

chronos

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Abstract

`chronos` is a $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X} 2_{\epsilon}$ 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 teaching¹ and, second, questions on 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 | Code: codeberg.org/cfr/chronos | Mirror: github.com/cfr42/chronos
¹See [this answer on T_EX StackExchange](#) or [view the PDF](#).

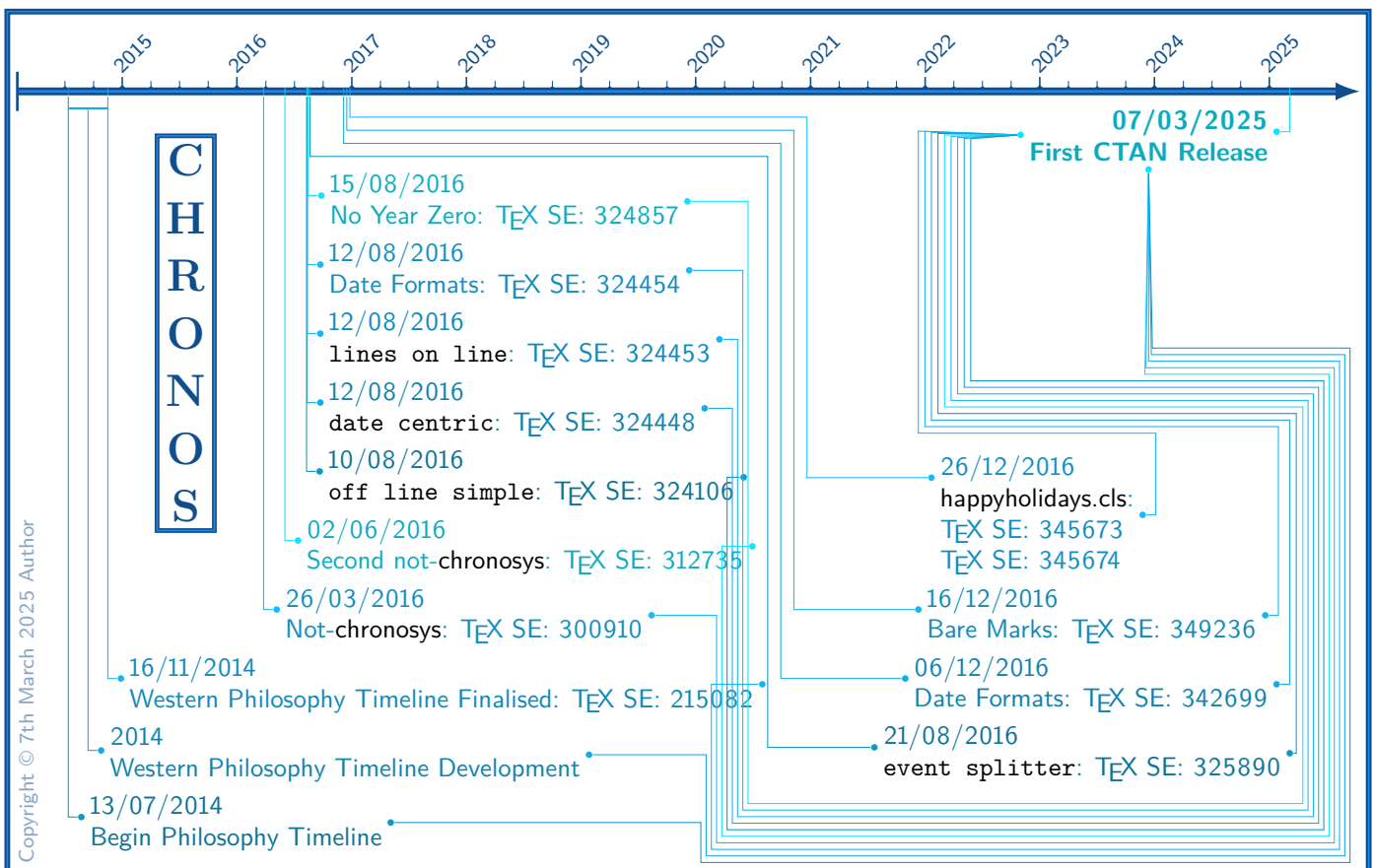


Figure 1: Chronos development: a chronos timeline (sections 6 and 8.4) with chronos style blues below (section 7.1.2) and custom styles tag left, tag post and tag right (section 13.3).

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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.

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`² are applied only locally, others, including changes to the `tikzpicture` initialisation code³, 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`⁴. 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 24th November, 4714 BCE should be permissible, but in fact, 24th November, 4713 BCE is the first date for which the package's behaviour should be relatively well-defined⁵. 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

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

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

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

⁵`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 package⁶.

`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 shit⁷.

Caveat emptor ...

3 Typesetting a Timeline

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

After loading `chronos` in the document preamble:

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

the `chronos` environment is available for typesetting timelines.

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

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

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

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

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

⁷In 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 era⁸. 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,  
}
```

⁸In 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 tag⁹ 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>`¹⁰.

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] {$\pi$};
```

⁹`chronos` is not the most optimistic of packages.

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

will add a large π 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_EX, so we join the connector we made when creating the text tag for Knuth to the connector we've just created for T_EX. 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 \LaTeX 2 ϵ 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 \LaTeX 2 ϵ formats prior to 2020–10–01)

PGF/TikZ libraries:

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

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

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

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

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

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

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

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

5 Invocation

chronos [*⟨chronos preamble⟩*]
environment

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

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

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

6 Chronos Anatomy

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

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

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

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

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

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

6.1 Chronos Timeline

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

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

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

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

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

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

6.2 Chronos Additional Element Types

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

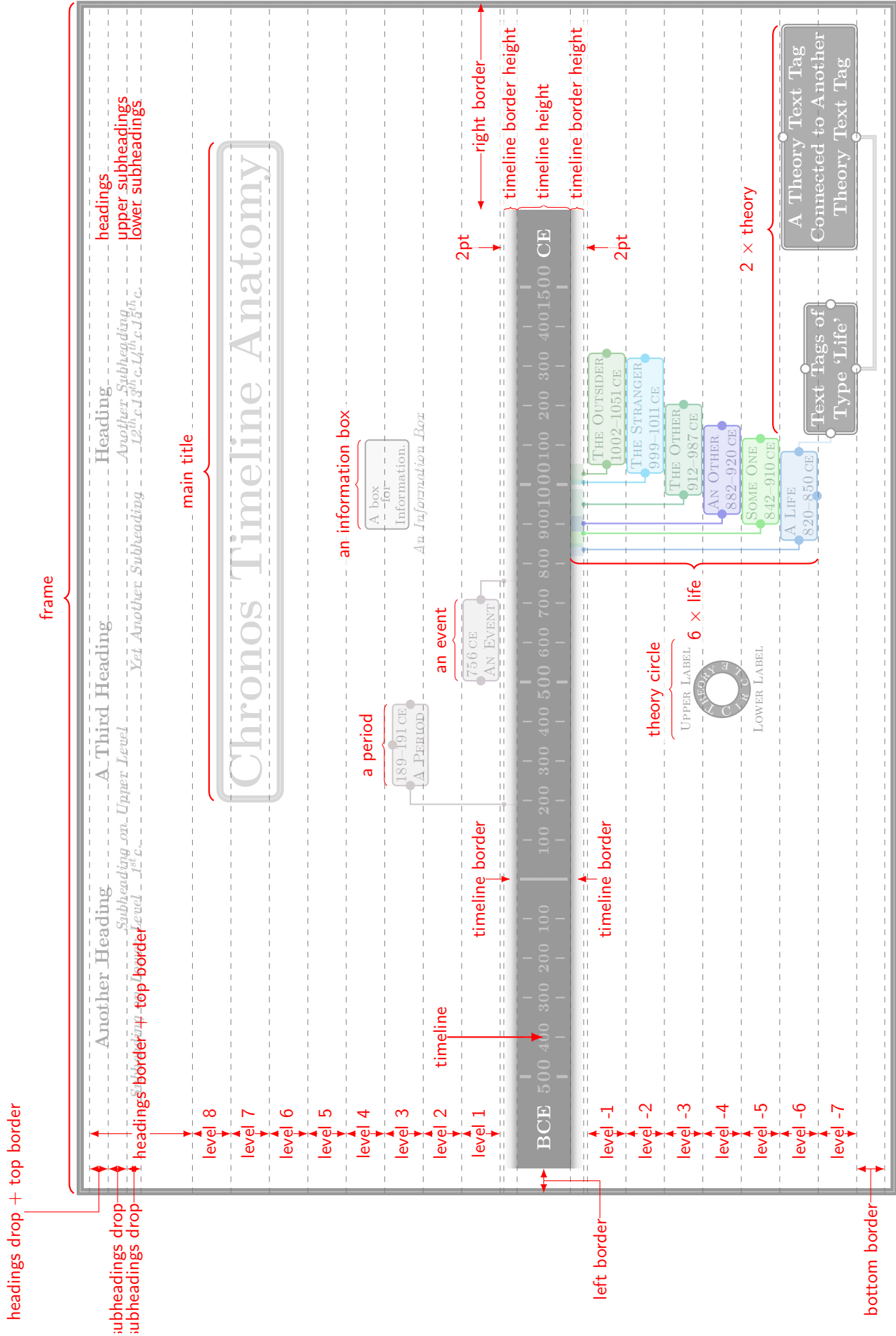


Figure 2: chronos anatomy

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

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

6.2.1 Primary Types

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

- These elements are assigned colours and colour names are created so they may easily be reused. These colours may (and, by default, are) used to create `connections`, `connectors`, `lines` and `text tags`.
- These elements are connected to the `timeline` by default using `connections` which join `chronos connectors` to `text tag connectors` on the elements' `text tags`.
- Dates/periods are (potentially) drawn or filled on, above or below the `timeline` using `lines`.
- `Text tags` are created for the elements¹¹. 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 default¹².
- 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.

¹¹I 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).

¹²Connectors 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

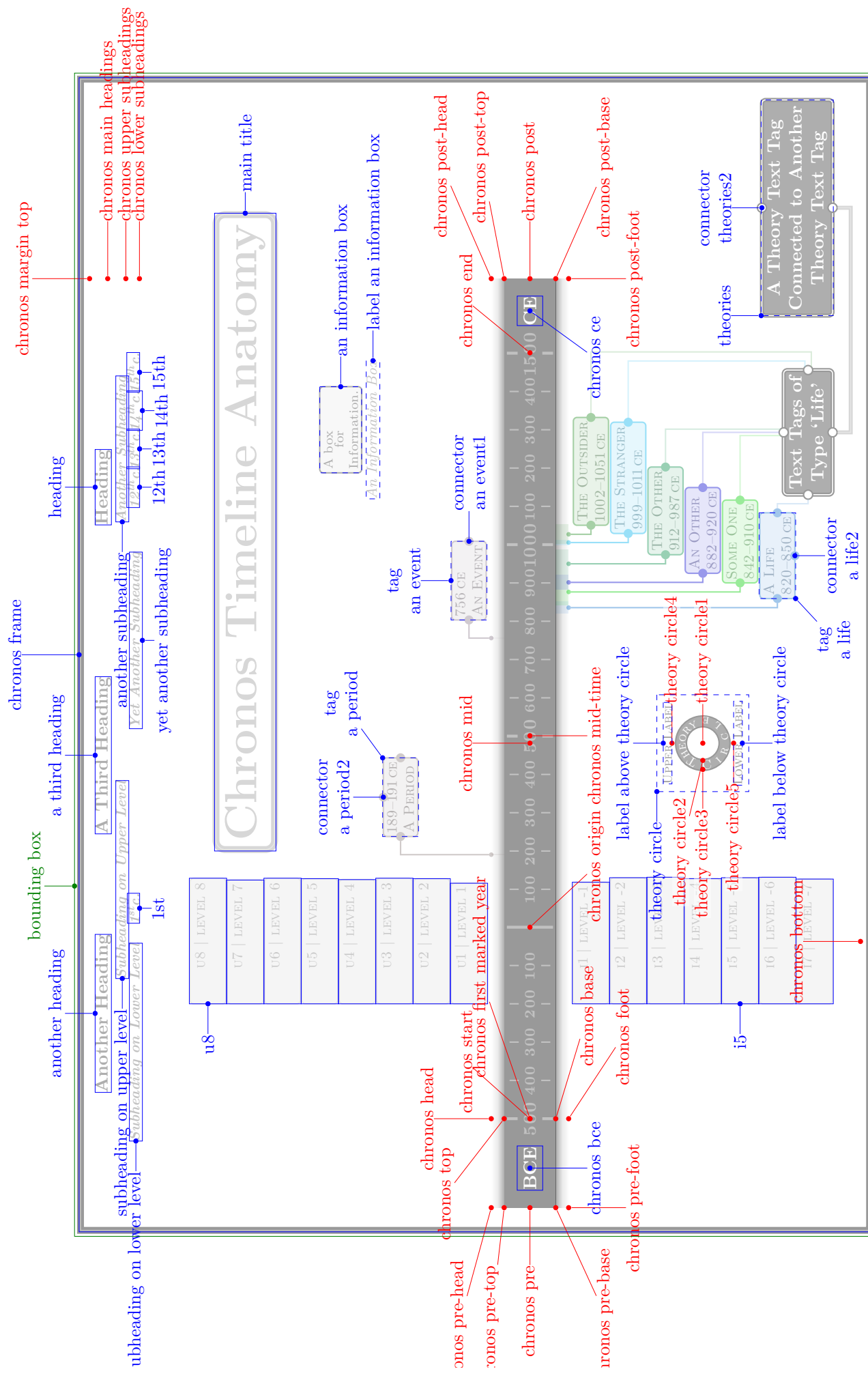
Figure 3 shows key coordinate and node names. Those available by default can be shown on any `timeline` using the option `debug`. Examples of different `tags` have been added with labels to illustrate how `chronos` names their coordinates and nodes. Detailed documentation is provided in sections 8 and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



• coordinates • nodes • bounding box

Figure 3: chronos anatomy: key coordinate and node names

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 150mm¹³. 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.

¹³Based 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	✓	✓

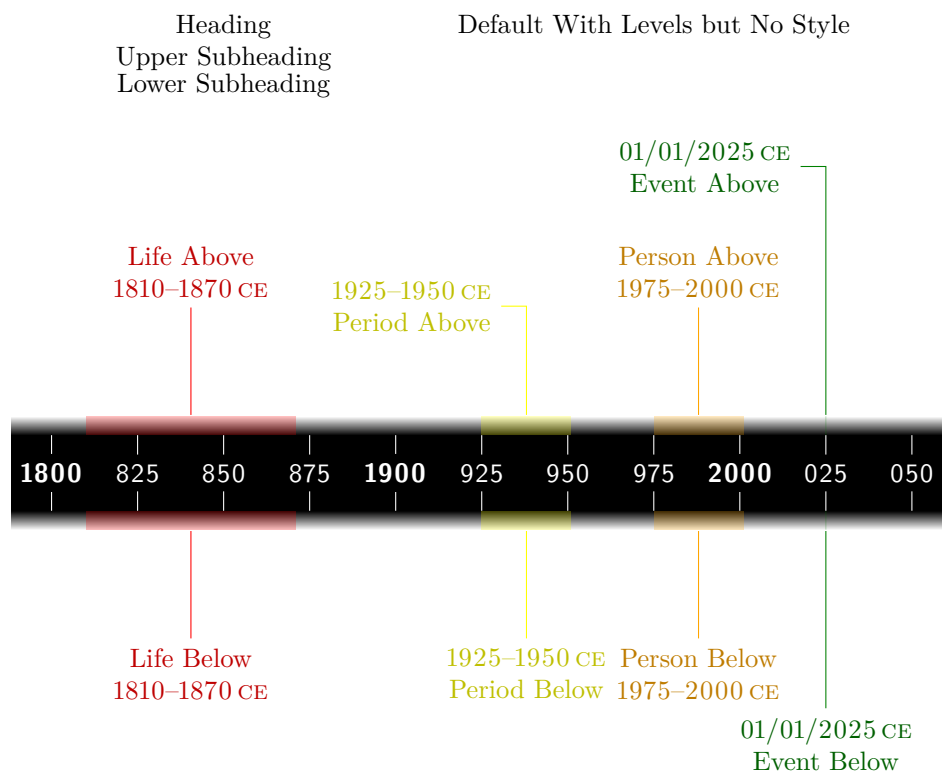


Figure 4: Chronos style: none.

