtheorifalse %^^A rhag ofn
5001     \tikzset{theori={enw={??},#1}}%
5002     \chronos@troilliwiau@tag{theori}%
5003     \IfExistTF \chronos@theori@angor{%
5004         \IfExistTF \chronos@cysylltwyr{%
5005             \pretocmd\chronos@cysylltwyr{\chronos@theori@angor,}{-}{-}%
5006         }{%
5007             \def\chronos@cysylltwyr{\chronos@theori@angor}%

```

```

5008     }%
5009   }{%
5010     \ifchronos@theori@isod
5011     \def\chronos@theori@angor{north}%
5012     \else
5013     \def\chronos@theori@angor{south}
5014     \fi
5015   }%
5016   \IfExistTF \chronos@cynnwys@testun {%
5017     \let\chronos@cynnwys@enw\relax
5018   }{%
5019     \IfExistF \chronos@cynnwys@enw {%
5020       \def \chronos@cynnwys@enw {\chronos@enw@priflythrennu{\chronos@theori@enw}}%
5021     }%
5022     \def \chronos@cynnwys@testun {\chronos@cynnwys@enw}%
5023   }%

creu testun | text tag

5024   \chronos@creu@testun@tag{alias=\chronos@theori@tikzname}{theori}{%
5025     \chronos@theori@ffonttestun\chronos@cynnwys@testun}%
5026   \IfExistT \chronos@cysylltwyr{%
5027     \chronos@angorau@theori{\chronos@theori@enw}{%
5028       cysylltwr \chronos@theori@enw
5029     }{connector \chronos@theori@enw}{%
5030       /chronos/@cysylltwr@testun=\chronos@theori@lliw
5031     }%
5032   }%
5033   \chronos@ailosod@nodweddion
5034 \endgroup
5035 }

```

`\chronos@angorau@theori` That is, anchors for `\chronostheory`.

```

5036 \protected\def \chronos@angorau@theori#1#2#3#4{%
5037   % #1 enw y prif node ;
5038   % #2 enw yr angor cyntaf ;
5039   % #3 connector ;
5040   % #4 style
5041   \ifchronos@phantom
5042     \PackageWarning{chronos}{Phantom tags cannot have connectors }%
5043   \else

```

ateb Symbol 1: <https://tex.stackexchange.com/a/385953/>

```

5044   \begin{scope}[/chronos/middle anchorborder]
5045     \setcounter{chronos@theori@countanchors}{0}%
5046     \@for \xx:=\chronos@cysylltwyr \do {%
5047       \stepcounter{chronos@theori@countanchors}%
5048       \ifnum\value{chronos@theori@countanchors}=1%
5049         \node (#2) [%
5050           #4,%
5051           alias=#2\thechronos@theori@countanchors,%
5052           alias=#3,%
5053           alias=#3\thechronos@theori@countanchors
5054         ] at (#1.middle \xx) {};
5055       \else
5056         \node (#2\thechronos@theori@countanchors) [%
5057           #4, alias=#3\thechronos@theori@countanchors
5058         ] at (#1.middle \xx) {};
5059     \fi
5060   }%
5061 \end{scope}%

```

```
5062 \fi
5063 }
```

`\cylchtheori` That is, `\theorycircle`.

```
5064 \NewDocumentCommand \cylchtheori { m } {%
5065 \begingroup
5066 \Undefine\chronos@cylchtheori@at
5067 \Undefine\chronos@cynnwys@testun
5068 \Undefine\chronos@cynnwys@enw
5069 \Undefine\chronos@cynnwys@dyddiadau
5070 \tikzset{cylch theori={enw={??},#1}}%

5071 \coordinate [%
5072 /chronos/every@cylch cylch theori,%
5073 /utils/exec=\pgfkeysalsofrom{\chronos@cadw}%
5074 ] (\chronos@cylchtheori@tikzname1) at (\chronos@cylchtheori@at);
5075 \path [/chronos/every@cylch cylch theori] (\chronos@cylchtheori@tikzname1)
5076 circle (\chronos@cylchtheori@bach) circle (\chronos@cylchtheori@mawr);
5077 \pgfmathsetlength\chronos@templgtha{\chronos@cylchtheori@bach+0.5pt}%
5078 \pgfmathsetlength\chronos@templgthc{\chronos@cylchtheori@mawr-0.5pt}%
5079 \pgfmathsetlength\chronos@templgthb{\chronos@cylchtheori@mawr+2pt}%
5080 \coordinate (\chronos@cylchtheori@tikzname2) at
5081 ($(\chronos@cylchtheori@tikzname1) - (\chronos@templgtha,0)$);
5082 \coordinate (\chronos@cylchtheori@tikzname3) at
5083 ($(\chronos@cylchtheori@tikzname1) - (\chronos@templgthc,0)$);
5084 \coordinate (\chronos@cylchtheori@tikzname4) at
5085 ($(\chronos@cylchtheori@tikzname1) + (0,\chronos@templgthb)$);
5086 \coordinate (\chronos@cylchtheori@tikzname5) at
5087 ($(\chronos@cylchtheori@tikzname1) - (0,\chronos@templgthb)$);
5088 \path [%
5089 /chronos/every@testun cylch theori/.expanded={%
5090 \chronos@cylchtheori@circletext@uchod\
5091 }%
5092 ] (\chronos@cylchtheori@tikzname2) arc (180:0:\chronos@templgtha);
5093 \path [%
5094 /chronos/every@testun cylch theori/.expanded={%
5095 \chronos@cylchtheori@circletext@isod
5096 }%
5097 ] (\chronos@cylchtheori@tikzname3) arc (180:360:\chronos@templgthc);
5098 \node (label above \chronos@cylchtheori@tikzname) [%
5099 anchor=south, /chronos/theori/cylchau/@label
5100 ] at (\chronos@cylchtheori@tikzname4) {\chronos@cylchtheori@label@uchod};
5101 \node (label below \chronos@cylchtheori@tikzname) [%
5102 anchor=north, /chronos/theori/cylchau/@label
5103 ] at (\chronos@cylchtheori@tikzname5) {\chronos@cylchtheori@label@isod};
5104 \node (\chronos@cylchtheori@tikzname) [%
5105 fit=(label below \chronos@cylchtheori@tikzname)
5106 (label above \chronos@cylchtheori@tikzname)
5107 (\chronos@cylchtheori@tikzname4)
5108 (\chronos@cylchtheori@tikzname5)%
5109 ] {};
5110 \chronos@ailosod@nodweddion
5111 \endgroup
5112 }
```

`\prideitl` That is, `\chronosmaintitle`.

```
5113 \NewDocumentCommand \prifdeitl { m }
5114 {%
5115 \begingroup
5116 \Undefine\chronos@prifdeitl@at
```

```

5117 \Undefine\chronos@prifdeitl@angor
5118 \tikzset{prif={#1}}%
5119 \IfExistF\chronos@prifdeitl@angor{\def\chronos@prifdeitl@angor{center}}%
5120 \IfExistTF\chronos@prifdeitl@tikzname{%
5121   \pgfqkeys{/chronos}{@tempd/.style={alias=prif deitl,alias=main title}}%
5122 }{%
5123   \def\chronos@prifdeitl@tikzname{prif deitl}%
5124   \pgfqkeys{/chronos}{@tempd/.style={alias=main title}}%
5125 }%
5126 \IfFreeT {\chronos@prifdeitl@cynnwys}{%
5127   \def\chronos@prifdeitl@cynnwys{%
5128     \chronos@enw@priflythrennu{\chronos@prifdeitl@enw}%
5129   }%
5130 }%
5131 \draw node (\chronos@prifdeitl@tikzname) [%
5132   draw=none,%
5133   /chronos/@tempd,%
5134   /chronos/prif/@teitl,%
5135   anchor=\chronos@prifdeitl@angor,%
5136   /utils/exec=\pgfkeysalsofrom{\chronos@cadw}%
5137 ] at (\chronos@prifdeitl@at) {\chronos@prifdeitl@cynnwys};
5138 \ifchronos@showcoords
5139   \begin{scope}[on chronos overlay layer]
5140     \draw [help lines, draw=chronos@lliw@node]
5141       (\chronos@prifdeitl@tikzname.north east) -|
5142       (\chronos@prifdeitl@tikzname.south west) -| cycle;
5143     \node [%
5144       /chronos/show coordinate={chronos show node colour}{0}{%
5145         \chronos@prifdeitl@tikzname
5146       }{10pt}{align=center}%
5147     ] at (\chronos@prifdeitl@tikzname.east) {};
5148   \end{scope}%
5149   \fi
5150 \endgroup
5151 }

```

`\gwybodaeth` That is, `\chronosinfo`.