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° .
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° . 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

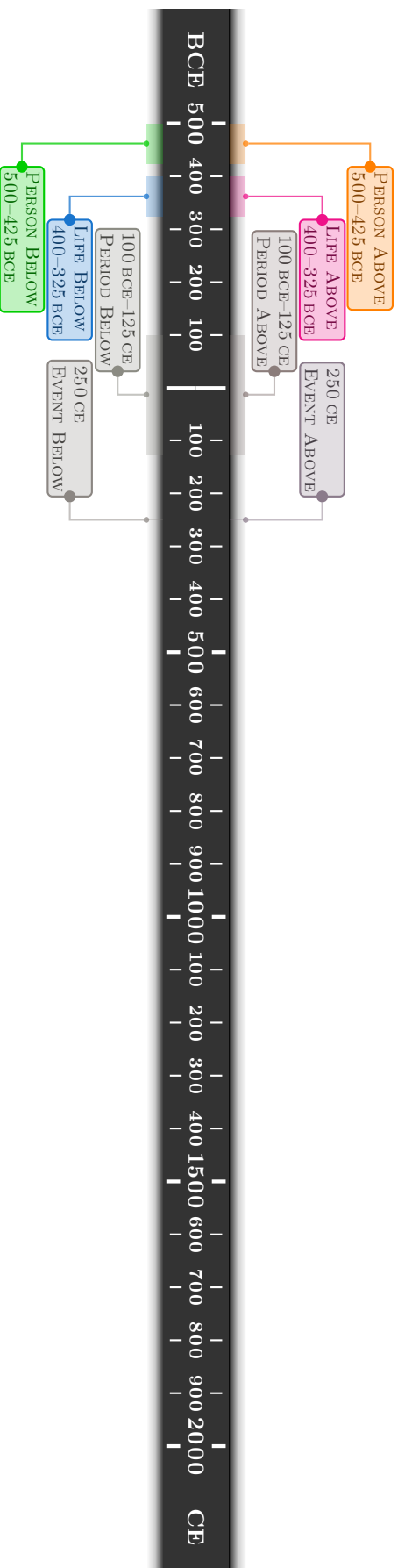


Figure 5: Chronos style: cronoleg.

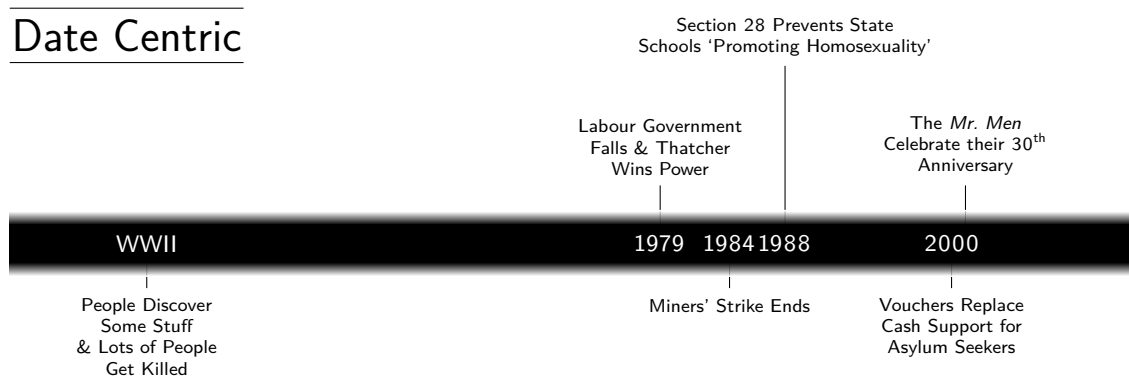


Figure 6: Chronos style: date centric.

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 colours¹⁴.

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 above¹⁵. $\langle length \rangle$ 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`¹⁶. 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 itself¹⁷. 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

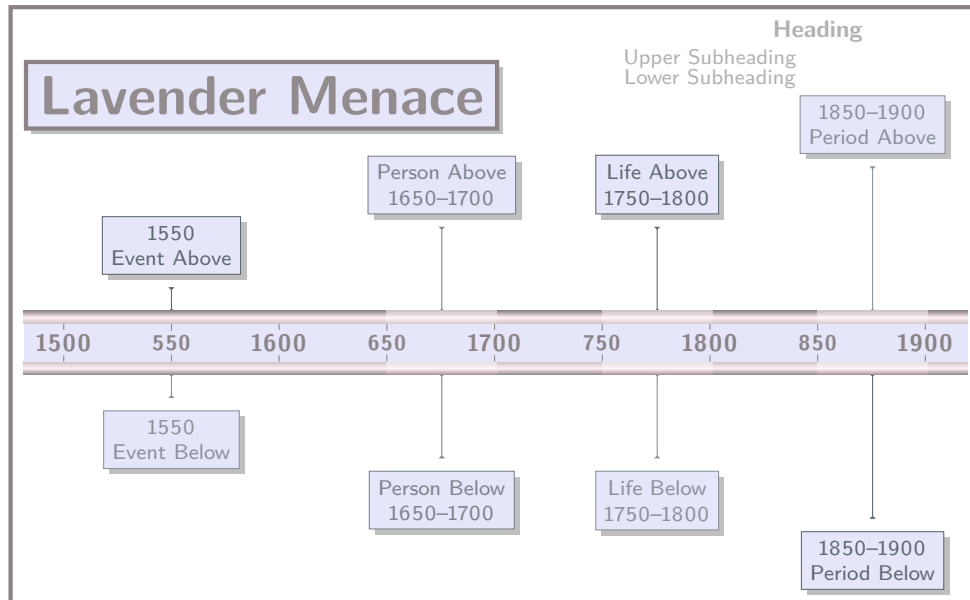
See table 1 and fig. 17.

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

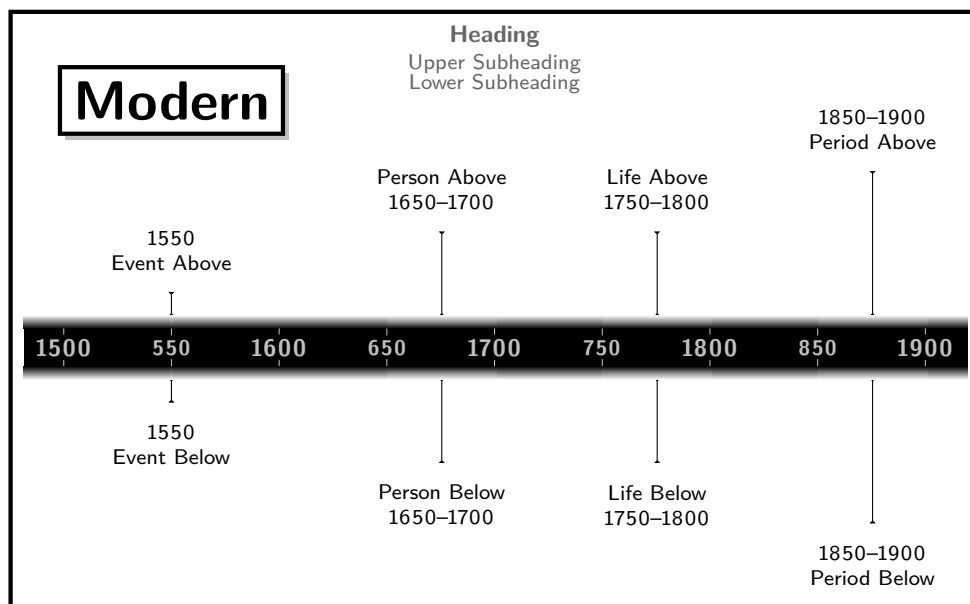
¹⁵Based on my answer at [TeX StackExchange: 342699](#).

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

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

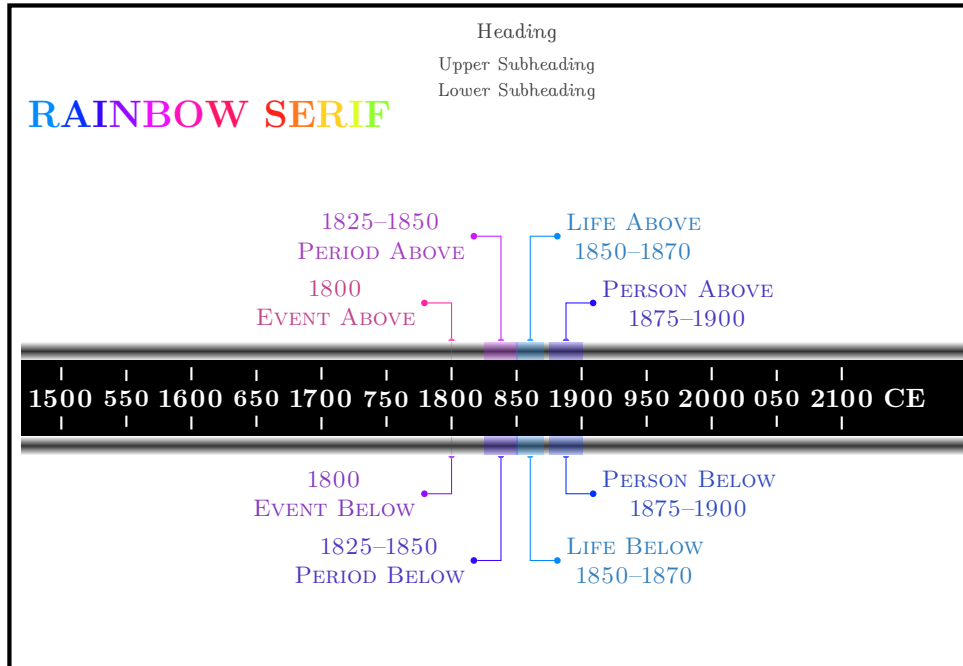


(a) Chronos style: lavender menace

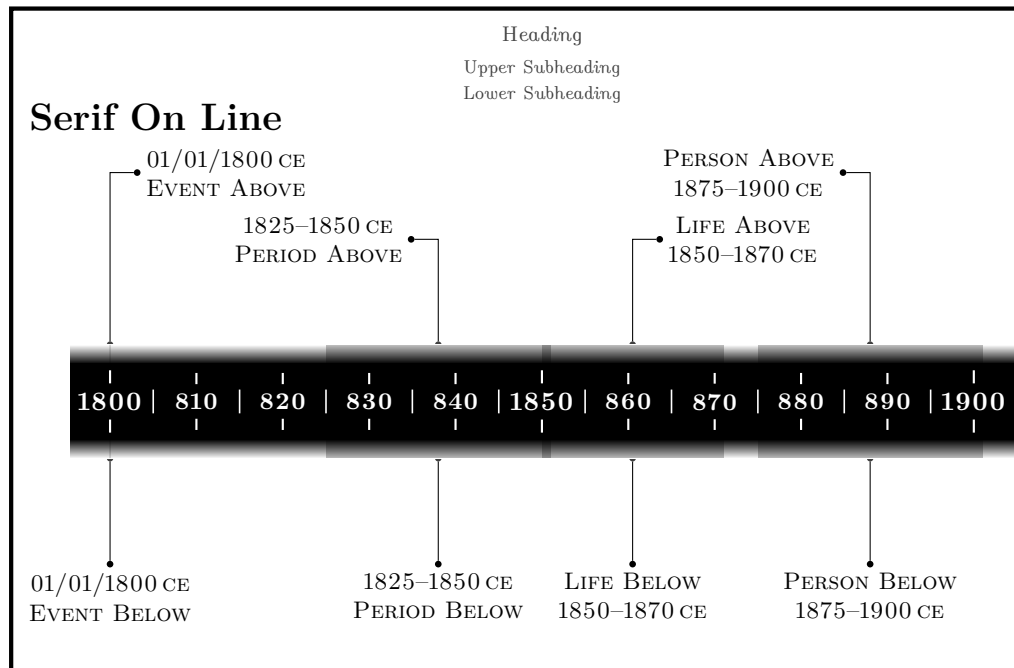


(b) Chronos style: modern

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.

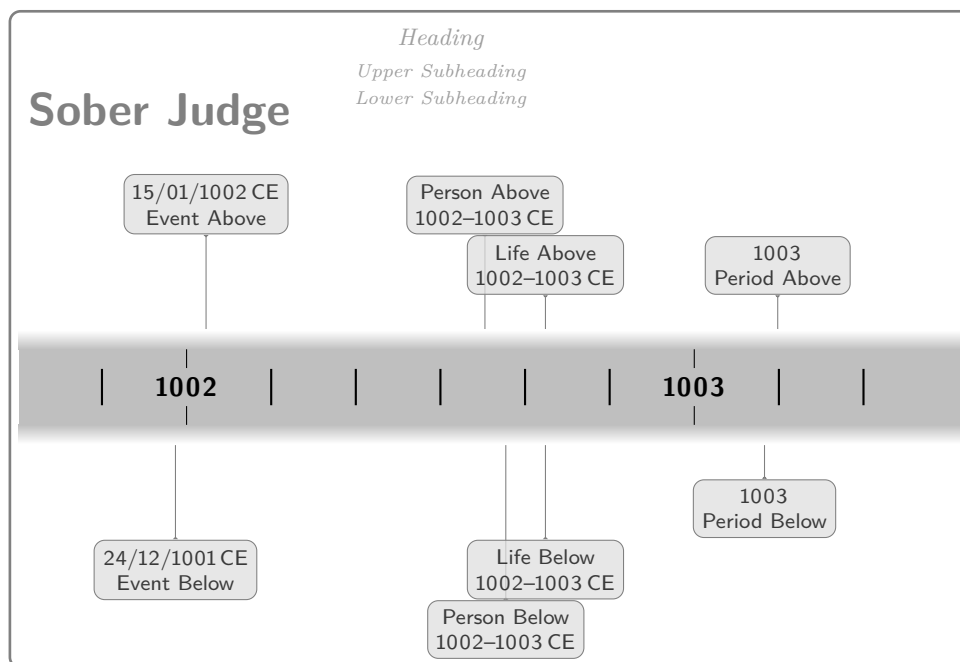


Figure 9: Chronos style: sober judge.

`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 itself¹⁸. 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.

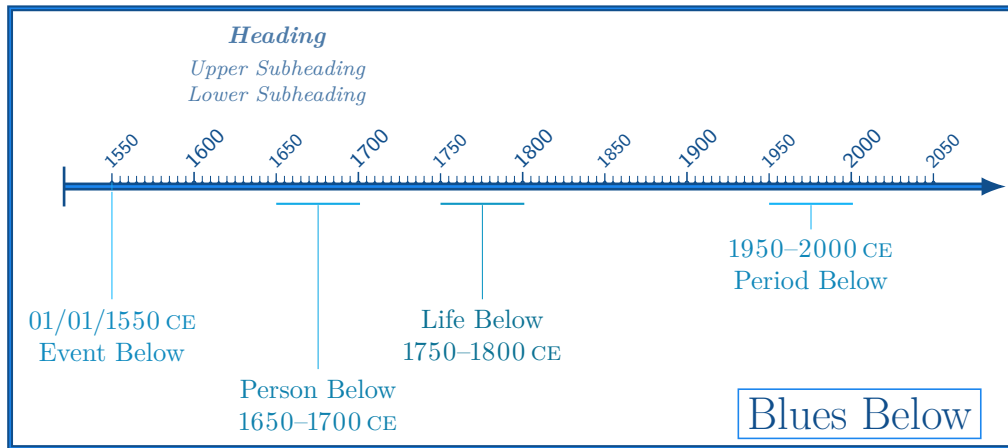
To load a colour schemes, you just write

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

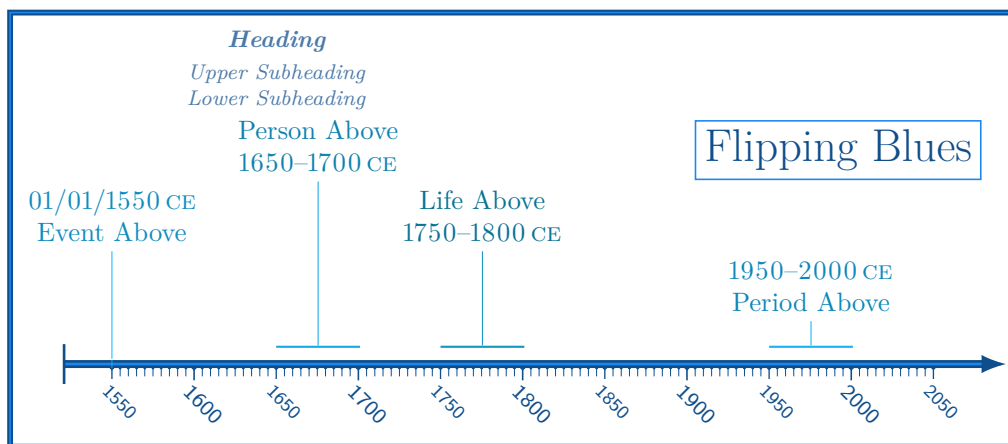
which would load the `chronos` style `modern` followed by the colour schemes `blues`. Since `chronos` styles may legitimately load colour schemes, but colour schemes may not load `chronos` styles, always load any `chronos` style *before* any colour scheme. Then make any further modifications you wish.

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

¹⁸Based 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.