```

5152 \NewDocumentCommand \gwybodaeth { s m }{%
5153   \begingroup
5154     \Undefine\chronos@gwybodaeth@angor
5155     \Undefine\chronos@gwybodaeth@at
5156     \let\chronos@cynnwys@testun\@empty
5157     \Undefine\chronos@cynnwys@enw
5158     \Undefine\chronos@gwybodaeth@capsiw
5159     \tikzset{gwybodaeth={enw={??},#2}}%
5160     \IfExistF \chronos@gwybodaeth@angor{\def\chronos@gwybodaeth@angor{west}}%
5161     \IfExistF \chronos@gwybodaeth@capsiw {%
5162       \def \chronos@gwybodaeth@capsiw {%
5163         \chronos@enw@priflythrennu{\chronos@gwybodaeth@enw}%
5164       }%
5165     }%
5166     \IfExistF \chronos@gwybodaeth@lliw {%
5167       \let\chronos@gwybodaeth@lliw\chronos@gwybodaeth@lliw@rhagosodedig
5168     }%
5169     \node (testun \chronos@gwybodaeth@tikzname) [%
5170       /chronos/@testun=\chronos@gwybodaeth@lliw,%
5171       anchor=\chronos@gwybodaeth@angor,%
5172       /chronos/.cd,%
5173       /utils/exec=\pgfkeysalsofrom{\chronos@cadw},%
5174       alias=tag \chronos@gwybodaeth@tikzname,%

```

```

5175     alias=text tag \chronos@gwybodaeth@tikzname,%
5176     alias=\chronos@gwybodaeth@tikzname
5177 ] at (\chronos@gwybodaeth@at) {\chronos@cynnwys@testun};
5178 \IfBooleanF {#1}{%
5179     \node (capswn \chronos@gwybodaeth@tikzname) [%
5180         /chronos/gwybodaeth/@label,%
5181         alias=enw \chronos@gwybodaeth@tikzname,%
5182         alias=name \chronos@gwybodaeth@tikzname,%
5183         alias=label \chronos@gwybodaeth@tikzname,%
5184         alias=caption \chronos@gwybodaeth@tikzname
5185     ] at (\chronos@gwybodaeth@tikzname.south) {\chronos@gwybodaeth@capswn};
5186 }%
5187 \edef\chronos@tempa{lliw \chronos@gwybodaeth@tikzname}%
5188 \edef\chronos@tempe{colour \chronos@gwybodaeth@tikzname}%
5189 \edef\chronos@tempf{color \chronos@gwybodaeth@tikzname}%
5190 \edef\chronos@tempb{\chronos@gwybodaeth@lliw}%
5191 \xglobal\colorlet{\chronos@tempa}{\chronos@tempb}%
5192 \xglobal\colorlet{\chronos@tempe}{\chronos@tempb}%
5193 \xglobal\colorlet{\chronos@tempf}{\chronos@tempb}%
5194 \colorlet{chronos current tag colour}{\chronos@tempb}%
5195 \colorlet{chronos current tag color}{\chronos@tempb}%
5196 \chronos@ailosod@nodweddion
5197 \endgroup
5198 }

```

`\hawlfraint` That is, `\chronoscopyright`.

```

5199 \NewDocumentCommand \hawlfraint { m }
5200 {%
5201     \begingroup
5202     \Undefine\chronos@hawlfraint@at
5203     \Undefine\chronos@hawlfraint@enw
5204     \def\chronos@hawlfraint@angor{north west}%
5205     \def\chronos@hawlfraint@cylchdroi{90}%
5206     \tikzset{hawlfraint={#1}}%
5207     \IfExistF{\chronos@hawlfraint@notis}{%
5208         \ifchronos@copyleft
5209             \def\chronos@hawlfraint@notis##1##2{Copyleft \textcopyright{} ##1 ##2}%
5210         \else
5211             \def\chronos@hawlfraint@notis##1##2{Copyright \textcopyright{} ##1 ##2}%
5212         \fi
5213     }%
5214     \IfExistF{\chronos@hawlfraint@at}{%
5215         \def\chronos@hawlfraint@at{current bounding box.south west}%
5216         \PackageWarning{chronos}{Placing copyright notice at bottom left }%
5217     }%
5218     \IfExistF {\chronos@hawlfraint@cynnwys}{%
5219         \IfBooleanExprTF {
5220             \CSFreeBoolean \chronos@hawlfraint@enw
5221             || ! (\CSFreeBoolean \chronos@hawlfraint@awdur)
5222             || ! (\CSFreeBoolean \chronos@hawlfraint@blwyddyn)
5223         }{%
5224             \IfExistF {\chronos@hawlfraint@awdur}{%
5225                 \IfExistTF {\svnauthor} {%
5226                     \IfExistTF {\svnFullAuthor} {%
5227                         \def\chronos@hawlfraint@awdur{\svnFullAuthor{\svnauthor}}%
5228                     }{%
5229                         \let\chronos@hawlfraint@awdur\svnauthor
5230                     }%
5231                 }{%
5232                     \def\chronos@hawlfraint@awdur{Author}%

```

```

5233     }%
5234     }%
5235     \IfExistF {\chronos@hawlfraint@blwyddyn}{%
5236         \IfExistTF {\svnyear} {%
5237             \let\chronos@hawlfraint@blwyddyn\svnyear
5238         }{%
5239             \let\chronos@hawlfraint@blwyddyn\today
5240         }%
5241     }%
5242     \def\chronos@hawlfraint@cynnwys{%
5243         \chronos@hawlfraint@notis{%
5244             \chronos@hawlfraint@blwyddyn
5245         }{%
5246             \chronos@hawlfraint@awdur
5247         }%
5248     }%
5249 }{%
5250     \def\chronos@hawlfraint@cynnwys{%
5251         \chronos@hawlfraint@notis{\chronos@hawlfraint@blwyddyn}{%
5252             \chronos@enw@priflythrennu{\chronos@hawlfraint@enw}%
5253         }%
5254     }%
5255 }%
5256 }%
5257 \IfExistTF{\chronos@hawlfraint@tikzname}{%
5258     \pgfqkeys{/chronos}{@tempd/.style={%
5259         alias=hawlfraint,%
5260         alias=copyright,%
5261         alias=copyleft%
5262     }}%
5263 }{%
5264     \def\chronos@hawlfraint@tikzname{hawlfraint}%
5265     \pgfqkeys{/chronos}{@tempd/.style={alias=copyright,alias=copyleft}}%
5266 }%

5267 \draw node (\chronos@hawlfraint@tikzname) [%
5268     draw=none,%
5269     /chronos/@tempd,%
5270     /chronos/@hawlfraint,%
5271     anchor=\chronos@hawlfraint@angor,%
5272     rotate=\chronos@hawlfraint@cylchdroi,%
5273     /utils/exec=\pgfkeysalsofrom{\chronos@cadw}%
5274 ] at (\chronos@hawlfraint@at) {\chronos@hawlfraint@cynnwys};
5275 \ifchronos@showcoords
5276     \begin{scope}[on chronos overlay layer]
5277         \draw [help lines, draw=chronos@lliw@node]
5278             (\chronos@hawlfraint@tikzname.north east) -|
5279             (\chronos@hawlfraint@tikzname.south west) -| cycle;
5280         \node [%
5281             /chronos/show coordinate={chronos show node colour}{0}{%
5282                 \chronos@hawlfraint@tikzname
5283             }{10pt}{align=center}%
5284         ] at (\chronos@hawlfraint@tikzname.east) {};
5285     \end{scope}%
5286     \fi
5287 \endgroup
5288 }

```

`\chronoscopyleft` Variant of `\chronoscopyright`.

```

5289 \NewDocumentCommand \chronoscopyleft { m }{%
5290     \begingroup

```

```

5291 \chronos@copylefttrue
5292 \hawlfraint {#1}%
5293 \endgroup
5294 }

```

`\chronos@dyddiadau@tag` Internal macro to figure out date format for tags.

#1 : tag e.g. byw / parhad ; #2 first date counter e.g. geni / thing ; #3 first label e.g. geni / dechrau ; #4 second date counter e.g. marw / otherthing ; #5 second label e.g. marw / diwedd

```

5295 \protected\def \chronos@dyddiadau@tag #1#2#3#4#5{%
5296 \IfCSEExistTF{chronos@#1@label#3}{%
5297 \IfCSEExistF{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@dimondblynnyddoedd
5332 \edef\chronos@temp{ \csname chronos@#2year\endcsname }%
5333 \edef\chronos@tempq{ \csname chronos@#4year\endcsname }%
5334 \ifnum\chronos@temp=\chronos@tempq\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 blynnyddoedd
- dal i edrych yn dwp pan dim ond blynnyddoedd 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 \protected\def \chronos@gosodborder@tag#1{%
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 \protected\def \chronos@troilliwiau@tag#1{%^^A <<<
5383   \IfCSExistTF {chronos@#1@at}{%
5384     \def\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>0pt\relax
5404     \expandafter\global\csname chronos@#1@isodfalse\endcsname
5405     \def\chronos@yshift@inv{-\chronos@yshift}%
5406   \else
5407     \ifdim\chronos@yshift<0pt\relax
5408       \expandafter\global\csname chronos@#1@isodtrue\endcsname
5409       \def\chronos@yshift@inv{-\chronos@yshift}%
5410     \else
5411       \ifdim\chronos@testun@yshift=0pt\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@troilliwiiau
5429     \csname ifchronos@#1@isod\endcsname
5430     \chronos@troilliwiiau@isod{#1}
5431   \else
5432     \chronos@troilliwiiau@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@enwaullisym1
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 \protected\def\chronos@gosodangor@tag#1{%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.

#1 : tag e.g. byw #2 : x dimen dechrau/geni #3 : x dimen diwedd/marw #4 : i greu enw cyntaf e.g. dechrau/geni #5 : i greu'r ail enw e.g. diwedd/marw #6 : i greu alias cyntaf e.g. start/birth #7 : i greu'r ail alias e.g. end/death

```

5482 \protected\def \chronos@creu@llinell #1#2#3#4#5#6#7%^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 \advance\chronos@llinell@yshift by \chronos@llinell@add@yshift
5488 \begin{scope}[/chronos/chronos@llinell@haenen]
5489     \ifchronos@yearsonline

5490         \path [/chronos/@llinell/.expand once=\csname chronos@#1@lliw\endcsname] %
5491             ({#2,0} |- \chronos@border@coord) -- +(0pt,\chronos@tempb) coordinate %
5492             (\chronos@tempa{ } #4) -| ({#3,0} |- \chronos@border@coord) coordinate %
5493             [midway] (\chronos@tempa{ } #5) -- cycle;
5494     \else
5495         \path [/chronos/@llinell/.expand once=\csname chronos@#1@lliw\endcsname] %
5496             ({#2,0} |- \chronos@border@coord) ++(0pt,\chronos@tempb) %
5497             ++(0pt,\chronos@llinell@yshift) coordinate (\chronos@tempa{ } #4) -- %
5498             ({#3,0} |- \chronos@tempa{ } #4) coordinate (\chronos@tempa{ } #5);
5499     \fi
5500     \ifchronos@eventdatessplit
5501         \ifchronos@yearsonline
5502             \path [/chronos/@llinell/.expand once=\csname chronos@#1@lliw\endcsname] %
5503                 ({#2,0} |- \chronos@border@coord@inv) -- +(0pt,\chronos@tempc) %
5504                 coordinate (\chronos@tempd{ } #4) -| ({#3,0} |- \chronos@border@coord@inv) %
5505                 coordinate [midway] (\chronos@tempd{ } #5) %
5506                 -- cycle;
5507         \else
5508             \path [/chronos/@llinell/.expand once=\csname chronos@#1@lliw\endcsname] %
5509                 ({#2,0} |- \chronos@border@coord@inv) ++(0pt,\chronos@tempc) %

```

```

5510      ++(Opt,-\chronos@llinell@yshift) coordinate (\chronos@tempd{} #4) -- %
5511      ({#3,0} |- \chronos@tempd{} #4) coordinate [midway] %
5512      (\chronos@tempd{} #5);
5513      \fi
5514      \fi

```

Re-define the start/end coordinates to correct y.

```

5515      \end{scope}%
5516      \coordinate [alias=#6 \chronos@tempa] (#4 \chronos@tempa) at (\chronos@tempa{} #4);
5517      \coordinate [alias=#7 \chronos@tempa] (#5 \chronos@tempa) at (\chronos@tempa{} #5);
5518      }%^^A >>>

```

`\chronos@creu@testun@tag` Internal macro to create text tags.

```

5519 \protected\long\def \chronos@creu@testun@tag#1#2#3{%^^A <<< make text tag
5520 % #1 : allweddu ychwanegol | additional keys
5521 % #2 : tag e.g. byw
5522 % #3 : testun | text
5523 \ifchronos@phantom
5524     \relax
5525 \else
5526     \expandafter\let\expandafter\chronos@tempa\csname chronos@#2@tikzname\endcsname
5527     \expandafter\let\expandafter\chronos@tempb\csname chronos@#2@at\endcsname
5528     \ifchronos@holhti@testun@tag
5529         \edef\chronos@tempa{\csname chronos@#2@tikzname\endcsname-inv}%
5530         \expandafter\let\expandafter\chronos@tempc\csname chronos@#2@inanchor\endcsname
5531         \pgfqkeys{/chronos}{%
5532             chronos@tempa@style/.style={/chronos/event date split},% oedd yshcale=-1,...
5533             chronos@tempb@style/.style={yshift=2*\chronos@yshift@inv}}%
5534         \path (\chronos@tempb);
5535         \pgfgetlastxy {\chronos@templgtha}{\chronos@templgthb}%
5536         \ifdim\chronos@templgthb>Opt
5537             \coordinate (chronos@temp@coord) at (\chronos@templgtha,-\chronos@templgthb);
5538         \else
5539             \coordinate (chronos@temp@coord) at (\chronos@templgtha,\chronos@templgthb);
5540         \fi
5541     \else
5542         \expandafter\let\expandafter\chronos@tempc\csname chronos@#2@angor\endcsname
5543         \pgfqkeys{/chronos}{%
5544             chronos@tempa@style/.style={#1},
5545             chronos@tempb@style/.style={#1}}%
5546         \coordinate (chronos@temp@coord) at (\chronos@tempb);
5547     \fi

```

ateb Symbol 1: <https://tex.stackexchange.com/a/385953/>

```

5548     \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?