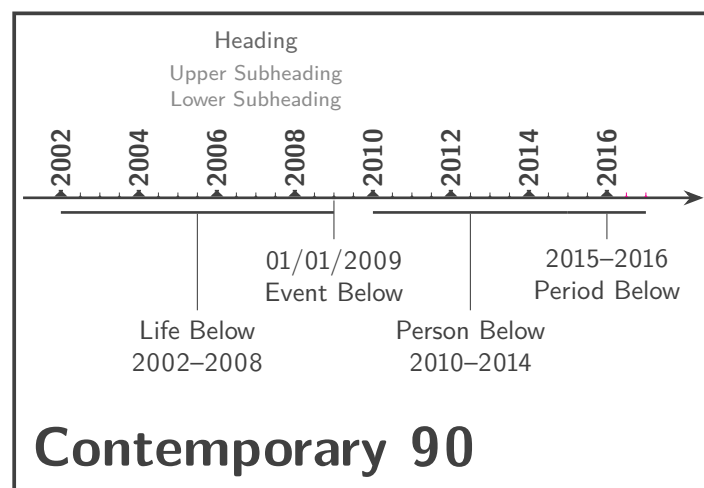
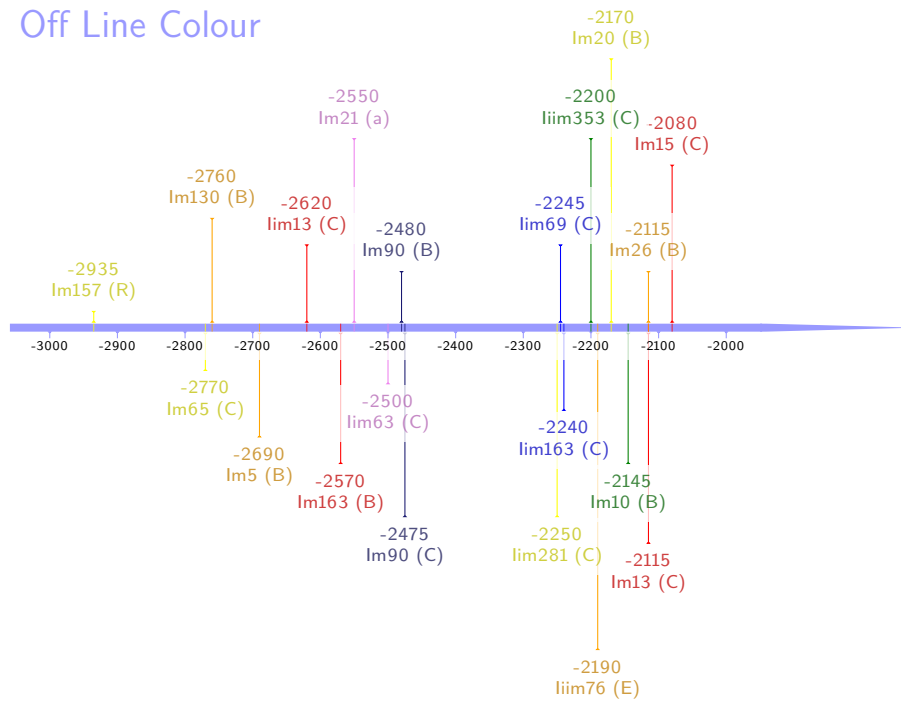


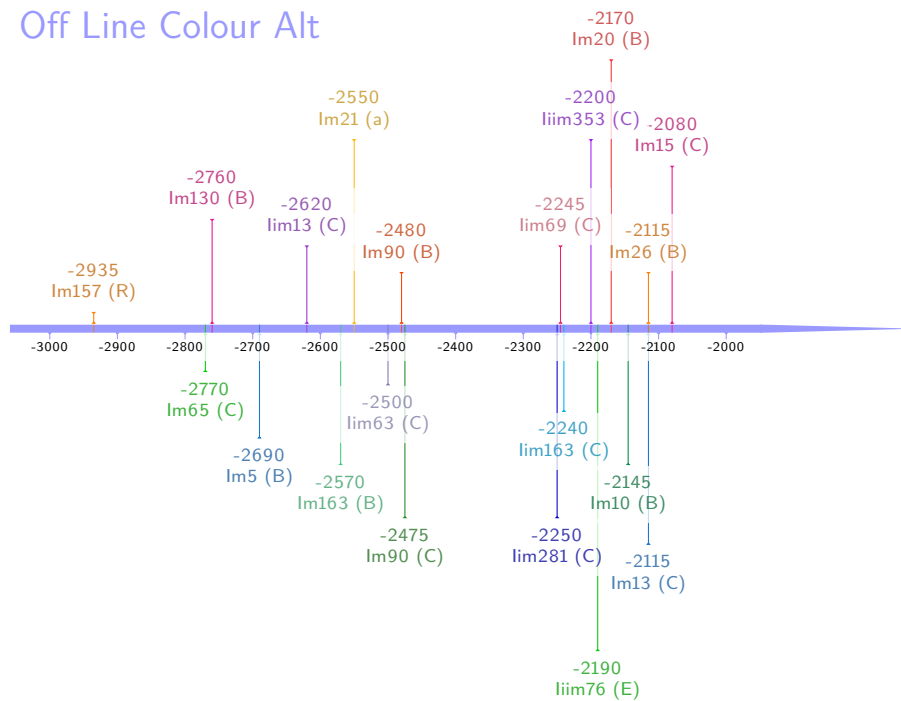
Figure 11: Chronos style: contemporary 90.

Off Line Colour



(a) Chronos style: off line colour.

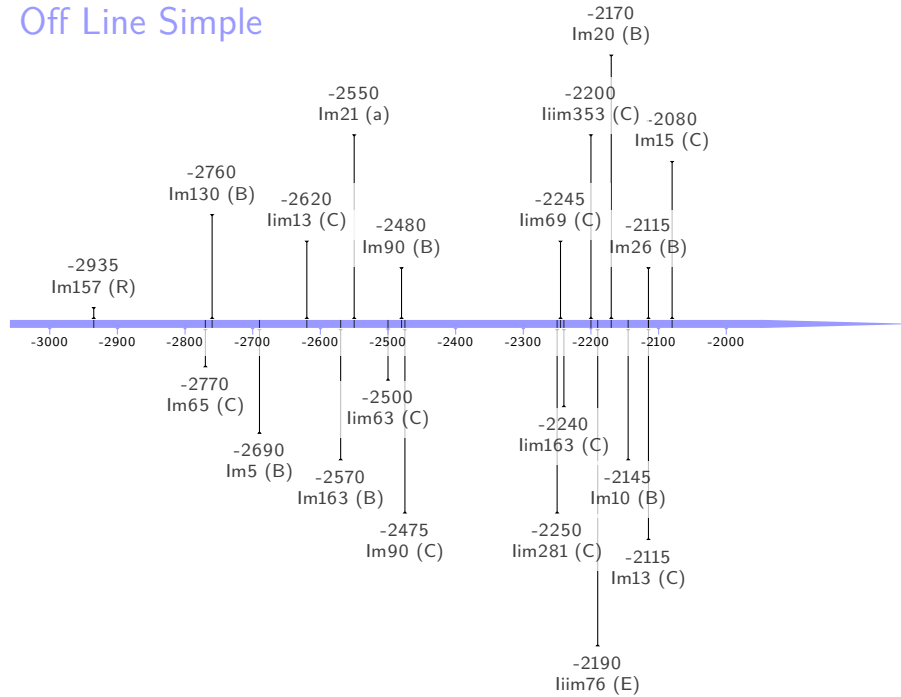
Off Line Colour Alt



(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.

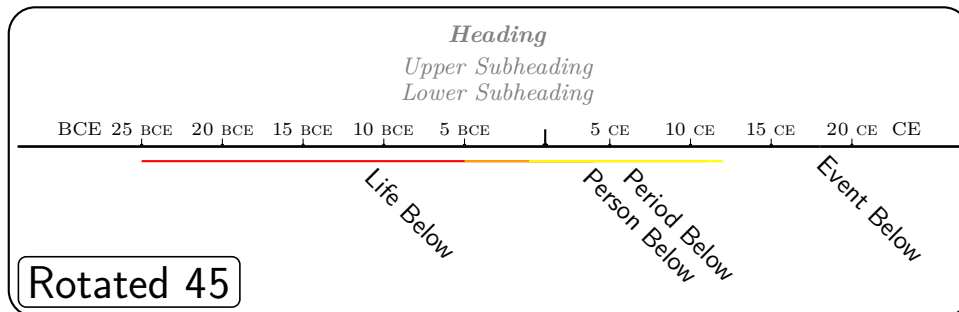


Figure 13: Chronos style: rotated 45.

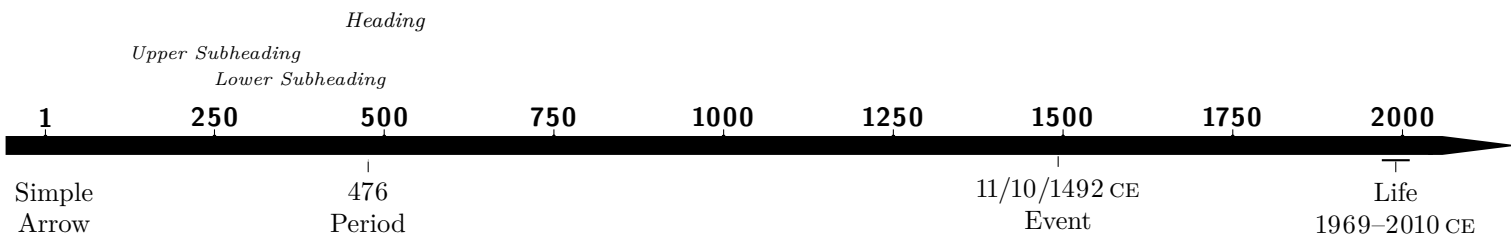


Figure 14: Chronos style: simple arrow.

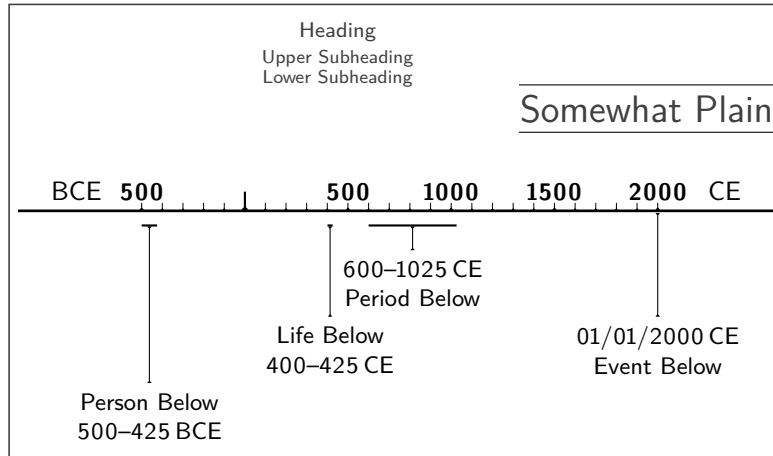


Figure 15: Chronos style: somewhat plain.

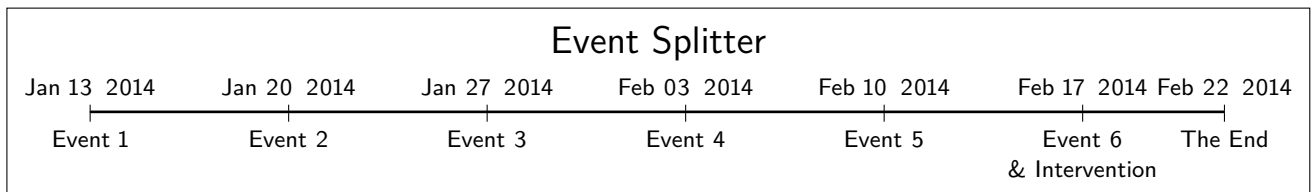
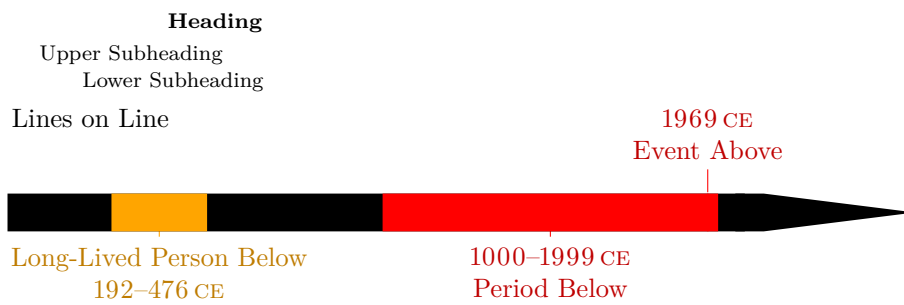
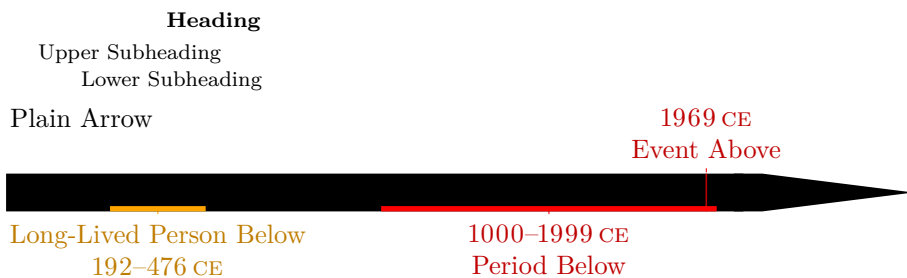


Figure 16: Chronos style: event splitter.



(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^AT_EX 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 concepts¹⁹, the font in which a word appears

¹⁹A ‘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 _E 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 13th, 14th and 21st 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 \TeX dimension, as opposed to an expression to be evaluated by `pgfmath`.

8.1.5 Dimension Notes

8.1.5.1 Dimensions Each key described as a dimension key is available in six forms²⁰:

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

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

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

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

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

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

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

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

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

²⁰Occasionally, 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 ($\langle\textit{specified value}\rangle - \langle\textit{existing value}\rangle$) 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 $\langle\textit{dimension}\rangle$, complete with units, which it subtracts from the $\langle\textit{existing dimension value}\rangle$ directly. This is faster but less flexible.

When dimension keys end in prime, prime-plus or prime-minus, $\langle\textit{dimension}\rangle$ 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\texttheight`

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 $\langle\textit{date format specification}\rangle$ ($\langle\textit{date format spec.}\rangle$) is an expression using the syntax explained in section 8.2.2.

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

8.1.6.2 Dates $\langle\textit{date}\rangle$ 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 $\langle\textit{colour}\rangle$ s should be colour names or mixtures supported by `xcolor`.

Example: `colour=WildStrawberry`

Example: `foreground=WildStrawberry!50!black`

8.1.7.2 Colour Lists $\langle\textit{colour list}\rangle$ 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 $\langle\textit{Y}\rangle\text{-}\langle\textit{M}\rangle\text{-}\langle\textit{D}\rangle$. 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 GNU²¹.

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

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

date format key

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

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

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

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

date format key

event

²¹I am grateful to Joseph Wright for providing the code implementing this at [T_EX 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

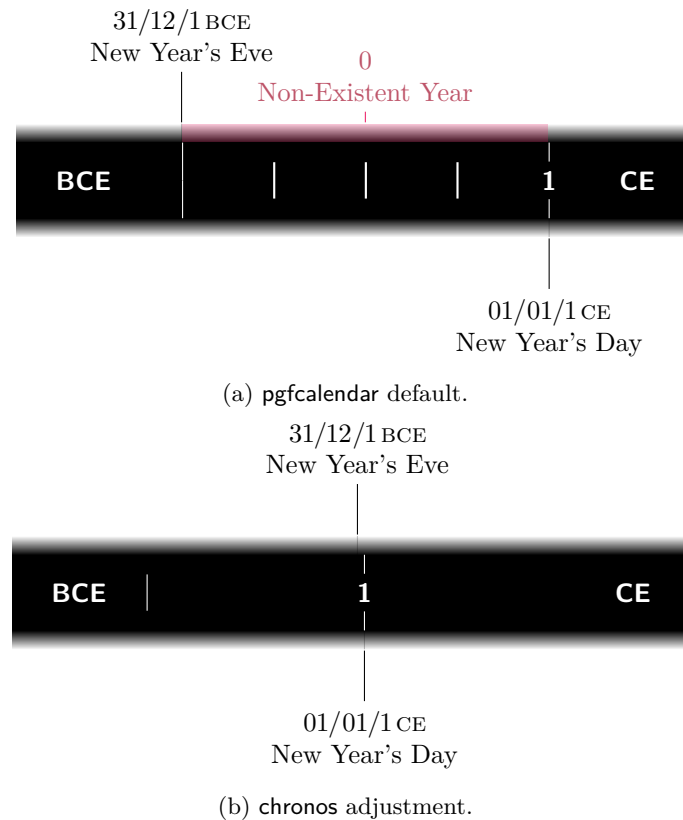


Figure 18: The problem of the non-existent year.