```

5549     \node (testun \chronos@tempa) [%
5550         /chronos/@testun/.expand once=\csname chronos@#2@lliw\endcsname,%
5551         anchor=\chronos@tempc,%
5552         /chronos/.cd,/utils/exec=\pgfkeysalsofrom{\chronos@cadw},%
5553         /chronos/chronos@tempb@style,%
5554         /tikz/.cd,%
5555         alias=tag \chronos@tempa,%
5556         alias=text tag \chronos@tempa
5557     ] at (chronos@temp@coord) {#3};%
5558     \ifchronos@tag@cysylltu

```

creu cylch ar y lein | make circle on timeline

```

5559     \scoped[/chronos/chronos@cysylltiad@haenen]{%
5560     \node (cysylltwr chronos \chronos@tempa) [%
5561     /chronos/@cysylltwr@chronos/.expand once=\csname chronos@#2@lliw\endcsname,%
5562     alias=chronos connector \chronos@tempa,%
5563     alias=circle \chronos@tempa,%
5564     alias=cylch \chronos@tempa
5565     ] at (\chronos@tempa) {};%
5566     }%

```

ateb Symbol 1: <https://tex.stackexchange.com/a/385953/>

```

5567     \begin{scope}[/chronos/middle anchorborder]%

```

creu cysylltwyr testun ar y node testun | make text connectors on the text node

```

5568     \node (cysylltwr testun \chronos@tempa) [%
5569     /chronos/@cysylltwr@testun/.expand once=\csname chronos@#2@lliw\endcsname,%
5570     /chronos/@cysylltwr@testun@prif/.expand once=\csname chronos@#2@lliw\endcsname,%
5571     alias=text tag connector \chronos@tempa,%
5572     alias=prif gysylltwr \chronos@tempa,%
5573     alias=main connector \chronos@tempa,%
5574     alias=cysylltwr \chronos@tempa0,%
5575     alias=testun cylch \chronos@tempa,%
5576     alias=connector \chronos@tempa0
5577     ] at (testun \chronos@tempa.middle \chronos@tempc) {};
5578     \end{scope}%
5579     \path (cysylltwr testun \chronos@tempa);
5580     \pgfgetlastxy{\chronos@templgtha}{\chronos@templgthb}%
5581     \path (cysylltwr chronos \chronos@tempa);
5582     \pgfgetlastxy{\chronos@templgthc}{\chronos@templgthb}%
5583     \ifdim\chronos@templgtha=\chronos@templgthc
5584     \def\chronos@tempe{--}
5585     \else
5586     \def\chronos@tempe{|-}
5587     \fi
5588     \ifbool{chronos@#2@cysylltiad}{%

```

cysylltu llinell amser i node testun | connect timeline to text node

```

5589     \scoped[/chronos/chronos@cysylltiad@haenen]{%
5590     \draw [%
5591     /chronos/@cysylltiad/.expand once=\csname chronos@#2@lliw\endcsname
5592     ] (cysylltwr chronos \chronos@tempa) \chronos@tempe
5593     (cysylltwr testun \chronos@tempa) ;%
5594     }%% oedd .\chronos@tempc
5595     }{% ifchronos@#2@cysylltiad
5596     \fi % \ifchronos@tag@cysylltu
5597     \fi
5598 }%^A >>>

```

`\chronosevent` Aliases and globalised defaults. Note these are the documented forms.

```

\chronoslife
\chronosperiod
\chronosinfo
\chronostheory
\chronostheorycircle
\chronosmaintitle
\chronoscopyright
\chronosshowpreset
\chronosshowcolor
\chronosshowfeatures
5599 \AtEndPreamble{%
5600 \ifpackageloaded{memoize}{%
5601 \mmzset{%
5602 auto={chronos}{memoize},
5603 }%
5604 }{% nid yw hyn yn memoizable byth bynnag
5605 \pgfkeys{/handlers/.meaning to context/.code={}}%
5606 }%
5607 \ifchronos@byw@isod

```

```

5608   \chronos@byw@isod@rhagtrue
5609   \else
5610   \chronos@byw@isod@rhagfalse
5611   \fi
5612   \ifchronos@digwyddiad@isod
5613   \chronos@digwyddiad@isod@rhagtrue
5614   \else
5615   \chronos@digwyddiad@isod@rhagfalse
5616   \fi
5617   \ifchronos@parhad@isod
5618   \chronos@parhad@isod@rhagtrue
5619   \else
5620   \chronos@parhad@isod@rhagfalse
5621   \fi
5622   \chronos@lliwiau@cadw@rhag
5623   \IfExistF \chronosevent{\let\chronosevent\digwyddiad}%
5624   \IfExistF \chronoslifef{\let\chronoslifef\byw}%
5625   \IfExistF \chronosperiod{\let\chronosperiod\parhad}%
5626   \IfExistF \chronosinfo{\let\chronosinfo\gwybodaeth}%
5627   \IfExistF \chronostheory{\let\chronostheory\theori}%
5628   \IfExistF \chronostheorycircle{\let\chronostheorycircle\cylchtheori}%
5629   \IfExistF \chronosmaintitle{\let\chronosmaintitle\prifdeitl}%
5630   \IfExistF \chronoscopyright{\let\chronoscopyright\hawlfraint}%
5631   \IfExistF \chronosshowpreset{\let\chronosshowpreset\chronos@dangos@gosod}%
5632   \IfExistF \chronosshowcolor{\let\chronosshowcolor\chronosshowcolour}%

```

`\chronosshowfeatures` Debugging.

```

5633   \ProvideDocumentCommand \chronosshowfeatures { o }{%
5634     \IfValueTF {#1} {%
5635       \chronos@dangos@nodwedddion{#1}
5636     }{%
5637       \chronos@dangos@nodwedddion@rhag
5638     }%
5639   }%

```

Required colours for `\chronosshowfeatures`.

```

5640   \providecolor{chronos show coordinate colour}{named}{chronos@lliw@coord}%
5641   \providecolor{chronos show node colour}{named}{chronos@lliw@node}%
5642   \providecolor{chronos show coordinate color}{named}{chronos@lliw@coord}%
5643   \providecolor{chronos show node color}{named}{chronos@lliw@node}%

```

`\ceyearlabel` Globalised defaults.

```

\bceyearlabel
\celabel 5644   \IfExistF \ceyearlabel {\let\ceyearlabel\chronos@yearce}%
5645   \IfExistF \bceyearlabel {\let\bceyearlabel\chronos@yearbce}%
\bcelabel 5646   \IfExistF \celabel {\let\celabel\chronos@ce}%
\tlstyle 5647   \IfExistF \bcelabel {\let\bcelabel\chronos@bce}%
\plstyle 5648   \IfExistF \tlstyle {\let\tlstyle\upshape}%
\sisshape 5649   \IfExistF \plstyle {\let\plstyle\upshape}%
\textsi 5650   \IfExistF \sisshape {\DeclareRobustCommand\sishape{\itshape\scshape}}%
\uishape 5651   \IfExistF \textsi {\DeclareTextFontCommand{\textsi}{\sisshape}}%
\textui 5652   \IfExistF \uishape {\let\uishape\itshape}%
5653   \IfExistF \textui {\DeclareTextFontCommand{\textui}{\uishape}}%
5654   }
5655   \chronos@presetfalse

```

## 17 chronos-lib-styles

Styles.

```
5656 \RequirePackage{chronos}
5657 \ProvidesPackageSVN[chronos-lib-styles.sty]{$Id: chronos-code.dtx 11797 2026-03-21 16:01:38Z
    cfrees $}[v0.9.4 \revinfo]
5658 \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
serif on line
rainbow serif
sober judge
5659 modern/.style={% <<<
5660 /chronos/.cd,
5661 modern/.meaning to context,
5662 colour scheme=modern,
5663 no colour rotation,
5664 timeline={%
5665 dates=1500:1900,
5666 timeline years=on line,
5667 timeline line={chronos timeline background colour, opacity=1},
5668 timeline height'=5mm,
5669 timeline marks,
5670 timeline border height'=5pt,
5671 major step font=\sffamily\bfseries\small,
5672 minor step font=\sffamily\bfseries\footnotesize,
5673 eras font=\sffamily\bfseries,
5674 timeline mark={line width=.4pt, shorten <=-2pt, shorten >=0pt},
5675 timeline minor mark={line width=.2pt, shorten <=-2pt, shorten >=0pt},
5676 },
5677 every chronos connectors'=coordinate,
5678 every text tag connectors+={circle, anchor=center, draw=none,%
5679 fill=none, minimum size=\pgflinewidth},
5680 connections={draw=##1, {Triangle[width=0pt 3,reversed,length=0pt 1.5]}-%
5681 {Triangle[width=0pt 5,reversed,length=0pt 2.5]}}},
5682 period/line={fill=chronos timeline foreground colour, blend mode=overlay},
5683 life/line={fill=chronos timeline foreground colour, blend mode=overlay},
5684 event/line={draw=chronos timeline foreground colour, thick, blend mode=overlay},
5685 every text tags={fill=chronos main background colour, text=###1,%
5686 fill opacity=.75, text opacity=1, draw=none, rounded corners,%
5687 align=center, font=\sffamily\footnotesize},
5688 only years,
5689 without eras,
5690 connections on=background,
5691 subheadings style={align=center, anchor=base, inner sep=0pt, outer sep=0pt,%
5692 text=chronos main colour!75!chronos main background colour, opacity=.8,%
5693 font=\sffamily\footnotesize},
5694 headings style={align=center, anchor=base, inner sep=0pt, outer sep=0pt,%
5695 text=chronos main colour!75!chronos main background colour, opacity=.8,%
5696 font=\sffamily\bfseries\small},
5697 main/frame={inner sep=5pt, ultra thick, draw=chronos main colour,%
5698 fill=none,},% oedd chronos@prifliw@cefnidir
5699 main/title={/chronos/main/@frame, font=\sffamily\huge\bfseries, %
5700 text=chronos main colour, anchor=center, align=center,%
5701 draw=chronos main colour,ultra thick,drop shadow,%
5702 fill=chronos main background colour,fill opacity=1},
5703 headings drops'=10pt:10pt:7.5pt,
5704 bce year label=BCE,
5705 ce year label=CE,
```

```

5706     levels=3:3,
5707 },% >>>
5708 lavender menace/.style={% <<<
5709     /chronos/.cd,
5710     lavender menace/.meaning to context,
5711     modern,
5712     colour scheme=lavender,
5713     rotate all colours,
5714     every text tags+={draw=###1,sharp corners,text opacity=1,%
5715         fill opacity=1,draw opacity=1,drop shadow},
5716     period/line+={top color=chronosSilver,%
5717         bottom color=chronos timeline border outer colour,fill opacity=1},
5718     life/line+={top color=chronosSilver,%
5719         bottom color=chronos timeline border outer colour,fill opacity=1},
5720     main/title+={text=chronos main colour!75!chronosDarkGray},
5721 },% >>>
5722 serif on line/.style={% <<<
5723     /chronos/.cd,
5724     serif on line/.meaning to context,
5725     no colour rotation,
5726     colour scheme=default,
5727     text tag connectors'={fill=##1, opacity=1, circle, minimum size=2.5pt,%
5728         anchor=center, inner sep=0pt, outer sep=0pt},
5729     chronos connectors'={fill=##1, opacity=.75, circle, minimum size=2.5pt,%
5730         anchor=center, inner sep=0pt, outer sep=0pt},
5731     timeline ce label={CE},
5732     timeline bce label={BCE},
5733     special date=none,
5734     timeline={%
5735         start date={1800-01-01},
5736         end date={1900-01-01},
5737         timeline years=on line,
5738         timeline marks,
5739         timeline year={text=chronos timeline foreground colour, align=center},
5740         timeline mark={draw=chronos timeline foreground colour, thick, shorten >=2.5pt},
5741         timeline minor mark={draw=chronos timeline foreground colour,%
5742             thick, shorten >=3.5pt},
5743         timeline bare mark={draw=chronos timeline foreground colour,%
5744             semithick, shorten >=2pt, shorten <=2pt},
5745         minor years,
5746         step divisions=2,
5747         timeline line={chronos timeline background colour},
5748         major step font=\normalfont\bfseries,
5749         minor step font=\normalfont\bfseries\small,
5750         eras font=\normalfont\bfseries,
5751     },
5752     headings style={text=chronos main colour!75!chronos main background colour,%
5753         font=\footnotesize\uishape},
5754     subheadings style={font=\scriptsize\uishape,%
5755         text=chronos main colour!75!chronos main background colour},
5756     event/text tag+={font=\small\scshape},
5757     period/text tag+={font=\small\scshape},
5758     life/text tag+={font=\small\scshape},
5759     period/line+={fill=##1, fill opacity=.25},
5760     life/line+={fill=##1, fill opacity=.25},
5761     every text tags+={text=###1!75!black},%^A add global default o/w ignored (ond nid
eisiau inner sep=0pt)
5762     levels=3:3,
5763     main/title+={font=\Large\bfseries,text=chronos main colour,draw=none},
5764     frame,
5765     main/frame+={draw=chronos timeline background colour, ultra thick},

```

```

5766 },% >>>
5767 rainbow serif/.style={% <<<
5768   /utils/exec={\selectcolormodel{rgb}},
5769   /chronos/.cd,
5770   rainbow serif/.meaning to context,
5771   serif on line,
5772   colour scheme=xcolseries,
5773   rotate all colours,
5774   timeline={%
5775     dates=1500:2100,
5776     timeline mark eras,
5777     timeline bare marks=false,
5778   },
5779   only years,
5780   without eras,
5781 },% >>>
5782 sober judge/.style={% <<<
5783   /chronos/.cd,
5784   sober judge/.meaning to context,
5785   colour scheme=sobriety,
5786   timeline={%
5787     start date=1001-10-01,
5788     end date=1003-06-14,
5789     step years=1,
5790     step divisions=6,
5791     timeline minor marks,
5792     timeline bare marks,
5793   },
5794   ce year label=CE,
5795   levels=3:3,
5796   no colour rotation,
5797   every connections'={draw=###1,%
5798     -{Triangle[width=1.5pt, reversed, length=.75pt, fill=###1]}},
5799   every text tags'={fill opacity=.75,%
5800     fill=###1!25, draw=###1, rounded corners,%
5801     font=\footnotesize\sffamily, text=chronos timeline foreground colour},
5802   main/title={font=\sffamily\bfseries\LARGE, text=chronos main colour},
5803   main/frame={draw=chronos main colour, line width=1pt, rounded corners},
5804   headings style={font=\rmfamily\small\itshape,%
5805     text=chronos main colour!75!chronos main background colour},
5806   subheadings style={/chronos/@amseraumawr,font=\scriptsize\rmfamily\itshape},
5807   every lines+={fill=none,draw=none},
5808 },% >>>

```

### 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
5809 somewhat plain/.style={%^^A <<<
5810   /chronos/.cd,
5811   somewhat plain/.meaning to context,
5812   no colour rotation,
5813   colour scheme=default,
5814   timeline={%
5815     major step font=\normalfont\sffamily\small\bfseries,
5816     minor step font=\normalfont\sffamily\footnotesize,
5817     eras font=\normalfont\normalsize\sffamily,
5818     timeline width'=100mm,
5819     timeline years=above,

```

```

5820     timeline ce label={CE},
5821     timeline bce label={BCE},
5822     timeline margin'=12.5pt,
5823     minor years=false,
5824     start=-500,
5825     end=2050,
5826     timeline year={inner xsep=0pt},
5827 },
5828 special date=none,
5829 ce year label={CE},
5830 bce year label={BCE},
5831 text tag yshift'=-10pt,
5832 every text tags+={fill=chronos main background colour,fill opacity=.25,%
5833     text opacity=1,font=\sffamily\small},
5834 every connections+={draw=####1,%
5835     {Triangle[width=Opt 3,reversed,length=Opt 1.5]}-%
5836     {Triangle[width=Opt 3,reversed,length=Opt 1.5]}}},
5837 every event below,
5838 every period below,
5839 every life below,
5840 levels=0:3,
5841 frame,
5842 headings style={font=\footnotesize\sffamily,%
5843     text=chronos main colour!75!chronos main background colour},
5844 subheadings style={/chronos/@amseraumawr,font=\scriptsize\sffamily},
5845 main/frame={draw=chronos main colour!75!chronos main background colour,semithick},
5846 main/title={/chronos/main/title lines={%
5847     draw=chronos main colour!50!chronos main background colour,%
5848     thick},%
5849     text=chronos main colour!75!chronos main background colour,%
5850     font=\Large\sffamily,},
5851 headings drops'=12pt:10pt:7.5pt,
5852 headings border'=30pt,
5853 },%^A >>>
5854 contemporary 90/.style={%^A <<<
5855     /chronos/.cd,
5856     contemporary 90/.meaning to context,
5857     colour scheme=contninety,
5858     every text tags+={text=####1,font=\sffamily},
5859     every lines+={line width=1pt},
5860     no colour rotation,
5861     timeline={%
5862         start date=2002-01-01,
5863         end date=2016-12-31,
5864         timeline arrow,
5865         conditional timeline arrow={%
5866             timeline/timeline width=-3pt+4.5\timelineht,
5867             timeline/timeline line+={shorten >={-3pt-4.5\timelineht}, -Stealth},
5868             before headings+={%
5869                 \path (chronos post) -- +(3pt+4.5\timelineht,0pt);
5870             },
5871         }},
5872     timeline marks,
5873     timeline minor marks,
5874     timeline mark={ultra thick},
5875     timeline minor mark={thick},
5876     step divisions=4,
5877     step major years=2,
5878     timeline year={fill=none},
5879     timeline margin'=5mm,
5880     timeline width'=90mm,