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 these²² and the `timeline era margins`.

For example,

```

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

```

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

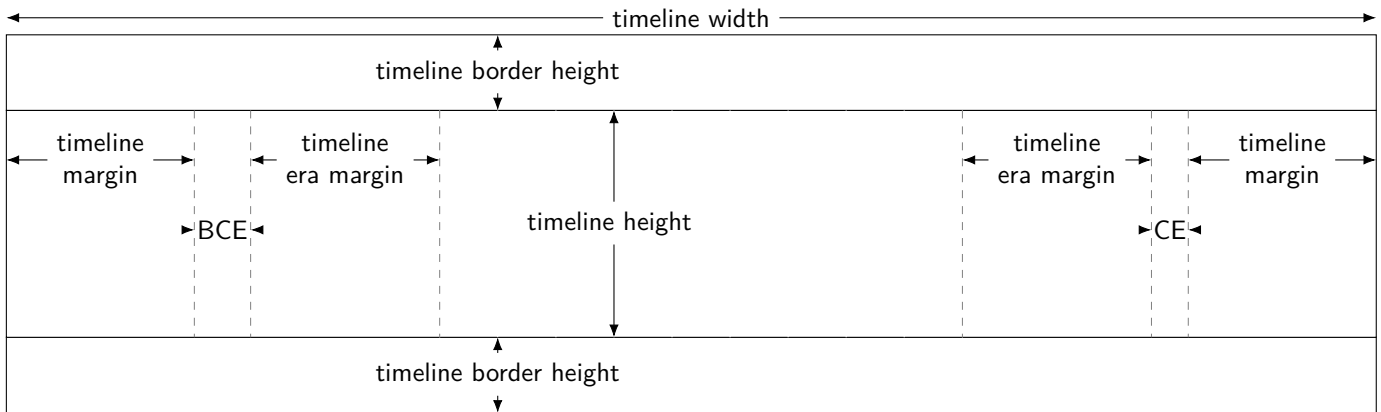


Figure 19: Timeline dimensions.

```

    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>*²³. 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.

²³Note 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 purposes²⁴. 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.

²⁴You 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.

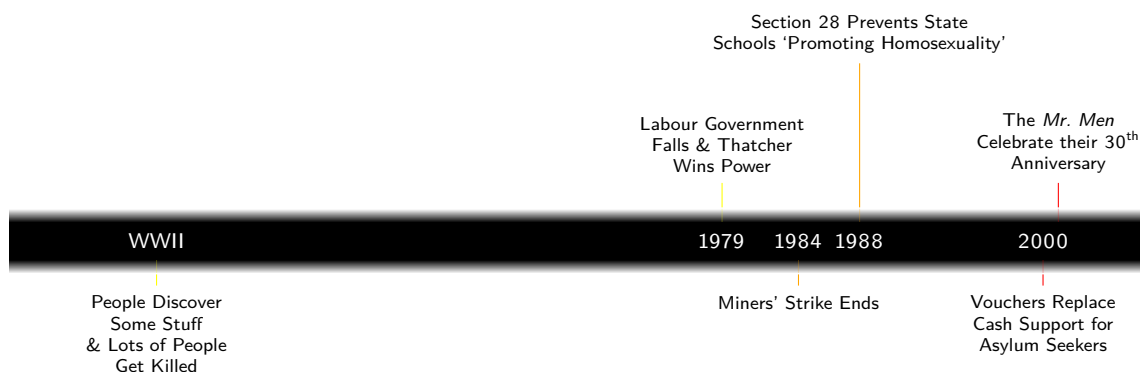


Figure 20: Illustration of event years on line.

`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.

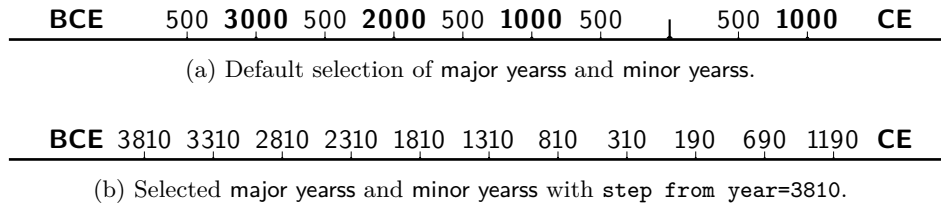


Figure 21: Default (fig. 21a) and non-default (fig. 21b) selection of major years and minor years when `dates={-3814}:1213`, `step major year=1000` and `step minor year=500`.

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. 1st 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`²⁵.

`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

²⁵So 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 years²⁶ 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

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

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

- `event year on line` *style* The style used to mark years on the timeline if `event years on line` is enabled. By default, the style otherwise used for years when on the line is used. Redefine this if you wish, but you could also use `timeline years`, since no other years will be set on the line anyway.
- `event year on line skip` *key* Don't put this particular event's year on the timeline. This can be used if the line would otherwise become too crowded. See section 9.3.
- `timeline/era switch off` *line style* The style to use if years are 'off line' and `mark at era switch` is true. With the standard settings, you would get a small mark at the switch, no different from other intermediate marks. Likely you want something more similar in stature to the year labels. Redefine or supplement using standard TikZ techniques.

Default: `thick, shorten >=0pt`

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

8.4.4 Timeline Fonts

- `major step font` = \langle key-value list \rangle *key*
The font used for major years.

Default:

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

- `timeline/minor step font` = \langle key-value list \rangle *key*
The font used for minor years.

Default:

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

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

The font used for era labels on the timeline.

Default:

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

8.4.5 Timeline Colours

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

`inner colour`

`timeline/timeline border`

`inner color`

colour key

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

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

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

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

`outer colour`

`timeline/timeline border`

`outer color`

colour key

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

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

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

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

`middle colour`

`timeline/timeline border`

`middle color`

colour key

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

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

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



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

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

`background`
colour key

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

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

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

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

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

`foreground`
colour key

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

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

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

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

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

8.4.6 Timeline Style

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

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

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

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

Default: `empty`

Initially: dependent on other options

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

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

```

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

```

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

```

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

```

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

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

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

Default: true

Initially: false

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

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

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

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

Default: empty

Initially: dependent on other options

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

8.5 Frame

`frame` = true|false
boolean key

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

Default: true

Initially: false

`frame uses bb` = true|false
boolean key

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

Default: `true`

Initially: `true`

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

`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`, ... below²⁷. 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

²⁷You 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 see²⁸.

`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

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

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

Default: none

See section 8.7.1 for an example.

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

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

Default: none

See section 8.7.1 for an example.

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

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

Default: none

See section 8.7.1 for an example.

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

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

Default: none

See section 8.7.1 for an example.

8.7.1 Example

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

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



```
\end{chronos}
```

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

8.7.2 Headings Configuration

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

```
headings style+
```

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

Default: empty

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

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

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

```
subheadings style+
```

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

Default: empty

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

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

8.8 Colours

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

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

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

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

```
event/default colour
```

```
period/default colour
```

```
theory/default colour
```

```
info/default colour
```

```
life/default color
```

```
event/default color
```

```
period/default color
```

```
theory/default color
```

```
info/default color
```

```
colour key
```

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

Default: `chronos main colour`

See foreground in section 8.4.5. For example,

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

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

8.8.1 Colour Rotation

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

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

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

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

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

8.8.2 Using Colours

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

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

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

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

to connect Donald Knuth with an element named `metafont`, which might be of type `theory`. The code used to draw the connection will use the same style and colour as any connection drawn between Donald Knuth and the timeline²⁹. 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 enabled³⁰, 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}`.

²⁹See section 9.6

³⁰See 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 (–) for tag contexts associated with `chronos` macros.

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

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

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

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

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

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

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

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

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

For example,

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

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

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

Element	Name	Description	TikZ Type
–	$\langle name \rangle$	Point on timeline at $\langle date \rangle$.	coordinate
line	–	Line from timeline to the edge of timeline border at $\langle date \rangle$.	$\backslash path$
chronos connector	chronos connector $\langle name \rangle$	Connection point at end of line.	node
text tag	tag $\langle name \rangle$	Main box representing element. By default, contains the date above the capitalised $\langle name \rangle$.	node
main connector	main connector $\langle name \rangle$	Connection point at TikZ anchor of text tag.	node
connection	–	Line between the chronos connector and main connector.	$\backslash draw$
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

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 1st. See section 8.2.2.

$\backslash chronosperiod$ $\{ \langle key-value list \rangle \}$ *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 \backslash 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 timeline³¹, **chronos** can create **connectors** for them to enable easy connections to other elements.

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

³¹At 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><name></code>	By default, contains a standard copyright or copyleft notice utilising whatever details are provided or default values and dummy texts.	node

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

9.3 Additional Elements: Local Configuration

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

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

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

Default: `main title` (main)

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

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

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

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

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

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

Default: `false`

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

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

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

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

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

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

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

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

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

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

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

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

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

Whether to connect the element to the timeline.

Default: true

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

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

Default: empty

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

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

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

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

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

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

```

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

```

Note the lack of an argument when used locally.

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

`place below` = true|false
boolean key

life, event, period, theory

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

```

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

```

Default: true

Initially: dependent on other options

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

life, event, period, theory

Thus the previous code could be rewritten as

```

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

```

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

life

period

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

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

is equivalent to

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

for life or

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

for period.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Default: true

Initially: false

Example: `\chronosperiod{\(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 events³².

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

`caption` = $\{ \langle \text{text} \rangle \}$ *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

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

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

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

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

Default: 15pt:9pt

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

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

9.4 Additional Elements: Local/Global Configuration

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

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

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

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

See section 8.2 for details and defaults.

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

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

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

See section 8.2 for details and defaults.

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

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

See section 8.2 for details and defaults.

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


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

See section 8.2 for details and defaults.

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

`<tag>/show eras`

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

See section 8.2 for details and defaults.

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

`<tag>/without eras`

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

See section 8.2 for details and defaults.

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

`<tag>/only text`

key Default: disabled

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

The following six sets of keys all work in the same way³³. If used when creating a specific element, they affect that element. If set in the `<chronos preamble>` or `\chronosset` with a `tag` prefix, they set the `tag`-specific setting and will affect all elements belonging to that tag unless overridden locally.

Note these keys require a tag prefix if used in a global context, such as the `<chronos preamble>`. They do not need a prefix if used when creating a particular element. For example,

```
\begin{chronos}
[
  event/line+={semithick},% prefix required ; event/ explicit
]
\chronosevent{%
  name=dydd dewi sant,
  date={1982-03-01},
  line+={double},% no prefix ; event/ implicit
}
```

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

```
\end{chronos}
```

`<tag>/connection` = `{(key-value list)}` *life, event, period, theory*
`<tag>/connection+`
`<tag>/connection'` *key* `(key-value list)` to apply to this element's connection. This affects the line drawn between the element's connector on the timeline and the text tag's main connector. This is intended for arbitrary TikZ keys; it should *not* be used for chronos keys as they may not be processed correctly. `<tag>/connection` and `<tag>/connection'` replace any current list; `<tag>/connection+` adds to it.

`<tag>/line` = `{(key-value list)}` *life, event, period*
`<tag>/line+`
`<tag>/line'` *key* `(key-value list)` to apply to this element's line on or parallel to the timeline. This is the line representing the temporal extension of a life or period. This is intended for arbitrary TikZ keys; it should *not* be used for chronos keys as they may not be processed correctly. `<tag>/line` and `<tag>/line'` replace any current list; `<tag>/line+` adds to it.

Default: `fill=##1,fill opacity=.25,draw=none` (on line, life/period)

Default: `draw=##1,fill=none,opacity=.25` (on line, event)

Default: `draw=##1,thick,fill opacity=.75` (off line, life/period)

Default: `draw=##1,draw opacity=.75,fill=none` (off line, event)

`<tag>/line yshift` = `{(dimension)}` *life, period*
dimension key

Default vertical displacement of lines from the timeline. Whether the displacement is reckoned from the centre or border of the timeline depends on the default placement.

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

macro
`<tag>/text tag` = `{(key-value list)}` *life, event, period, theory, info*
`<tag>/text tag+`
`<tag>/text tag'` *key* `(key-value list)` to apply to this element's text tag. This is intended for arbitrary TikZ keys; it should *not* be used for chronos keys as they may not be processed correctly. `<tag>/text tag` and `<tag>/text tag'` replace any current list; `<tag>/text tag+` adds to it.

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

See also `<tag>/date font` and `<tag>/text font`.

`<tag>/chronos connector` = `{(key-value list)}` *life, event, period*
`<tag>/chronos connector+`
`<tag>/chronos connector'` *key* Specify TikZ settings to be used when creating chronos connectors on the timeline. Note that `<tag>/chronos connector` *adds* options to the current list. If, for some reason, you want to override this, you must do so explicitly. In general, it does *not* make sense to change this base option, so consider carefully whether you wish to do so.

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

`<tag>/text tag connector` = `{(key-value list)}` *life, event, period, theory*
`<tag>/text tag connector+`
`<tag>/text tag connector'` *key* Specify TikZ settings to be used when creating text tag connectors on the timeline. Note that `<tag>/text tag connector` *adds* options to the current list. If, for some reason, you want to override this, you must do so explicitly. In general, it does *not* make sense to change this base option, so consider carefully whether you wish to do so.

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

`<tag>/main text tag connector` = `{(key-value list)}` *life, event, period, theory*
`<tag>/main text tag connector+`
`<tag>/main text tag connector'` *key*

Specify *additional* TikZ settings to be used when creating the main connectors on text tags. `<tag>/main text tag connector` and `<tag>/main text tag connector'` replace any current list; `<tag>/main text tag connector+` adds to it. The 'main' connector is the one which connects (or would connect) the text tag to the timeline. These keys are rarely needed because, usually, you want all the text tag connectors to look the same. Only use one of these three keys rather than one from the previous set if you *don't* want `<key-value list>` to apply to all of them. You do *not* need to duplicate settings here.

Note that `<tag>/main text tag connector` *adds* options to the current list. If, for some reason, you want to override this, you must do so explicitly. In general, it does *not* make sense to change this base option, so consider carefully whether you wish to do so.

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

`<tag>/label` = `{<key-value list>}` *info, theory circle*

`<tag>/label'`
`<tag>/label+` *key* Style to apply to the caption of an element of tag type `info` or the labels of an element of type `theory circle`. In the latter case, the style applies to both the upper and lower label.

Default: empty

`label` and `label'` replace the current list; `label+` replaces it.

`<tag>/title` = `{<key-value list>}` *main*

`<tag>/title'`
`<tag>/title+` *key* Style to apply to the main title, an element of tag type `main`.

Default: empty

`main/title` and `main/title'` replace the current list; `main/title+` replaces it.

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

This style is available when creating a text tag of type `main` and draws lines along the northern and southern sides of the node. It is used in `somewhat plain` and `date centric`.

`<tag>/author` = `{<text>}` *copyleft, copyright*
key

The author's name for a `copyleft` or `copyright` notice. This is used only if `name content` is unset.

Default: `Author` (as a last resort)

If `author` and `name content` are unset, `chronos` first tries to figure out a suitable author. If `name` is set, a capitalised version is used. Otherwise, if `\svnauthor` is defined, `\svnFullAuthor{<\svnauthor>}` is used, if `\svnFullAuthor` is available, or `\svnauthor`, if it is not. If `chronos` still hasn't found an author, `Author` is used.

`<tag>/copyleft` = `true|false` *copyleft, copyright*
boolean key

Whether a `copyleft` or `copyright` notice should specify `copyleft` or `copyright`.

Default: `false` (`\chronoscopyright`)

Default: `true` (`\chronoscopyleft`)

`\chronoscopyright` respects the global default, so if you set `<tag>/copyleft true` with `\chronosset`, both macros will make `copyleft` notices unless overridden in the `<key-value list>` of options they absorb when executed. `\chronoscopyleft` always creates a `copyleft` notice, regardless of any global settings, unless `copyleft` is explicitly set `false` when invoked.

`<tag>/notice` = `{<macro definition>}` *copyleft, copyright*
key

Template for a `copyleft` or `copyright` notice. It is used as the definition of the macro used for the content of the notice and should absorb two arguments: year and author.

Default: `{Copyleft \textcopyleft{ } #1 #2}` (if `<tag>/copyleft` is `true`)

Default: `{Copyright \textcopyright{ } #1 #2}` (if `<tag>/copyleft` is `false`)

For example,

```
\begin{chronos}
[
  copyright/notice={Created by #2 in the year #1 of the Great Debacle at the behest of
  His Gracious Grasp Full Acre Fanfare the Nineteenth.},
]
```

`<tag>/rotate` = `<angle>` *copyleft, copyright*
key

The angle to rotate the node containing a copyleft or copyright notice.

Default: 90

`<tag>/year` = `<text>` *copyleft, copyright*
key

The year of publication for a copyleft or copyright notice.

Default: `\svnyear` (if available)

Default: `\today` (otherwise)

9.4.1 Specialist Fonts for Text Tags

`<tag>/date font` = `{}` *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` = `{}` *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` = $\{(\text{key-value list})\}$ *life, event, period, theory*
`event`
`period` Equivalent to prefixing each item in $\langle \text{key-value list} \rangle$ with $\langle \text{tag} \rangle$.
`theory`
`key`

```
\begin{chronos}
[
  life={%
    full dates,
    without eras,
    text tag+={font=\sffamily},
    text font=\bfseries,
    date font=\small,
    colours above={red,orange,blue},
    colours below={darkgray,gray,black,magenta},
  },
  period={%
    only years,
    text tag+={opacity=.75},
  },
  event={%
    text tag+={double=blue},
  },
]
\end{chronos}
```

$\langle \text{tag} \rangle / \text{default colour}$ = $\langle \text{colour name} \rangle$ *life, event, period, theory, info*
 $\langle \text{tag} \rangle / \text{default color}$
`colour key` The default colour to use for all elements of type $\langle \text{tag} \rangle$, as explained in section 8.8. *This key does something quite different if used when creating a specific element. See section 9.3 for details.* For example,

```
\begin{chronos}[
  life/default colour=blue,
  event/default colour=green,
  period/default colour=red,
]
\end{chronos}
```

See section 8.8 for details and defaults.

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

```
\begin{chronos}[
  colours above={gray,blue,green},
  life/colours above={magenta,pink,purple},
]
\end{chronos}
```

See section 8.8 for details and defaults.

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

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

```
\end{chronos}
```

See section 8.8 for details and defaults.

`colour rotation` = true|false *life, event, period, theory*
`color rotation` Whether colour rotation is enabled by default.
`(tag)/colour rotation` Default: true
`(tag)/color rotation` boolean key

```
\begin{chronos}[
  colour rotation=false,
]
\end{chronos}
```

See section 8.8 for details and defaults.

`copyleft` = {(key-value list)} *copyleft, copyright*
`copyleft'` Style to apply to the copyleft or copyright, an element of tag type copyleft / copyright.
`copyleft+` Default: empty
`copyright` Default: empty
`copyright'` `copyleft`, `copyleft'`, `copyright` and `copyright'` replace the current list; `copyleft+` and
`copyright+` *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 `\chronosset`.

`text tags` = {(key-value list)} *life, event, period, theory, info*
`text tags+` Set or modify the global default `(key-value list)` to be applied to text tags in the absence of a
`text tags'` tag-specific setting (section 9.4). `text tags` and `text tags'` replace the current value; `text`
key `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 = $\{(key\text{-}value\ list)\}$ *life, event, period, theory*
connections+
connections' Set or modify the global default $\langle key\text{-}value\ list \rangle$ to be applied to connections in the absence of
key 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 $\langle tag \rangle / \text{connection}$, $\langle tag \rangle / \text{connection+}$ and $\langle tag \rangle / \text{connection}'$ in just the same way as **text tags**, **text tags+** and **text tags'** are related to $\langle tag \rangle / \text{text tag}$, $\langle tag \rangle / \text{text tag+}$ and $\langle tag \rangle / \text{text tag}'$. Please see above for details.

lines = $\{(key\text{-}value\ list)\}$ *life, event, period*
lines+
lines' Set or modify the global default $\langle key\text{-}value\ list \rangle$ to be applied to lines in the absence of a tag-specific
key 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 $\langle tag \rangle / \text{line}$, $\langle tag \rangle / \text{line+}$ and $\langle tag \rangle / \text{line}'$ in just the same way as **text tags**, **text tags+** and **text tags'** are related to $\langle tag \rangle / \text{text tag}$, $\langle tag \rangle / \text{text tag+}$ and $\langle tag \rangle / \text{text tag}'$. Please see above for details.

chronos connectors = $\{(key\text{-}value\ list)\}$ *life, event, period, theory*
chronos connectors+
chronos connectors' Set or modify the global default $\langle key\text{-}value\ list \rangle$ to be applied to chronos connectors in the absence
key 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 $\langle tag \rangle / \text{chronos connector}$, $\langle tag \rangle / \text{chronos connector+}$ and $\langle tag \rangle / \text{chronos connector}'$ in just the same way as **text tags**, **text tags+** and **text tags'** are related to $\langle tag \rangle / \text{text tag}$, $\langle tag \rangle / \text{text tag+}$ and $\langle tag \rangle / \text{text tag}'$. Please see above for details.

text tag connectors = $\{(key\text{-}value\ list)\}$ *life, event, period, theory*
text tag connectors+
text tag connectors' Set or modify the global default $\langle key\text{-}value\ list \rangle$ to be applied to text tag connectors in the absence
key of a tag-specific setting (section 9.4). **text tag connectors'** replaces the current value; **text tag connectors** and **text tag connectors+** replace it.

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

These keys are related to the tag-specific $\langle tag \rangle / \text{text tag connector}$, $\langle tag \rangle / \text{text tag connector+}$ and $\langle tag \rangle / \text{text tag connector}'$ in just the same way as **text tags**, **text tags+** and **text tags'** are related to $\langle tag \rangle / \text{text tag}$, $\langle tag \rangle / \text{text tag+}$ and $\langle tag \rangle / \text{text tag}'$. Please see above for details.

main text tag connectors = $\{(key\text{-}value\ list)\}$ *life, event, period, theory*
main text tag connectors+
main text tag connectors' Set or modify the global default $\langle key\text{-}value\ list \rangle$ to be applied to main text tag connectors in the
key 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.

Default: empty

These keys are related to the tag-specific `<tag>/main text tag connector`, `<tag>/main text tag connector+` and `<tag>/main text tag connector'` in just the same way as `text tags`, `text tags+` and `text tags'` are related to `<tag>/text tag`, `<tag>/text tag+` and `<tag>/text tag'`. Please see above for details.

The next six sets of keys are convenience keys which set or modify the global defaults and the corresponding keys for all tags at once.

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

`every text tags+`
`every text tags'`
key A convenience key equivalent to setting the same `<key-value list>` for all of `text tags`, `life/text tag`, `event/text tag`, `period/text tag`, `theory/text tag` and `info/text tag` or the `+` or `'` variants. *This key should never be used when creating a specific element.* See section 9.4 and above for details and defaults.

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

`every connections+`
`every connections'`
key A convenience key equivalent to setting the same `<key-value list>` for all of `connections`, `life/connection`, `event/connection`, `period/connection` and `theory/connection` or the `+` or `'` variants. *This key should never be used when creating a specific element.* See section 9.4 and above for details and defaults.

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

`every lines+`
`every lines'`
key A convenience key equivalent to setting the same `<key-value list>` for all of `lines`, `life/line`, `event/line` and `period/line` or the `+` or `'` variants. *This key should never be used when creating a specific element.* See section 9.4 and above for details and defaults.

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

`every chronos connectors+`
`every chronos connectors'`
key A convenience key equivalent to setting `<key-value list>` for all of `chronos connectors`, `life/chronos connector`, `event/chronos connector`, `period/chronos connector` and `theory/chronos connector` or the `+` or `'` variants. *This key should never be used when creating a specific element.* See section 9.4 and above for details and defaults.

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

`every text tag connectors+`
`every text tag connectors'`
key A convenience key equivalent to setting the same `<key-value list>` for all of `text tag connectors`, `life/text tag connector`, `event/text tag connector`, `period/text tag connector` and `theory/text tag connector` or the `+` or `'` variants. *This key should never be used when creating a specific element.* See section 9.4 and above for details and defaults.

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

`every main text tag connectors+`
`every main text tag connectors'`
key A convenience key equivalent to setting the same `<key-value list>` for all of `main text tag connectors`, `life/main text tag connector`, `event/main text tag connector`, `period/main text tag connector` and `theory/main text tag connector` or the `+` or `'` variants. *This key should never be used when creating a specific element.* See section 9.4 and above for details and defaults.

`every theory circle circle` = `{(key-value list)}` *theory circle*

`every theory circle circle'`
`every theory circle circle+`
key Configuration of the base ring for elements of tag type `theory circle`. The ring consists of two circles with the smaller forming a hole in the centre by default. Changing or deleting the filling rule will eliminate the hole.

Default: `fill=<chronos main colour>`, `draw=<chronos main colour>`, `even odd rule`

`every theory circle circle` and `every theory circle circle+` add to the current `<key-value list>`; `every theory circle circle'` replaces it.

`every theory circle text` = `{(key-value list)}` *theory circle*

`every theory circle text'`
`every theory circle text+`
key

Style applied to the texts used in constructing elements of tag type theory circle. By default the texts are placed along the semicircular paths corresponding to the upper and lower halves of the ring formed by the theory circle circles. This means the colour used here should differ from that used to fill the circles, given the default styles.

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

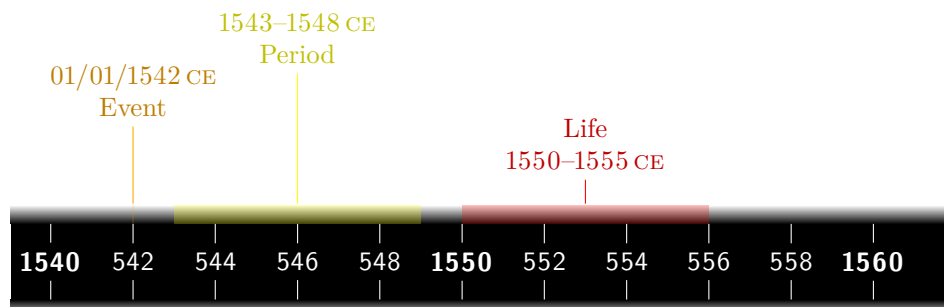
`every theory circle text` and `every theory circle text+` add to the current *<key-value list>*; `every theory circle text'` replaces it.

`text tag yshift` = *<dimension>*
dimension key

life, event, period, theory

The `yshift` to apply when placing the `text tag` if `yshift` is otherwise `0pt` and `at` is unset. You should probably never use this key in the context of a particular element, because `yshift` works just as well and will probably be more reliable and certainly faster. Moreover, unlike `yshift`, which can be used to adjust a position set with `at`, `text tag yshift` cannot. If `at` is used, `text tag yshift` is ignored. It makes sense to set this globally if you want all elements or all elements belonging to a particular tag to be shifted by some specified distance from the timeline. For example,

```
\begin{chronos}[
  life/text tag yshift=10pt,
  event/text tag yshift=30pt,
  period/text tag yshift=50pt,
  theory/text tag yshift=70pt,
]
\end{chronos}
```



Theory

The following keys take the form `{every} <tag>`, optionally followed by prime or plus. *They should not be used to configure elements for which other global keys exist, such as colours, connections, connectors, date formats, lines or text tags.* Generally, these keys should be unnecessary and are best avoided, although they may occasionally be convenient.

`every life` = *<(key-value list)>*

life

`every life'`

`every life+` Additional configuration for all elements of tag type life. These do much the same as `life/tag`, `life/tag+` and `life/tag'`, but should *never* be used when creating a specific element. `every life` and `every life+` add to the current *<key-value list>*; `every life'` replaces it.

`every event` = *<(key-value list)>*

event

`every event'`

`every event+` Additional configuration for all elements of tag type event. These do much the same as `event/tag`, `event/tag+` and `event/tag'`, but should *never* be used when creating a specific element. `every`

event and every event+ add to the current $\langle key\text{-value list} \rangle$; every event' replaces it.

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

`every period'`
`every period+`
key Additional configuration for all elements of tag type period. These do much the same as period/tag, period/tag+ and period/tag', but should *never* be used when creating a specific element. every period and every period+ add to the current $\langle key\text{-value list} \rangle$; every period' replaces it.

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

`every theory'`
`every theory+`
key Additional configuration for all elements of tag type theory. These do much the same as theory/tag, theory/tag+ and theory/tag', but should *never* be used when creating a specific element. every theory and every theory+ add to the current $\langle key\text{-value list} \rangle$; every theory' replaces it.

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

`every info'`
`every info+`
key Additional configuration for all elements of tag type info. These do much the same as info/tag, info/tag+ and info/tag', but should *never* be used when creating a specific element. every info and every info+ add to the current $\langle key\text{-value list} \rangle$; every info' replaces it.

9.6 Adding Connections, Using Colours and Accessing Styles

To access the colour list used for the timeline etc., see sections 8.3 and 8.4.5. For details of the way colour list are assigned to elements, see section 8.8.

Life, event, period and theory elements are designed to be connected not only, in the case of those which are connectable, to the timeline, but also to each other. To ensure consistent styling, this requires the use of `chronos` styles in TikZ commands.

In addition, densely-packed timelines sometimes require non-standard paths be used to connect a minority of elements to the timeline in an efficient way. Again, this requires access to `chronos` styles.

`chronos connect` = $\{ \langle tag \rangle : \{ \langle element name \rangle \} \}$ *life, event, period, theory*
style

This sets the style used for connections belonging to elements of type $\langle tag \rangle$ with the colour assigned to $\langle element name \rangle$ (section 8.8). For example,

```
\draw [chronos connect=life:johannes gutenber] (connector johannes gutenber) -- (
connector printing press) (connector johannes gutenber2) -|- (connector movable type) (
connector johannes gutenber3) -- ++(5pt,0pt) |-| (connector gutenber bible);
```

This will draw a line using the style for connections of tag type `life` and the colour assigned to the element named `johannes gutenber`. Note the use of connectors on both the element's own text tag and on other elements' text tags. In this case, tag `johannes gutenber` is being connected to tag `printing press`, tag `movable type` and tag `johannes gutenber bible`.

The following four keys provide analogous access to the styles and colour list used for `chronos` connectors, text tag connectors, lines and text tags and are used in the same way.

`chronos create chronos` = $\{ \langle tag \rangle : \{ \langle element name \rangle \} \}$ *life, event, period*
`connector`
style

This sets the style used for `chronos` connectors belonging to elements of type $\langle tag \rangle$ with the colour assigned to $\langle element name \rangle$.

`chronos create text tag` = $\{ \langle tag \rangle : \{ \langle element name \rangle \} \}$ *life, event, period, theory*
`connector`
style

This sets the style used for text tag connectors belonging to elements of type $\langle tag \rangle$ with the colour assigned to $\langle element name \rangle$.

`chronos mark line` = $\{ \langle tag \rangle : \{ \langle element name \rangle \} \}$ *life, event, period*
style

This sets the style used for lines (on or near the timeline) belonging to elements of type $\langle tag \rangle$ with the colour assigned to $\langle element name \rangle$.

`chronos text tag = { $\langle tag \rangle$ }: { $\langle element name \rangle$ }` *life, event, period, theory, info*
style

This sets the style used for text tags belonging to elements of type $\langle tag \rangle$ with the colour assigned to $\langle element name \rangle$.

We can also use the colour assigned to `johannes gutenberg` directly. Perhaps, for example, we'd like to put a book symbol near this element in the appropriate colour.

Example: `\node [colour johannes gutenberg, above left=5pt and 10pt of tag johannes gutenberg.north west, anchor=south east, inner sep=0pt] { $\langle book-symbol \rangle$ };`

10 Drawing on Chronos Layers

See section 6.4.

`on chronos background layer` Apply to a scope to draw everything inside on layer `chronos background`.
style

```
\begin{scope}[on chronos background layer]
  \node {Something};% in between the regular background and chronos middle ground
\end{scope}
```

`on chronos middle ground layer` Apply to a scope to draw everything inside on layer `chronos middle ground`.
style

```
\begin{scope}[on chronos middle ground layer]
  \node {Something};% behind the main layer and chronos background
\end{scope}
```

`on chronos foreground layer` Apply to a scope to draw everything inside on layer `chronos foreground`.
style

```
\begin{scope}[on chronos foreground layer]
  \node {Something};% above the main layer but behind chronos overlay.
\end{scope}
```

`on chronos overlay layer` Apply to a scope to draw everything inside on layer `chronos overlay`.
style

By default, `chronos` puts only debugging information on `chronos overlay`, which means drawing on this layer should always draw on top of anything constructed by the package code.

```
\begin{scope}[on chronos overlay layer]
  \node {Something over everything else.};
\end{scope}
```

In addition, `chronos` never puts anything on the non-`chronos` PGF/TikZ background layer and it would be difficult to persuade it to do so without rewriting internal code. Drawing on *this* layer, therefore, is almost guaranteed to end up behind everything constructed by the package code³⁴.