```

```

5881     timeline year={rotate=90},
5882     major step font=\sffamily\upshape\tlstyle\bfseries,
5883     minor step font=\sffamily\upshape\tlstyle,
5884     eras font=\sffamily\upshape\tlstyle\bfseries,
5885     timeline years=above,
5886     timeline years anchor=west,
5887 },
5888 without eras,
5889 every event below,
5890 every life below,
5891 every period below,
5892 levels=0:3,
5893 frame,
5894 headings style={font=\small\sffamily\plstyle,%
5895     text=chronos main colour!80!chronos main background colour},
5896 subheadings style={font=\footnotesize\sffamily\plstyle,%
5897     text=chronos main colour!60!chronos main background colour},
5898 main/frame={%
5899     double=chronos timeline foreground colour!25!chronos timeline background colour,%
5900     draw=chronos timeline foreground colour!75!chronos timeline background colour,%
5901     thin},
5902 main/title={font=\sffamily\upshape\plstyle\bfseries\huge,text=chronos main colour},
5903 },%^A >>>
5904 blues below/.style={%^A <<<
5905     /utils/exec={\selectcolormodel{rgb}},
5906     /chronos/.cd,
5907     blues below/.meaning to context,
5908     colour scheme=blues,
5909     rotate all colours,
5910     timeline={%
5911         timeline years=above,
5912         timeline marks,
5913         timeline minor marks,
5914         step minor year=50,
5915         step divisions=10,
5916         step major year=100,
5917         dates=1550:2050,
5918         timeline height'=3pt,
5919         timeline line={chronos timeline foreground colour,%
5920             double=chronos timeline background colour,%
5921             line width=\timelineht/3,double distance=\timelineht/3},
5922         timeline arrow,
5923         conditional timeline arrow={%
5924             timeline/timeline line+={Bar-Latex,shorten <=-\timelineht/3,%
5925                 shorten >=-3pt-2.1\timelineht},
5926             timeline/timeline width-={3pt+2.43\timelineht},
5927             before headings+={\path (chronos post) -- ++(3pt+2.1\timelineht,0pt) %
5928                 coordinate (chronos arrow tip) (chronos pre) -- %
5929                 ++(-\timelineht/3,0pt) coordinate (chronos arrow tail);},
5930         }},
5931         timeline mark={chronos timeline foreground colour,line width=.6pt,shorten >=-4pt},
5932         timeline minor mark={chronos timeline foreground colour,%
5933             line width=.5pt,shorten >=-3.5pt},
5934         timeline bare mark={%
5935             chronos timeline foreground colour,line width=.3pt,shorten >=-2.5pt},
5936         timeline year={fill=none,text=chronos timeline foreground colour,%
5937             rotate around={45:(chronos year \chronosyeari |- chronos top)}}},
5938         major step font=\sffamily\footnotesize\tlstyle,
5939         timeline years anchor=south west,
5940         minor step font=\sffamily\scriptsize\tlstyle,
5941         timeline margin'=17.5pt,

```

```

5942     },
5943     minor year format={!Y},
5944     every event below,
5945     every life below,
5946     every period below,
5947     levels=0:3,
5948     headings style+={%
5949         text=chronos main colour!75!chronos main background colour,%
5950         font=\small\itshape\bfseries,%
5951     },
5952     subheadings style+={%
5953         text=chronos main colour!75!chronos main background colour,%
5954         font=\footnotesize\itshape,%
5955     },
5956     main/title+={%
5957         font=\LARGE,text=chronos timeline foreground colour,%
5958         draw=chronos timeline background colour,semithick,%
5959     },
5960     main/frame+={%
5961         thick,draw,chronos timeline foreground colour,%
5962         double=chronos timeline background colour,%
5963     },
5964     copyright={font=\footnotesize\sffamily, inner sep=0pt, outer sep=0pt,%
5965         text=chronos timeline foreground colour!50!chronos main background colour},
5966     copyright/rotate=90,
5967     copyright/tag anchor=north west,
5968 },%^A >>>
5969 timeline year rotate/.code={%
5970 },
5971 flipping blues/.style={%^A <<<
5972     /chronos/.cd,
5973     flipping blues/.meaning to context,
5974     blues below,
5975     timeline={%
5976         timeline years=below,
5977         timeline year={%
5978             fill=none,rotate around={-90:(chronos year \chronosyeari)},%
5979             text=chronos timeline foreground colour,%
5980         },
5981         timeline years anchor=north west,
5982     },
5983     every event above,
5984     every life above,
5985     every period above,
5986     levels=3:0,
5987 },%^A >>>
5988 rotated 45/.style={%^A <<<
5989     /chronos/.cd,
5990     rotated 45/.meaning to context,
5991     colour scheme=default,
5992     rotate all colours,
5993     timeline={%
5994         start date={{-25}-01-01},
5995         end date={20-01-01},
5996         step major years=5,
5997         timeline years=off line,
5998         timeline years=above,
5999         timeline marks,
6000         timeline font=\scriptsize,
6001         mark at era switch,
6002     },

```

```

6003     only text,
6004     year format={!Y !E},
6005     lines={draw=#1},
6006     every text tags+={rotate=-45},
6007     event/tag+={tag anchor=west},
6008     period/tag+={tag anchor=west},
6009     life/tag+={tag anchor=west},
6010     text tag yshift'=2.5pt,
6011     every event below,
6012     every period below,
6013     every life below,
6014     no connectors,
6015     no connections,
6016     lines on=foreground,
6017     frame,
6018     every text tags+={font=\sffamily},
6019     main/frame={draw=chronos main colour,rounded corners=10pt,thick},
6020     main/title={%
6021         draw=chronos main colour,rounded corners=3pt,%
6022         semithick,font=\sffamily\LARGE,%
6023     },
6024     headings style={%
6025         font=\itshape\small\bfseries,%
6026         text=chronos main colour!50!chronos main background colour,%
6027     },
6028     subheadings style={font=\itshape\small,%
6029         text=chronos timeline foreground colour!50!chronos timeline background colour},
6030 },%^A >>>
6031 off line colour/.style={%^A <<< ateb: https://tex.stackexchange.com/a/324106/
6032 /chronos/.cd,
6033 off line colour/.meaning to context,
6034 colour scheme=offlinebasic,
6035 rotate all colours,
6036 timeline={%
6037     timeline width'=120mm,
6038     timeline height'=3pt,
6039     start date={-3000}-01-01,
6040     end date={-2000}-01-01,
6041     timeline font=\sffamily\tiny,
6042     timeline year={text=chronos main colour},
6043     timeline arrow,
6044     conditional timeline arrow={%
6045         timeline/timeline width-=#1,
6046         timeline/timeline line+={%
6047             shorten >={-#1}, -{Triangle Cap[length=#1]},
6048         },
6049         before headings+={%
6050             \path (chronos post) -- +(#1,0pt);
6051         },
6052     }-},
6053     timeline border height'=0pt,
6054     step major years=100,
6055     step minor years=0,
6056     step divisions=0,
6057     timeline years=below,
6058     timeline marks,
6059     timeline minor marks=false,
6060     minor years=false,
6061     timeline bare marks=false,
6062 },
6063     every text tags+={%