```
\begin{scope}[on background layer]% fill area below the timeline
  \fill [blue!25!white] (chronos pre |- chronos bottom) rectangle (chronos post-foot);
\end{scope}
```

³⁴Unless nefarious TeXnicians have interfered with your installation. It is even quite unlikely a bug would cause this kind of problem, though bugs will doubtless cause many others.

11 Externalising Chronos Timelines with Memoize

As explained in section 15, `chronos` timelines cannot be externalised with PGF/TikZ's `external`. Since PGF/TikZ, in general, and `chronos`, in particular, can be rather slow to compile, this is serious issue. If you only have a two or three small timelines, the compilation time will be negligible. But if you have a large, densely packed timeline or many timelines, compilation time will quickly become excessive.

Fortunately, `chronos` environments *can* be externalised. Moreover, they can be externalised more conveniently, more robustly and more securely, without the need for a separate compilation for each `chronos`. This means compilation is only a little slower when the timelines are being compiled (whereas compilation would be far slower with the external `pgf/ti\emphkz` library, even if it worked) and subsequent compilations are fast.

Sašo Živanović's `memoize` has no trouble compiling this documentation and externalising its timelines. `Memoize` is a little more trouble to set up initially than the external `pgf/ti\emphkz` library, but requires far less fine-tuning once configured.

To externalise `chronos` timelines, *you must first setup memoization as explained in* `memoize's documentation`³⁵.

`Chronos` supports automemoization out-of-the-box³⁶: to enable automatic memoization of `chronos` environments, simply load `memoize` early in your preamble. `Chronos` will then enable 'automemoization' for all timelines³⁷.

All `chronos` styles (except `default`) and all colour schemes (except `default`) are defined so that modification will automatically trigger the recompilation of all `chronos` timelines which use them.

12 Deferring Code

If you don't know why you might want to use the keys in this section, you don't need to use them.

```

timeline config = {(code)}
timeline config'
timeline config+
  key

```

Execute additional `(code)` after `chronos` has processed the keys at the start of the `chronos` environment, but before further processing the resulting configuration and constructing the timeline. These keys are provided primarily for use in `chronos` style definitions, but may occasionally be useful elsewhere. `timeline config` and `timeline config+` add to the current code; `timeline config'` replaces it. Note that `timeline config'` is destructive: it obliterates any existing code `chronos` has installed, which may be entirely unrelated to the code now being stored. `Chronos` style authors should never use this form. Even if the code is for purely private use in a locked room with no internet access, you should stick to the additive forms unless your memory is infallible *and* you always remember to use it.

12.1 Additional TikZ

Generally, you can mix arbitrary TikZ code freely into the body of the `chronos` environment. For example, this is how to add connections between text tags or to decorate your timeline with symbols or ornaments.

However, sometimes you might want to add something *after* `chronos` has finished. You might, for example, want to do something after the frame is drawn or place something relative to headings

³⁵By 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.

³⁶This 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.

³⁷Of course, memoization can be disabled permanently or temporarily for some or all timelines. See `memoize's` documentation for details or look at the code for this document, which disables memoization for fig. 1 to prevent destruction of hyperlinks.

or subheadings. Two sets of keys are provided for this purpose. One set enable you to execute arbitrary TikZ code within the picture's bounding box; the other enables you to do so outside. Generally, it is the first set you will want to use; the second are useful in a narrower range of cases and for debugging purposes.

```
chronos tikz' = {\TikZ commands}
```

```
chronos tikz
```

```
chronos tikz+
```

key

Commands to execute after the *<timeline additions specification>* and any frame, headings and subheadings are drawn, but before debugging information is added (see section 14). `chronos tikz` and `chronos tikz+` add to current material; `chronos tikz'` replaces it. Material added with these keys is included in the final picture's bounding box. If you draw outside the frame and outer border, for example, the final bounding box expands to accommodate it. *If you aren't sure which set of keys to use, choose these.*

```
chronos tikz outside bb' = {\TikZ commands}
```

```
chronos tikz outside bb
```

```
chronos tikz outside bb+
```

key

Commands to execute after the *<timeline additions specification>* and any frame, headings and subheadings are drawn, but before debugging information is added (see section 14). `chronos tikz outside bb` and `chronos tikz outside bb+` add to current material; `chronos tikz outside bb'` replaces it. Material added with these keys is excluded when the final picture's bounding box is determined. If you draw outside the frame and outer border, for example, TeX will treat it as if it didn't exist and you will need to ensure adequate space is available to accommodate it manually. *If you aren't sure which set of keys to use, avoid these.*

Finally, you might want to add material at some specific point in the construction of the picture (e.g. after headings but before the frame). The following sets of keys facilitate such additions.

```
before headings' = {\TikZ commands}
```

```
before headings
```

```
before headings+
```

key

Commands to execute after the *<timeline additions specification>*, but before constructing any headings. `before headings` and `before headings+` add to current material; `before headings'` replaces it.

```
before drawing frame' = {\TikZ commands}
```

```
before drawing frame
```

```
before drawing frame+
```

key

Commands to execute after the *<timeline additions specification>* and any headings and subheadings are drawn, but before constructing any frame. `before drawing frame` and `before drawing frame+` add to current material; `before drawing frame'` replaces it.

13 Custom Schemes and Styles

The macros and keys explained in this section enable you to define custom colour schemes and chronos styles. These may then be used in the same way as those provided by `chronos` (section 7).

Customisation is a two-stage process. Chronos styles should not define colours definable by colour schemes.

Colour schemes are straightforward to define; chronos styles are a bit trickier.

13.1 Defining Chronos Colour Schemes

As explained in section 7.2, in addition to the default colours, `chronos` currently provides `blues`, `contninety`, `cronoleg`, `lavender`, `modern`, `offlinebasic`, `offlinealt`, `sobriety` and `xcolseries`³⁸ (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.

³⁸Note that `xcolseries` uses the `hsb` colour model, which is not supported by PGF/TikZ. If loading this set of colours directly, add `/utils/exec=` to `chronos`'s optional argument. This is not necessary if loading a `chronos` style which utilises `xcolseries`. In either case, all colours in the current `chronos` environment will be converted to `rgb`.

New colour schemes should follow the examples in `chronos-lib-colschemes.sty`³⁹. 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 keys⁴⁰. It is sufficient to specify the required deviations from *<existing scheme>*. For example, here's the code to set up `offlinealt`,

```
\chronosnewcolourscheme[cronoleg]{offlinealt}{%
  timeline foreground=blue!40,
}
```

13.1.1 How Colour Schemes are Processed

When a colour scheme is loaded, `chronos` processes the settings in six stages.

1. The specified *<existing scheme>* or defaults are loaded.
2. Keys for the ‘core’ colours `foreground` and `background` are set and flipped to provide default settings for the ‘core derivative’ colours `timeline foreground` and `timeline background`.
3. Keys for the ‘core derivative’ colours `timeline foreground` and `timeline background` are set and the resulting four colours used to derive default settings for the ‘core border’ colours `timeline border inner`, `timeline border middle` and `timeline border outer`. In particular, `timeline border inner` is set to match `timeline background`, `timeline border outer` is set to `background` and `timeline border middle` is set to a 50-50 mix of the two.
4. Keys for the ‘core border’ colours `timeline border inner`, `timeline border middle` and `timeline border outer` are set. The main `foreground` colour is assigned to the ‘elemental’

³⁹For 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`.

⁴⁰In 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><colour name></i>	chronosblack
background	<i><colour name></i>	chronoswhite
timeline foreground	<i><colour name></i>	chronosCerulean
timeline background	<i><colour name></i>	chronosDodgerBlue4!50!chronosblack
timeline border outer	<i><colour name></i>	chronoswhite
timeline border inner	<i><colour name></i>	chronosCerulean
timeline border middle	<i><colour name></i>	chronosDodgerBlue4!50!chronosblack
life/default	<i><colour name></i>	chronosDodgerBlue4
event/default	<i><colour name></i>	chronosDodgerBlue4
period/default	<i><colour name></i>	chronosDodgerBlue4
theory/default	<i><colour name></i>	chronosDodgerBlue4
info/default	<i><colour name></i>	chronosDodgerBlue4
default above	<i><list of colour names></i>	chronosRed, chronosOrange, chronosYellow, chronosGreen, chronosBlue, chronosMidnightBlue, chronosViolet
default below	<i><list of colour names></i>	chronosCerulean!50!chronosDodgerBlue4, chronosCerulean!50!chronosDodgerBlue3, chronosCerulean!50!chronosDodgerBlue2, chronosCerulean!50!chronosDodgerBlue1, chronosCerulean
life/above	<i><list of colour names></i>	chronosDeepPink2, chronosDarkOrange1, chronosFirebrick1, chronosPurple0, chronosWildStrawberry, chronosOrangeRed1, chronosDarkGoldenrod1, chronosDarkOrchid3
life/below	<i><list of colour names></i>	chronosDodgerBlue3, chronosGreen3, chronosBlue3, chronosSpringGreen4, chronosDeepSkyBlue2, chronosForestGreen, chronosPeriwinkle, chronosSeaGreen3
event/above	<i><list of colour names></i>	chronosThistle4, chronosThistle4!.5!chronosThistle3, chronosThistle3, chronosThistle3!.5!chronosThistle2, chronosThistle2
event/below	<i><list of colour names></i>	chronosSeashell4, chronosSeashell4!.5!chronosSeashell3, chronosSeashell3, chronosSeashell3!.5!chronosSeashell2, chronosSeashell2
period/above	<i><list of colour names></i>	chronosMistyRose4, chronosMistyRose4!.5!chronosMistyRose3, chronosMistyRose3, chronosMistyRose3!.5!chronosMistyRose2, chronosMistyRose2
period/below	<i><list of colour names></i>	chronosIvory4, chronosIvory4!.5!chronosIvory3, chronosIvory3, chronosIvory3!.5!chronosIvory2, chronosIvory2
theory/above	<i><list of colour names></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><list of colour names></i>	xcolor g2!![0],xcolor g2!![1],xcolor g2!![2],xcolor g2!![3],xcolor g2!![4],xcolor g2!![5],xcolor g2!![6],xcolor g2!![7],xcolor g2!![8],xcolor g2!![9],xcolor g2!![10],xcolor g2!![11],xcolor g2!![12],xcolor g2!![13],xcolor g2!![14],xcolor g2!![15]

default colours `life/default`, `event/default`, `period/default`, `theory/default` and `info/default`.

5. Keys for the ‘elemental’ default colours `life/default`, `event/default`, `period/default` and `theory/default` are set.
6. *Much later*, after the user configuration for the `chronos` environment has been read, `chronos` potentially flips the ‘core derivative’ colours `timeline foreground` and `timeline background`. See section 13.2.

Only after this sixth stage are the ‘public’ names listed in table 14 assigned to the final set of colour scheme-definable colours.

13.2 Defining Chronos Styles

The current method for creating `chronos` styles is straightforward in theory, but potentially hazardous in practice. Here’s an example from `chronos-lib-styles.sty`.

```
\pgfqkeys{/chronos}{%
  blues below/.style={%
    /chronos/.cd,
    blues below/.meaning to context,
    colour scheme=blues,
    rotate all colours,
    timeline={%
      timeline years=above,
      timeline marks,
      timeline minor marks,
      step minor year=50,
      step divisions=10,
      step major year=100,
      dates=1550:2050,
      timeline height'=3pt,
      timeline line={chronos timeline foreground colour,double=chronos timeline
background colour,line width=\timelineht/3,double distance=\timelineht/3},
      timeline arrow,
      conditional timeline arrow={%
        timeline/timeline line+={Bar-Latex,shorten <=-\timelineht/3,shorten >=-3pt-2.1\
timelineht},
        timeline/timeline width--={3pt+2.43\timelineht},
        before headings+={\path (chronos post) -- ++(3pt+2.1\timelineht,0pt) (chronos
pre) -- ++(-\timelineht/3,0pt);},
      }},
      timeline mark={chronos timeline foreground colour,line width=.6pt,shorten >=-4pt},
      timeline minor mark={chronos timeline foreground colour,line width=.5pt,shorten
>=-3.5pt},
      timeline bare mark={chronos timeline foreground colour,line width=.3pt,shorten
>=-2.5pt},
      timeline year={fill=none,text=chronos timeline foreground colour,rotate around
={45:(chronos year \chronosyeari |- chronos top)}},
      major step font=\sffamily\footnotesize\tlstyle,
      timeline years anchor=south west,
      minor step font=\sffamily\scriptsize\tlstyle,
      timeline margin'=17.5pt,
    },
    minor year format={!Y},
    every event below,
    every life below,
    every period below,
    levels=0:3,
    headings style+={text=chronos main colour!75!chronos main background colour,font=\
small\itshape\bfseries},
```



```

    subheadings style+={text=chronos main colour!75!chronos main background colour,font
=\footnotesize\itshape},
    main/title+={font=\LARGE,text=chronos timeline foreground colour,draw=chronos
timeline background colour,semithick},
    main/frame+={thick,draw,chronos timeline foreground colour,double=chronos timeline
background colour},
    copyright={font=\footnotesize\sffamily, inner sep=0pt, outer sep=0pt, text=chronos
timeline foreground colour!50!chronos main background colour},
    copyright/rotate=90,
    copyright/tag anchor=north west,
  },
}

```

This definition is chosen because it is one of the most technically complex examples. This complexity is a function of several factors: it uses *off-line* years; the year labels are rotated; the line involves two arrow tips; and the line is drawn with `double`.

Note the following:

1. colours listed in table 13 are used but not defined;
2. instead, a custom colour configuration is set by loading an appropriate colour scheme;
3. there is a weird looking `\chronosyeari` in the definition of `timeline year`;
4. `timeline/timeline arrow` and `timeline/conditional timeline arrow` enables use of arrow tips to be toggled off;
5. `dates` are defined, even though they are almost certainly wrong in most cases;
6. `.meaning to context` is used, even though the user might not have loaded `memoize`, which defines it.
7. some fonts use a non-standard command `\tlstyle`.

Item 7 need not concern us here. If certain packages are loaded, it ensures tabular, lining figures; if not, `chronos` provides a command with this name at the end of the preamble by simply `\letting` it to `\upshape`.

Regarding item 5, the standard `chronos` styles all define `dates`, but whether they should do so is another question. On the one hand, if they are not defined (as they are not if no `chronos` style is loaded), `chronos` will generate an error, alerting the user to the deficiency. Since it is highly unlikely any default choice will suit any user, let alone most of them, an error might be considered appropriate. On the other hand, some `chronos` styles are far more suitable for some temporal ranges than others. For example, consider this excerpt from the definition of `contemporary 90`:

```

timeline={%
  timeline marks,
  timeline minor marks,
  timeline mark={ultra thick},
  timeline minor mark={thick},
  step divisions=4,
  step major years=2,
},

```

This is fine for a `timeline` of a decade or two, but quite unsuitable for one representing either the period 3,000 BCE–2025 CE or the first half of 1857. While a user can always modify these settings, along with the `dates`, a default range provides a sense of the temporal duration the `chronos` style is suitable for ‘out-of-the-box’.

The author of this package has found a comfortable spot on a convenient fence and intends to stay there, whatever the provided `chronos` styles might suggest. The reader is warned to make the most of the fences available here, as there are none whatsoever in the next section.

Table 14: Keys and names for `chronos` colours. Note that neither ‘colour’ nor ‘color’ appears in any key in the first column, but in every key in the second. In the second column, ‘color’ may be substituted for ‘colour’ in any name.

		Colour Schemes Key	Later Accessible As			
MUST NOT define!	C O R E	core {	foreground	chronos main colour	C O R E	
			background	chronos main background colour		
		core derivative {	timeline foreground	chronos timeline foreground colour		
	timeline background		chronos timeline background colour			
	core border {	timeline border outer	chronos timeline border outer colour			
		timeline border inner	chronos timeline border inner colour			
		timeline border middle	chronos timeline border middle colour			
	Should NOT touch!	E L E M E N T A L	default colours {	life/default		-
				event/default		-
period/default				-		
theory/default				-		
info/default				-		
colour lists {		default above	-			
		default below	-			
		life/above	-			
		life/below	-			
		event/above	-			
		event/below	-			
		period/above	-			
		period/below	-			
		theory/above	-			
		theory/below	-			

13.2.1 How (Not) to Customise Colours

Items 1 and 2 are the most important. *Chronos styles MUST NOT set core, core derivative or core border colours, where ‘core, core derivative and core border colours’ refer to those listed in tables 13 and 14.* In many cases, violating this rule may appear to work, but in others doing so will produce weird results or errors.

Moreover, *chronos styles should not set any other colour key or colour list directly.* In many cases, violating this rule may appear to work, but in others doing so will cause things not to work as expected.

To summarise, *if it can be done by a colour scheme, it should be done by a colour scheme*⁴¹.

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`.

⁴¹That is, ‘can implies ought’.

3. `timeline years` is not on line.

Condition 3 cannot be determined until the complete configuration has been read. In particular, it is not known when colour schemes and chronos styles are read. While it is recommended users select a chronos style congruent with their preferred setting for `timeline years`, this is intended to make configuration easier and is not a requirement.

Only *after* colours are potentially switched are the public names listed in table 14 assigned, long after colour schemes and chronos styles have been read.

It is nonetheless possible, indeed recommended, to *use* the public names in chronos styles, though they cannot be used in colour schemes. It is only *defining* them at this stage which is problematic.

Here is an example from the definition of `modern` in `chronos-lib-styles`:

```
✓ timeline line={chronos timeline background colour, opacity=1},
  period/line={fill=chronos timeline foreground colour, blend mode=overlay},
  life/line={fill=chronos timeline foreground colour, blend mode=overlay},
  event/line={draw=chronos timeline foreground colour, thick, blend mode=overlay},
  every text tags={fill=chronos main background colour, text=####1, fill opacity=.75,
text opacity=1, draw=none, rounded corners, align=center, font=\sffamily\footnotesize},
```

This is perfectly proper⁴². 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

⁴²At least, it is fine as far as `chronos` goes. Whether it is proper `TikZ` code is not for me to judge.

relevant year. Obviously, we can't do this for each node. We don't know how many there are or what they are named. Instead, we need a hook into the `\foreach` loop `chronos` uses when creating the year labels.

`\chronosyeari`
macro refers to the current year *inside the \foreach loop used to mark years on the timeline*. (`chronos year \chronosyeari`) isn't actually the node, but the point representing the date on the timeline, but the node starts there, so we can use it provided `timeline years anchor` is set appropriately.