```

```

6064     text=####1!75!black,font=\sffamily\scriptsize,%
6065     fill=chronos main background colour,fill opacity=.75,%
6066   },
6067   every connections+={%
6068     draw=####1,%
6069     {Triangle[width=Opt 3,reversed,length=Opt 1.5]}-%
6070     {Triangle[width=Opt 3,reversed,length=Opt 1.5]},%
6071   },
6072   event/line'={},
6073   year format={!q!Y},
6074   event/date format={!q!Y},
6075   main/title={font=\sffamily\Large,text=chronos timeline foreground colour},
6076   chronos tikz+={%
6077     \ifchronos@timeline@showyears
6078     \scoped[on chronos middle ground layer]{%
6079       \fill [chronos main background colour, fill opacity=.75]
6080         (chronos pre) -| (chronos post |- chronos phantom year.south) -| cycle ;
6081     }
6082     \fi
6083   },
6084 },%^A >>>
6085 off line colour/.default=20mm,
6086 off line color/.forward to=/chronos/off line colour,
6087 off line colour alt/.style={%^A <<<
6088   /chronos/.cd,
6089   off line colour alt/.meaning to context,
6090   off line colour=#1,

```

use cronoleg colours

```

6091   colour scheme=offlinealt,
6092   rotate all colours,
6093   event/colours below from clist={lliwiau_byw_isod},
6094   event/colours above from clist={lliwiau_byw_uchod},
6095 },%^A >>>
6096 off line colour alt/.default=20mm,
6097 off line color alt/.forward to=/chronos/off line colour alt,
6098 off line simple/.style={%^A <<< https://tex.stackexchange.com/a/324106/
6099   /chronos/.cd,
6100   off line simple/.meaning to context,
6101   off line colour=#1,
6102   rotate no colours,
6103 },%^A >>>
6104 off line simple/.default=20mm,
6105 simple arrow/.style={%^A <<< https://tex.stackexchange.com/a/342699/
6106   /chronos/.cd,
6107   simple arrow/.meaning to context,
6108   timeline={%
6109     start date={1-01-01},
6110     end date={2000-01-01},
6111     step major years=250,
6112     timeline height'=2.5mm,
6113     timeline years=off line,
6114     timeline width'=200mm,
6115     timeline arrow,
6116     conditional timeline arrow={%
6117       timeline/timeline width-=#1,
6118       timeline/timeline line+={shorten >={-#1}, -{Triangle Cap[length=#1]}},
6119     before headings+={%
6120       \path (chronos post) -- +(#1,0pt);
6121     },
6122   }-},

```

```
6123     mark at era switch=false,
6124   },
6125   date format={!d/!m/!Y},
6126   every event below,
6127   every period below,
6128   every life below,
6129   no colour rotation,
6130   headings style={font=\footnotesize\itshape},
6131   subheadings style={font=\scriptsize\itshape},
6132 },%^A >>>
6133 simple arrow/.default=10mm,
6134 event splitter/.style={%^A <<< https://tex.stackexchange.com/a/325890/
6135 /chronos/.cd,
6136 event splitter/.meaning to context,
6137 no colour rotation,
6138 timeline={%
6139   start date=2014-01-13,
6140   end date=2014-02-22,
6141   timeline width'=150mm,
6142   timeline margin'=0pt,
6143   timeline era margin'=0pt,
6144   timeline years=none,
6145   timeline years=off line,
6146 },
6147 event/date format={!b !d \thinspace !Y},
6148 event dates split,
6149 text tag yshift'=3pt,
6150 event text tag={font=\sffamily\small},
6151 no connectors,
6152 every event below,
6153 main/title={font=\sffamily\Large},
6154 frame,
6155 main/frame={draw},
6156 },%^A >>>
```

### 17.0.3 No-year

Years are not marked.

date centric  
lines on line  
plain arrow

```
6157 date centric/.style={%^A <<<
6158 /chronos/.cd,
6159 date centric/.meaning to context,
6160 timeline={%
6161   timeline width'=150mm,
6162   timeline height'=5mm,
6163   start date=1935-01-01,
6164   end date=2010-12-31,
6165   timeline font=\sffamily\small,
6166   timeline border height'=5pt,
6167 },
6168 event/text tag+={font=\sffamily\scriptsize, fill=none},
6169 no colour rotation,
6170 event/default colour=chronos main colour,
6171 event years on line,
6172 main/title+={%
6173   font=\sffamily\LARGE,text=chronos main colour,%
6174 /chronos/main/title lines={%
6175   draw=chronos timeline background colour,line width=1.5pt,%
6176 }%
```

```

6177     },
6178   },%^A >>>
6179   lines on line/.style={%^A <<< https://tex.stackexchange.com/a/324453/
6180     /chronos/.cd,
6181     lines on line/.meaning to context,
6182     rotate all colours,
6183     timeline={%
6184       timeline width'=120mm,
6185       timeline height'=#1,
6186       start date=01-01-01,
6187       end date=2016-12-31,
6188       timeline years=none,
6189       timeline years=above,
6190       timeline arrow,
6191       conditional timeline arrow={%
6192         timeline/timeline width'=-20mm,
6193         timeline/timeline line+={shorten >=-20mm, --{Triangle Cap[length=20mm]}},
6194         before headings+={%
6195           \path (chronos post) -- +(20mm,0pt);
6196         },
6197       }{)},
6198   },
6199   only years,
6200   period/line+={line width=#1,draw=##1},
6201   life/line+={line width=#1,draw=##1},
6202   line yshift=.5*#1,
6203   event/line+={semithick},
6204   text tag yshift=2.5pt+.5*#1,
6205   every event above,
6206   every period below,
6207   every life below,
6208   headings style={font=\footnotesize\bfseries},
6209   subheadings style={font=\footnotesize},
6210 },%^A >>>
6211 plain arrow/.default=5mm,
6212 plain arrow/.style={%^A <<< https://tex.stackexchange.com/a/324453/
6213   /chronos/.cd,
6214   plain arrow/.meaning to context,
6215   lines on line=#1,
6216   line yshift'=1pt,
6217   text tag yshift'=2.5pt,
6218   period/line+={line width=2pt,draw=##1},
6219   life/line+={line width=2pt,draw=##1},
6220 },%^A >>>
6221 plain arrow/.default=5mm,
6222 }%^A % END styles >>>

```

## 18 **chronos-lib-colschemes**

Colour schemes.

```

6223 \RequirePackage{chronos}
6224 \ProvidesPackageSVN[chronos-lib-colschemes.sty]{%$Id: chronos-code.dtx 11797 2026-03-21
16:01:38Z cfrees $}[v0.9.4 \revinfo]

```

**blues** cylluniau lliwiau | colour schemes

**contninety**

**offlinealt**

**xcolseries**

**lavender**

**modern**

**offlinebasic**

**sobriety**

```

6225 \chronosnewcolourscheme[default]{blues}{%^A <<<
6226   timeline foreground=chronosDodgerBlue4,
6227   timeline background=chronosDodgerBlue2,

```

```

6228 default below={%
6229   chronosCerulean!50!chronosDodgerBlue4,chronosCerulean!50!chronosDodgerBlue3,%
6230   chronosCerulean!50!chronosDodgerBlue2,chronosCerulean!50!chronosDodgerBlue1,%
6231   chronosCerulean},
6232 default above={chronosCerulean!50!chronosDodgerBlue4,%
6233   chronosCerulean!50!chronosDodgerBlue3,chronosCerulean!50!chronosDodgerBlue2,%
6234   chronosCerulean!50!chronosDodgerBlue1,chronosCerulean},
6235 foreground=chronosDodgerBlue4,
6236 background=white,
6237 }%^A >>>
6238 \chronosnewcolourscheme[default]{contninetv}{%^A <<<
6239 foreground=chronosdarkgray,
6240 timeline foreground=chronosdarkgray,
6241 }%^A >>>
6242 \chronosnewcolourscheme[cronoleg]{offlinealt}{%^A <<<
6243 timeline foreground=blue!40,
6244 }%^A >>>