```
timeline year={rotate around={45:(chronos year \chronosyeari |- chronos top)}},
timeline years anchor=south west,
```

13.2.3 Hashes

You may have noticed the following line in the excerpt from `modern`'s definition above.

```
every text tags={fill=chronos main background colour, text=####1, fill opacity=.75,
text opacity=1, draw=none, rounded corners, align=center, font=\sffamily\footnotesize},
```

Anywhere you'd normally use a single hash (e.g. `#1`) in defining a TikZ style, you need two (`##1`) because you're nesting that definition within the definition of another style. So it is not surprising to find lines such as

```
connections={draw=##1, {Triangle[width=0pt 3,reversed,length=0pt 1.5]}-{Triangle[width
=0pt 5,reversed,length=0pt 2.5]}},
```

in `modern`'s definition, but why *four*?

Certain keys require one or more additional doublings of hashes. Anytime you use an `every` key, you need to double. Double double makes four, so we get `text=####1`⁴³.

Elsewhere, a single doubling is generally sufficient, as shown in these lines from the definition of `plain arrow`

```
period/line+={line width=2pt,draw=##1},
life/line+={line width=2pt,draw=##1},
```

Incidentally, PGF doesn't complain if you quadruple the hashes here, though it does so if you make the same mistake elsewhere. So silence does not always indicate correctness. This is important if you're debugging: don't assume because a pattern generates no error in one case, it cannot be the source of an error in another.

Note also that if you say

```
x text tags={draw=####1,sharp corners,text opacity=1,fill opacity=1,draw opacity=1,
drop shadow},
```

T_EX 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 ##.
```

```
?
```

⁴³For real fun with hashes, may I recommend `chronos` or `forest`?

If you double the hashes *again* (#####1), you'll get the same error. The actual problem is that you've used too many.

✓ `text tags={draw##1,sharp corners,text opacity=1,fill opacity=1,draw opacity=1,drop shadow},`

is correct in a chronos style definition i.e. twice the number required in the `<chronos preamble>`. If you reduce the hashes to one (#1), you'll get no error but the wrong output as the element's colour won't be used.

Despite this, chronos styles should always use chronos keys and hashes for colours.

Hashes are essential for two reasons.

1. Hard-coding colours breaks colour rotation. In order for colours to be not just assigned in rotation, but used for the elements they are assigned to, chronos style definitions must use the colour names passed to them. So hashes are essential when defining the properties of tag elements subject to colour rotation.
2. Chronos ***cannot track colours it doesn't know about and it doesn't know about colours passed directly to PGF/TikZ keys.*** Hard-coding colours breaks the system of colour names chronos provides. Chronos will assign colour names to colours regardless, but the names will not refer to the colours actually used. They will merely refer to the colours assigned. Chronos styles are responsible for ensuring assigned colours are used so chronos colour names work correctly. Suppose a chronos style includes `event/text tag+={text=red},event/connection+={draw=red}`. Chronos will keep assigning colours to elements of tag type event, but it will not assign 'red' except by happy chance.

Example: `\draw [chronos connect=period:red letter day] ...`

will still work, but may well use black or navy blue rather than the pillar box red expected. Since this referencing system works for some elements not subject to colour rotation at all, such as those belonging to tag info and applies even when colour rotation is disabled completely, it constitutes a more general reason to avoid hard-coding colours, even if the effects may be less immediately noticeable in some timelines.

13.2.4 Timeline Arrow

Chronos styles must decide whether to support timelines with and/or without one or more arrow tips and/or line caps. In deciding this, note the following points.

- Only `off line` styles can support these features.
- Adding, removing or modifying a tip or cap requires adjusting the `timeline width`. This is because the length available for representing time is reduced when some proportion of the timeline line is used for a tip or cap. Chronos adjusts automatically for `timeline margins` and `timeline era margins`, but styles are responsible for other adjustments.
- Supporting both arrowed and non-arrowed variants therefore requires conditionalised code.
- Each arrow tip and line cap requires a bespoke adjustment, even if used in default form.
- Users may legitimately use `timeline/timeline arrow` and `timeline/no timeline arrow` after loading a chronos style.
- Chronos styles may legitimately ignore these keys.
- Chronos styles must delay finalising the content of `timeline` until the end of the `<chronos preamble>` if they wish to support variants with and without tips and/or caps.

See `timeline/timeline arrow` and `timeline/no timeline arrow`.

```
timeline/conditional = {(<key-value list if arrow/cap>)}key-value list otherwise
  timeline arrow
    key
```

This key expects two arguments: *<key-value list if arrow/cap>* should be a list of key-values to be executed if `timeline/timeline arrow` is true; *<key value list otherwise>* should be a list of key-values to be executed if it is false. Chronos will switch the key path to `/chronos/` prior to using the list, but the `timeline` prefix must be specified if required. The effect is to add code to the style `timeline/do timeline arrow` which executes *<key-value list if arrow/cap>* if `timeline arrow` is true and *<key-value list otherwise>* otherwise. More specifically, the code used to implement this mechanism is equivalent to

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

If the timeline uses off line yearss, `\pgfqkeys{/chronos/timeline}{<do timeline arrow>}` is executed after `timeline/timeline height` is finalised.

Example: See below.

`timeline/do timeline arrow`
key

Chronos styles are expected to set this *via* `timeline/conditional timeline arrow`, which causes it to be executed in `timeline config`, but they could also execute it explicitly if required.

Default: dependent on other options

For example, `lines on line` supports arrowed and non-arrowed variants using

```
lines on line/.style={% https://tex.stackexchange.com/a/324453/
  /chronos/.cd,
  ...
  timeline={%
    timeline width'=120mm,
    ...
    timeline arrow,
    conditional timeline arrow={%
      timeline/timeline width'--=20mm,
      timeline/timeline line+={shorten >=-20mm, --{Triangle Cap[length=20mm]}},
      before headings+={%
        \path (chronos post) -- +(20mm,0pt);
      },
    }{ },
  },
  ...
},
```

`timeline arrow` requests an arrow by default, but does nothing else. `conditional timeline arrow` sets up the style keys to execute if `timeline arrow` is still enabled when `do timeline arrow` is executed. At this stage, then, no actual changes are applied to the style to be applied to the timeline.

The actual effects on the timeline's style are determined only at the end of *<chronos preamble>* when `timeline/do timeline arrow` is executed. Hence, the user may override the style's use

of `timeline arrow` by writing `timeline/timeline arrow=false` or `timeline/no timeline arrow` after loading lines on line.

Styles which support timeline arrows must do the following to ensure correct results⁴⁴.

1. Set `timeline/timeline arrow` if an arrow, non-default line-cap or similar is to be default.
2. Use `timeline/conditional timeline arrow` if a non-arrow is to be supported and configure the arrow/cap/spacer(s) *only* using this conditional.
3. Decrease `timeline/timeline width` by the total length of arrows, caps and spacers. At the beginning of the `chronos` environment, this dimension must equal the actual length available for the `timeline era margins`, `timeline margins` and the representation of time, else marks and years may be placed onto arrows or caps.

The recommended way to do this at present is to

- (a) calculate the total length of arrows, caps and spacers by hand and use `timeline/timeline width' = {\total length}` to subtract it from the user-specified `width`⁴⁵;
 - (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.

⁴⁴This 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.

⁴⁵Accurate calculation requires knowledge of `\pgflinewidth`, any use of `double`, custom options passed to the arrow and details of the formula PGF uses to calculate the length for the specific types of arrow tips and/or line caps configured. In some cases, this information is included in the *TikZ* manual but, in most cases, you must consult the source of the `arrows.meta` `pgf/ti\emphkz` library.

If you only want to use non-chronos keys in your style, however, it *is* straightforward. Simply create whatever PGF/TikZ styles you wish and add them to particular elements as you deem appropriate.

The trouble starts if you want to define style which include chronos keys. More particularly, difficulties arise if you want to use keys which are specific to tag contexts such as `at` or `tag anchor`. For example, the timeline in fig. 1 uses three custom styles, `tag left`, `tag post` and `tag right` to place text tags. Consider the definition of `tag right`,

```
at/.expand once=level -##1.south -| ##2,
tag anchor=north west,
anchor=south west,
xshift=5pt,
connectors=east,
```

It uses `at` and `tag anchor`, which are tag-specific chronos keys, as well as the `anchor` and `xshift` PGF/TikZ keys. A naïve approach would suggest

```
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'⁴⁶.

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}{%
```

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


```

at/.expand once=level -##1.south -| ##2,
tag anchor=north east,
anchor=south east,
xshift=-5pt,
text tag+={align=right},
},
tag post/.chronos key maker={tag post}{style}{%
at=level -##1.south -| chronos end,
tag anchor=north west,
anchor=south east,
connect=false,
connectors=east,
},

```

Note `tag post`'s use of the standard coordinate `chronos end` (fig. 3).

14 Debugging

*Note that many keys in this section draw on `chronos` overlay layer. They will typically draw **over** content you've created. This should not be a concern as they are not intended for use in the final document.*

`placeholders` = on|off
choice key

If enabled, any helper nodes created with `levels` will be visible rather than invisible⁴⁷ 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

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

Labels a selection of `chronos` coordinates, which may be useful for placement or trouble-shooting purposes.

Default: `true`

Initially: `false`

`show bounding box = true|false`

boolean key

Draws the bounding box of the `tikzpicture` containing the timeline.

Default: `true`

Initially: `false`

`show nodes = true|false`

boolean key

If, and only if, `timeline mark eras` is explicitly enabled (as opposed to being enabled just because a timeline spans BCE and CE), draws and labels the nodes containing the era labels on the timeline.

Default: `true`

Initially: `false`

`debug` A convenience key which switches on all four of the options above.

key

```
\begin{chronos}
  debug,
\end{chronos}
```

The following keys are available to customise the output of the options in this section.

`show coordinate colour = <colour name>`

`show coordinate color`

colour key

Default: `red`

`show bb colour = <colour name>`

`show bb color`

colour key

Default: `green`

`show node colour = <colour name>`

`show node color`

colour key

Default: `blue`

`show coordinate` A style used to show coordinates. It is used both directly and indirectly by both `show coord` and `show node coord`. If you want to redefine it, it should take 5 arguments: a colour name, an angle, the name of the coordinate, a dimension and a (possibly empty) key-value list.

Default: `fill=#1, circle, anchor=center, inner sep=1pt, text=#1, pin=[[#1, inner sep=0pt, pin edge={draw=#1}, pin distance=#4, #5]#2:#3}`

`show coord` A style used to show coordinates. If you want to redefine it, it should take 2 arguments: the name of the coordinate and an angle.

style

Default: `/chronos/show coordinate={<chronos show coordinate colour>}{#1}{#2}{30pt}{}`

`show node coord` A style used to show particular points on nodes. If you want to redefine it, it should take 2 arguments: the name of the coordinate and an angle.

style

Default: `/chronos/show coordinate={<chronos show node colour>}{#1}{#2}{30pt}{}`

`\chronosshowcolour` [`<\macroname>`]{<colour name>}

macro

`\chronosshowcolour*` [`<\macroname>`]{<colour name>}

macro

`\chronosshowcolor` [`<\macroname>`]{<colour name>}

macro

`\chronosshowcolor*` [`\macroname`]{`<colour name>`}

macro

Extract the colour specification of `<colour name>` to the macro `\macroname`. The starred forms show `\macroname`; the remainder merely (re)define it. In case it is not obvious, don't use a `\macroname` you care about as it will be overwritten without warning. By default, an internal macro is used and reused, so, if you don't specify `\macroname`, you can only inspect one colour specification at a time.

Example: `\chronosshowcolour*{white}`

will show the colour specification of `white` on the terminal.

The remainder are unlikely to be helpful except in debugging `chronos` and no attempt has been made to render their output intelligible.

`\chronosshowpreset` Show non-default globalised options. This shows the properties⁴⁸ currently recorded as set by the user. This includes selected options set by `chronos` styles and options set with `\chronosset`, but not defaults set by `chronos` when loading. This list is used in deciding whether to change the current setting of an option during timeline configuration. For example, if a user specifically requests `off line years` with a `timeline height` of 50mm in white-on-blue, `chronos` won't override those settings. But if a user asks for `off line years` without specifying `timeline height` or changing the default colours, `chronos` will try to select something reasonable for `timeline height` and assume the user wants black-on-white rather than white-on-white.

macro

The output of `\chronosshowpreset` is unlikely to prove especially enlightening unless debugging `chronos`. Here, for example, is the output when used at the start of a sample `chronos` environment,

```
The sequence \l__chronos_gosod_seq is empty
> .
```

and right after the optional argument has been processed,

The sequence `\l__chronos_gosod_seq` contains the items (without outer braces):

```
> {angor@blynyddoedd}
> {timeline@years}
> {@digwyddiad@llawn}
> {@byw@llawn}
> {@parhad@llawn}
> {markeras}
> {llynell}
> {cysylltiad}
> {llynell amser}
> {border}.
```

So this user didn't specify any non-default settings in the document preamble or with `\chronosset`, but has either set or specified a `chronos` style which set various options for this particular `chronos` environment, which `chronos` should respect. Note that the output tells us nothing about what has been chosen, but only *that* an explicit choice has been made. For example, `markeras` means the user has decided eras should or should not be marked on the timeline, but does not tell us which.

`\chronosshowfeatures` [`<tag>`]

macro

life, event, period, theory, info

Shows properties⁴⁹ 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`.

⁴⁸Specifically, the contents of the `expl3` sequence used to record the names of `chronos` properties.

⁴⁹Specifically, `expl3` property lists.

Here's the output from `\chronosshowfeatures` inside a `chronos` environment, but outside any tag context,

The property list `\l__chronos_prop` contains the pairs (without outer braces):

```
> {@tag} => {{,/chronos/troi lliwiau=false,/chronos/blynyddoedd yn
unig,/chronos/heb gyfnodau,/chronos/troi lliwiau=true}}
> {@cysylltwr@chronos} => {{coordinate}}
> {@cysylltwr@testun} => {{anchor=center,inner sep=0pt,outer
sep=0pt,circle, anchor=center, draw=none, fill=none, minimum
size=\pgflinewidth }}
> {@llinell} => {{}}
> {@testun} => {{fill=chronos main background colour, text=###1, fill
opacity=.75, text opacity=1, draw=none, rounded corners, align=center,
font=\sffamily \footnotesize ,draw=###1,sharp corners,text opacity=1,fill
opacity=1,draw opacity=1,drop shadow}}
> {@cysylltiad} => {{draw=##1, {Triangle[width=0pt 3,reversed,length=0pt
1.5]}-{Triangle[width=0pt 5,reversed,length=0pt 2.5]}}}
```

and from `\chronosshowfeatures[event]`,

The property list `\l__chronos_digwyddiad_prop` contains the pairs (without outer braces):

```
> {@cysylltwr@chronos} => {{coordinate}}
> {@cysylltwr@testun} => {{circle, anchor=center, draw=none, fill=none,
minimum size=\pgflinewidth }}
> {@testun} => {{fill=chronos main background colour, text=##1, fill
opacity=.75, text opacity=1, draw=none, rounded corners, align=center,
font=\sffamily \footnotesize ,draw=##1,sharp corners,text opacity=1,fill
opacity=1,draw opacity=1,drop shadow}}
> {@tag} => {{,/chronos/blynyddoedd yn unig,/chronos/heb
gyfnodau,/chronos/troi lliwiau=true}}
> {@llinell} => {{draw=chronos timeline foreground colour, thick, blend
mode=overlay}}}
```

Table 15: Public names for `chronos` internal macros defined locally within the *<timeline specification>*.