```

xcolor manual: 35

```

6245 \definecolorseries{xcolor g2}{hsb}{grad}{hsb}{.575,1,1}{.987,-.234,0}
6246 \definecolorseries{xcolor s2}{hsb}{step}{hsb}{.575,1,1}{.11,-.05,0}
6247 \resetcolorseries{xcolor g2}
6248 \resetcolorseries{xcolor s2}
6249 \chronosnewcolourscheme[default]{xcolseries}{%^A <<<
6250 default above={%
6251   xcolor s2!![0],xcolor s2!![1],xcolor s2!![2],xcolor s2!![3],%
6252   xcolor s2!![4],xcolor s2!![5],xcolor s2!![6],xcolor s2!![7],%
6253   xcolor s2!![8],xcolor s2!![9],xcolor s2!![10],xcolor s2!![11],%
6254   xcolor s2!![12],xcolor s2!![13],xcolor s2!![14],xcolor s2!![15]},
6255 default below={%
6256   xcolor g2!![0],xcolor g2!![1],xcolor g2!![2],xcolor g2!![3],%
6257   xcolor g2!![4],xcolor g2!![5],xcolor g2!![6],xcolor g2!![7],%
6258   xcolor g2!![8],xcolor g2!![9],xcolor g2!![10],xcolor g2!![11],%
6259   xcolor g2!![12],xcolor g2!![13],xcolor g2!![14],xcolor g2!![15]},
6260 background=white,
6261 foreground=black,
6262 timeline foreground=white,
6263 timeline background=black,
6264 timeline border inner=white,
6265 timeline border outer=white,
6266 timeline border middle=black!80,
6267 life/default=chronosdarkgray,
6268 event/default=chronosdarkgray,
6269 period/default=chronosdarkgray,
6270 theory/default=chronosdarkgray,
6271 info/default=chronosdarkgray,
6272 }%^A >>>
6273 \chronosnewcolourscheme[default]{lavender}{%^A <<<
6274 timeline foreground=chronosLavenderBlush4,
6275 timeline background=chronosLavender,
6276 timeline border inner=chronosLavenderBlush3,
6277 timeline border middle=chronosLavenderBlush1,
6278 timeline border outer=chronosLavenderBlush4,
6279 foreground=chronosLavenderBlush4,
6280 background=chronosLavender,
6281 default above={%
6282   chronosLavenderBlush4!90!chronosMediumPurple!50!chronosDarkSlateGrey,%
6283   chronosLavenderBlush3!90!chronosMediumPurple!50!chronosDarkSlateGrey,%
6284   chronosLavenderBlush2!90!chronosMediumPurple!50!chronosDarkSlateGrey},
6285 default below={%
6286   chronosLavenderBlush2!90!chronosMediumPurple!50!chronosDarkSlateGrey,%

```

```
6287     chronosLavenderBlush3!90!chronosMediumPurple!50!chronosDarkSlateGrey,%
6288     chronosLavenderBlush4!90!chronosMediumPurple!50!chronosDarkSlateGrey},
6289 }%^^A >>>
6290 \chronosnewcolourscheme[default]{modern}{%^^A <<<
6291     timeline foreground=chronosSilver,
6292 }%^^A >>>
6293 \chronosnewcolourscheme[default]{offlinebasic}{%^^A <<<
6294     timeline foreground=blue!40,
6295     foreground=black,
6296     background=white,
6297 }%^^A >>>
6298 \chronosnewcolourscheme[default]{sobriety}{%^^A <<<
6299     foreground=gray,
6300     background=white,
6301     timeline background=gray!50,
6302     timeline foreground=black,
6303     life/default=gray,
6304     event/default=gray,
6305     period/default=gray,
6306     theory/default=gray,
6307     info/default=gray,
6308 }%^^A >>>
```

## Change History

v0.7?	General: First repo release. (Ish.) Earlier versions were published informally on <code>T<sub>E</sub>X StackExchange</code> . . . . .	105	<code>\@chronos@set</code> : Eliminate <code>xparse</code> macros for internal commands. (According to <code>T<sub>E</sub>X SE</code> chat this is The Right Thing To Do). . . . .	190
v0.9	General: First <code>CTAN</code> release. . . . .	105	<code>\byw</code> : Add helper coordinates for placing things relative to life/period lines, including provisional coordinates for getting <code>x</code> only. . . .	191
	First <code>CTAN</code> release. . . . .	105	Adjust reference coordinate placement for additional line shift. . . . .	191
v0.9.1	General: Minimal code documentation. <code>docstrip</code> implementation. . . . .	105	<code>\chronos@angorau@theori</code> : Remove unused variant of <code>and use \def</code> for internal macro <code>\chronos@angorau@theori</code> . . . . .	197
v0.9.2	General: Fix info reported for <code>chronos-lib-styles.sty</code> . . . . .	209, 218	<code>\chronos@creu@llinell</code> : Add helper coordinates for placing things relative to life/period lines, including provisional coordinates for getting <code>x</code> only. . . . .	206
v0.9.3	General: Add <code>\ifchronos@hollti@testun@tag</code> in lieu of starred form of text tag creator (so I can replace <code>\NewDocumentCommand</code> by more proper <code>\defs</code> . . . . .	129	<code>\chronos@creu@testun@tag</code> : Use <code>\def</code> rather than <code>\NewDocumentCommand</code> to maybe (or not) keep somebody or something happy in the unlikely event she, he, they or it should ever happen by. . . . .	206
	Add <code>at aux</code> and <code>line add yshift</code> etc. . . . .	61	<code>\chronos@dangos@clist</code> : Eliminate <code>xparse</code> macros for internal commands. (According to <code>T<sub>E</sub>X SE</code> chat this is The Right Thing To Do). . . . .	122
	Add <code>at aux</code> for placing the <code>text tag</code> relative to the beginning or ending of a <code>life</code> or <code>period</code> . .	141	<code>\chronos@if@gosodF</code> : Switch to <code>\def</code> . . . . .	121
	Add <code>at aux</code> . . . . .	68	<code>\chronosdangoslliwiau</code> : Eliminate unused internal macros <code>\chronos@dangos@lliwiau</code> and <code>\chronos@dangos@lliwiau@rhag</code> . . . . .	122
	Add <code>line add yshift</code> etc. . . . .	70	<code>\chronosshowcolour</code> : Use <code>xparse</code> interface directly for <code>\chronosshowcolour</code> . . . . .	123
	Eliminate <code>xparse</code> macros for internal commands. (According to <code>T<sub>E</sub>X SE</code> chat this is The Right Thing To Do). . . . .	136	<code>\parhad</code> : Add helper coordinates for placing things relative to life/period lines, including provisional coordinates for getting <code>x</code> only. . .	195
	Remove unused internal macro <code>\chronos@showdate</code> , variants of internal macros <code>\chronos@showdate@cs</code> , <code>\chronos@showyear</code> . . . . .	120	Adjust reference coordinate placement for additional line shift. . . . .	196
	Remove unused variants of internal macro <code>\chronos@ychwanegu@nodweddion@rhestr</code> , unused internal macro <code>\chronos@cadw@nodweddion@rhestr</code> . . . . .	121	v0.9.4	
	Use <code>\def</code> internal macros <code>\chronos@troilliwiau@isod</code> , <code>\chronos@troilliwiau@uchod</code> , <code>\chronos@lliwiau@isod</code> , <code>\chronos@lliwiau@uchod</code> and change usage in code accordingly. . . . .	120	General: Fix non-working <code>every date format</code> key. . . . .	158
			Update key names in example. . . . .	5

## 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.

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<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).

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