Public name	Chronos internal name
<code>\ceyearlabel</code>	<code>\chronos@yearce</code>
<code>\bceyearlabel</code>	<code>\chronos@yearbce</code>
<code>\celabel</code>	<code>\chronos@ce</code>
<code>\bcelabel</code>	<code>\chronos@bce</code>
<code>\timelineht</code>	<code>\chronos@height</code>
<code>\timelineborderht</code>	<code>\chronos@borderheight</code>
<code>\timelinewd</code>	<code>\chronos@width</code>
<code>\lineyshift</code>	<code>\chronos@llinell@yshift</code>

Table 16: Public names for `chronos` internal macros defined if undefined at the end of the preamble.

Public name	Chronos internal name
<code>\ceyearlabel</code>	<code>\chronos@yearce</code>
<code>\bceyearlabel</code>	<code>\chronos@yearbce</code>
<code>\celabel</code>	<code>\chronos@ce</code>
<code>\bcelabel</code>	<code>\chronos@bce</code>

15 Compatibility

`Chronos` timelines cannot be externalised using `TikZ`'s external `pgf/ti\emphkz` library⁵⁰.

`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, $\LaTeX 2_{\epsilon}$ 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 tests⁵¹, 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.

⁵⁰However, `chronos` pictures *can* be ‘memoized’. Moreover, if `memoize` is loaded, `chronos` will set up ‘automemoization’ by default. See section 11.

⁵¹They 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_EX SE Answers

The CTAN release of `chronos` is not backwards compatible with versions published on [T_EX 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_EX 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 preamble⁵²:

```
\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.

⁵²The 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†

v0.9.1 (SVN 10925)

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 do¹.

*This is file `chronos-code.dtx`.

†Bug tracker: codeberg.org/cfr/chronos/issues | Code: codeberg.org/cfr/chronos | Mirror: github.com/cfr42/chronos

¹I’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^AT_EX 2_ε package.

```

1 \RequirePackage{svn-prov}
2 \def\GetFileBaseName#1-#2\nil{#1}
3 \edef\MyFileBaseName{\expandafter\GetFileBaseName\jobname\nil}
4 \ProvidesPackageSVN[chronos.sty]{$Id: chronos-code.dtx 10925 2025-03-07 15:07:59Z cfrees
5 }[v0.9.1 \revinfo]
6 \DefineFileInfoSVN[chronos]

7 \NeedsTeXFormat{LaTeX2e}[2021-11-15]
8 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

```

copied verbatim, excepting format from Joseph Wright's `siunitx.sty` under LPPL

```

8 \@ifundefined{ExplLoaderFileDate}{%
9   \RequirePackage{expl3}%
10 }{}

```

almost verbatim from `siunitx.sty`

```

11 \@ifl@t@r\ExplLoaderFileDate{2022-02-24}{%
12 }{%
13   \PackageError{chronos}{Support package expl3 too old}
14   {%
15     You need to update your installation of the bundles 'l3kernel' and
16     'l3packages'.\MessageBreak
17     Loading~chronos~will~abort!%
18   }%
19   \endinput
20 }%
21 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
22 \ExplSyntaxOn
23 \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

24 \keys_define:nn { chronos } %^^A <<<
25 {
26   enwau~lliw~syml .legacy_if_set:n = chronos@enwauiliwsyml,
27   enwau~lliw~syml .default:n = true,
28   enwau~lliw~syml .initial:n = true,
29   enwau~lliw~syml .usage:n = general,
30   simple~colour~names .legacy_if_set:n = chronos@enwauiliwsyml,
31   simple~colour~names .default:n = true,
32   simple~colour~names .usage:n = general,
33   simple~color~names .legacy_if_set:n = chronos@enwauiliwsyml,
34   simple~color~names .default:n = true,
35   simple~color~names .usage:n = general,
36   dim~enwau~lliw~syml .legacy_if_set_inverse:n = chronos@enwauiliwsyml,
37   dim~enwau~lliw~syml .default:n = true,
38   dim~enwau~lliw~syml .usage:n = general,
39   no~simple~colour~names .legacy_if_set_inverse:n = chronos@enwauiliwsyml,
40   no~simple~colour~names .default:n = true,
41   no~simple~colour~names .usage:n = general,
42   no~simple~color~names .legacy_if_set_inverse:n = chronos@enwauiliwsyml,
43   no~simple~color~names .default:n = true,
44   no~simple~color~names .usage:n = general,
45 } %^^A >>>

```

`\IfFormatAtLeastTF` Joseph Wright: from `siunitx.sty`; <https://chat.stackexchange.com/transcript/message/64327823#64327823>

```

46 \providecommand \IfFormatAtLeastTF { \@ifl@t@r \fmtversion }
47 \IfFormatAtLeastTF { 2022-06-01 }
48 {
49   \ProcessKeyOptions [ chronos ]
50 }{
51   \RequirePackage { l3keys2e }
52   \ProcessKeysOptions { chronos }
53 }

54 \IfFormatAtLeastTF { 2020-10-01 }{
55 }{
56   \RequirePackage { xparse }
57   \providecommand \ExpandArgs [1]
58   { \cs_if_exist_use:c { exp_args:N #1 } }
59 }
60 \ExplSyntaxOff
61 \RequirePackage{xcolor}

```

A mae fixedpointarithmetic eisiau fp - fixedpointarithmetic needs fp

```

62 \RequirePackage{tikz,etoolbox,pgfcalendar,calc,fp}% rwyd ti *eisiau* calc!
63 \usetikzlibrary{arrows.meta,calc,positioning,fixedpointarithmetic,decorations.%
64   text,fit,shadows}
65 \IfFileExists{tikzlibrarycfrforeground.code.tex}{%
66   \usetikzlibrary{cfrforeground}%
67 }{%
68   \usetikzlibrary{backgrounds}%
69 }

70 \ExplSyntaxOn

71 \bool_new:N \l__chronos_byw_troi_bool
72 \bool_new:N \l__chronos_digwyddiad_troi_bool
73 \bool_new:N \l__chronos_parhad_troi_bool
74 \bool_new:N \l__chronos_theori_troi_bool
75 \bool_new:N \l__chronos_gwybodaeth_troi_bool
76 \bool_new:N \l__chronos_troi_bool

77 \clist_new:N \g__chronos_lliwiau_uchod_clist
78 \clist_new:N \g__chronos_lliwiau_isod_clist
79 \clist_new:N \g__chronos_lliwiau_byw_uchod_clist
80 \clist_new:N \g__chronos_lliwiau_byw_isod_clist
81 \clist_new:N \g__chronos_lliwiau_parhad_uchod_clist
82 \clist_new:N \g__chronos_lliwiau_parhad_isod_clist
83 \clist_new:N \g__chronos_lliwiau_digwyddiad_uchod_clist
84 \clist_new:N \g__chronos_lliwiau_digwyddiad_isod_clist
85 \clist_new:N \g__chronos_lliwiau_theori_uchod_clist
86 \clist_new:N \g__chronos_lliwiau_theori_isod_clist
87 \clist_new:N \g__chronos_lliwiau_uchod_rhag_clist
88 \clist_new:N \g__chronos_lliwiau_isod_rhag_clist
89 \clist_new:N \g__chronos_lliwiau_byw_uchod_rhag_clist
90 \clist_new:N \g__chronos_lliwiau_byw_isod_rhag_clist
91 \clist_new:N \g__chronos_lliwiau_parhad_uchod_rhag_clist
92 \clist_new:N \g__chronos_lliwiau_parhad_isod_rhag_clist
93 \clist_new:N \g__chronos_lliwiau_digwyddiad_uchod_rhag_clist
94 \clist_new:N \g__chronos_lliwiau_digwyddiad_isod_rhag_clist
95 \clist_new:N \g__chronos_lliwiau_theori_uchod_rhag_clist
96 \clist_new:N \g__chronos_lliwiau_theori_isod_rhag_clist
97 \clist_new:N \l__chronos_llythrennau_bach_clist
98 \clist_set:Nn \l__chronos_llythrennau_bach_clist
99 {
100   a, an, and, as, but, for, if, in, is, of, on, the

```

```

101 }
102 \clist_new:N \l__chronos_dyddiadau_coords_clist
103 \clist_new:N \l__chronos_subheadings_clist
104 \clist_new:N \g__chronos_century_subheadings_clist
105 \clist_new:N \l__chronos_headings_clist
106 \clist_new:N \l__chronos_tmpa_clist
107 \clist_new:N \g__chronos_tmpa_clist
108 \clist_new:N \l__chronos_tmpb_clist
109 \clist_new:N \l__chronos_tmpe_clist

110 \int_gzero_new:N \g__chronos_int
111 \int_new:N \l__chronos_tmpe_int
112 \int_new:N \l__chronos_tmpe_int

113 \prop_new:N \l__chronos_byw_prop
114 \prop_new:N \l__chronos_digwyddiad_prop
115 \prop_new:N \l__chronos_gwybodaeth_prop
116 \prop_new:N \l__chronos_parhad_prop
117 \prop_new:N \l__chronos_theori_prop

118 \prop_new:N \l__chronos_rhagosedig_prop
119 \prop_new:N \l__chronos_prop
120 \prop_new:N \l__chronos_tmpe_prop

121 \regex_const:Nn \c__chronos_enw_regex { [^A-Za-z0-9\s\~] }
122 \regex_const:Nn \c__chronos_enw_priflythren_cyntaf_regex { (^[A-Za-z]*)([a-z]) }
123 \regex_const:Nn \c__chronos_enw_diogelu_regex
124 {
125   ([\s\~\c{\\}][[:punct:]]*) ([^\s\~\c{\\}]*)(\b|\c{\\})
126 } % \s unrhyw space character \b word boundary

127 \regex_const:Nn \c__chronos_curly_bracket { [ \{ \} ] }
128 \regex_const:Nn \c__chronos_initial_minus { ^\~ }

129 \seq_new:N \l__chronos_gosod_seq
130 \seq_new:N \l__chronos_tmpe_seq

131 \tl_new:N \l__chronos_lliw_tl
132 \tl_new:N \l__chronos_date_tl
133 \tl_new:N \l__chronos_dateformat_tl
134 \tl_new:N \l__chronos_year_tl
135 \tl_new:N \l__chronos_yearformat_tl
136 \tl_new:N \l__chronos_minoryearformat_tl
137 \tl_new:N \l__chronos_tikzname_tl
138 \tl_set:Nn \l__chronos_dateformat_tl { !d/!m/!Y }
139 \tl_set:Nn \l__chronos_yearformat_tl { !Y }
140 \tl_set:Nn \l__chronos_minoryearformat_tl { !c }
141 \tl_new:N \l__chronos_tmpe_tl
142 \tl_new:N \l__chronos_tmpe_tl
143 \tl_new:N \l__chronos_tmpe_tl
144 \tl_new:N \l__chronos_tmpe_tl

```

foreground Colour keys handled by l3keys.

```

background
timeline foreground 145 \keys_define:nn { chronos / lliwiau }%^^A <<<
timeline background 146 {
timeline border outer 147 foreground .code:n = {\__chronos_color_set_from_existing:nn
timeline border inner 148 {chronos@prifliw}{#1}},
timeline border middle 149 foreground .groups:n = {core},
life 150 background .code:n = {\__chronos_color_set_from_existing:nn
period 151 {chronos@prifliw@cefndir}{#1}},
event 152 background .groups:n = {core},
theory 153 timeline ~ foreground .code:n = {\__chronos_color_set_from_existing:nn
info 154 {chronos@lliw@llinell}{#1}

```

```

155  },
156  timeline ~ foreground .groups:n = {core ~ derivative},
157  timeline ~ background .code:n = {\_chronos_color_set_from_existing:nn
158    {chronos@lliw@cefndir@llinell}{#1}},
159  timeline ~ background .groups:n = {core ~ derivative},
160  timeline ~ border ~ outer .code:n = {\_chronos_color_set_from_existing:nn
161    {chronos@borderouter}{#1}},
162  timeline ~ border ~ outer .groups:n = {core ~ border},
163  timeline ~ border ~ inner .code:n = {\_chronos_color_set_from_existing:nn
164    {chronos@borderinner}{#1}},
165  timeline ~ border ~ inner .groups:n = {core ~ border},
166  timeline ~ border ~ middle .code:n = {\_chronos_color_set_from_existing:nn
167    {chronos@bordermiddle}{#1}},
168  timeline ~ border ~ middle .groups:n = {core ~ border},
169  life / default .code:n = {\_chronos_color_set_from_existing:nn
170    {chronos@byw@lliw@rhagosodedig}{#1}},
171  event / default .code:n = {\_chronos_color_set_from_existing:nn
172    {chronos@digwyddiad@lliw@rhagosodedig}{#1}},
173  period / default .code:n = {\_chronos_color_set_from_existing:nn
174    {chronos@parhad@lliw@rhagosodedig}{#1}},
175  theory / default .code:n = {\_chronos_color_set_from_existing:nn
176    {chronos@theori@lliw@rhagosodedig}{#1}},
177  info / default .code:n = {\_chronos_color_set_from_existing:nn
178    {chronos@gwybodaeth@lliw@rhagosodedig}{#1}},

```

default above Colour list keys handled by l3keys.

```

default below
  life above
  life below
  event above
  event below
  period above
  period below
  theory above
  theory below
179  default ~ above .clist_gset:N = \g__chronos_lliwiau_uchod_clist,
180  default ~ below .clist_gset:N = \g__chronos_lliwiau_isod_clist,
181  life / above .clist_gset:N = \g__chronos_lliwiau_byw_uchod_clist,
182  life / below .clist_gset:N = \g__chronos_lliwiau_byw_isod_clist,
183  event / above .clist_gset:N = \g__chronos_lliwiau_digwyddiad_uchod_clist,
184  event / below .clist_gset:N = \g__chronos_lliwiau_digwyddiad_isod_clist,
185  period / above .clist_gset:N = \g__chronos_lliwiau_parhad_uchod_clist,
186  period / below .clist_gset:N = \g__chronos_lliwiau_parhad_isod_clist,
187  theory / above .clist_gset:N = \g__chronos_lliwiau_theori_uchod_clist,
188  theory / below .clist_gset:N = \g__chronos_lliwiau_theori_isod_clist,
189  }%^^A >>>

```

YY yn lle YYYY

```

190  \cs_new_protected_nopar:Npn \_chronos_year_shorten:n #1
191  {
192    \int_set:Nn \l__chronos_tmpa_int { \tl_count:n { #1 } }
193    \int_compare:nTF
194    {
195      \l__chronos_tmpa_int < 3
196    }
197    {
198      #1
199    }
200    {
201      \int_compare:nTF
202      {
203        \l__chronos_tmpa_int < 4
204      }
205      {
206        \_chronos_year_shorten_aux:w 0 #1 \q_stop
207      }
208      {
209        \_chronos_year_shorten_aux:w #1 \q_stop % expl3 manuaal, 46
210      }

```

```

211 }
212 }
213 \cs_new_protected_nopar:Npn \__chronos_year_shorten_aux:w #1 #2 #3 #4 \q_stop
214 {
215   #3 #4
216 }
217 \cs_generate_variant:Nn \__chronos_year_shorten:n { V , v , x }
218 \cs_new_protected_nopar:Npn \__chronos_year_semi_shorten:n #1
219 {

220   \int_set:Nn \l__chronos_tmpa_int { \tl_count:n { #1 } }
221   \int_compare:nTF
222   {
223     \l__chronos_tmpa_int < 4
224   }
225   {
226     #1
227   }
228   {

```

expl3 manual, 46 (w/q_stop?) ; §5.7 Unbraced

```

229   \__chronos_year_semi_shorten_aux:w #1 \q_stop

230 }
231 }
232 \cs_new_protected_nopar:Npn \__chronos_year_semi_shorten_aux:w #1 #2 #3 #4 \q_stop
233 {
234   #2 #3 #4
235 }
236 \cs_generate_variant:Nn \__chronos_year_semi_shorten:n { V , v , x }
237 \cs_generate_variant:Nn \int_abs:n { v }
238 \cs_generate_variant:Nn \tl_replace_all:Nnn { Nnx }

```

dangos dyddiadau | show dates

ateb Joseph Wright: <http://tex.stackexchange.com/a/327642/> ; PD/CCO at <https://tex.stackexchange.com/users/73/joseph-wright>

```

239 \cs_new_protected_nopar:Npn \__chronos_show_date:n #1
240 {%
241   \tl_set_eq:NN \l__chronos_date_tl \l__chronos_dateformat_tl
242   \tl_replace_all:Nnx \l__chronos_date_tl { !a }
243     { \pgfcalendarweekdayshortname{\thechronos@weekday} }
244   \tl_replace_all:Nnx \l__chronos_date_tl { !A }
245     { \pgfcalendarweekdayname{\thechronos@weekday} }
246   \tl_replace_all:Nnx \l__chronos_date_tl { !b }
247     { \pgfcalendarmonthshortname{\csname chronos@#1month\endcsname} }
248   \tl_replace_all:Nnx \l__chronos_date_tl { !B }
249     { \pgfcalendarmonthname{\csname chronos@#1month\endcsname} }
250   \tl_replace_all:Nnx \l__chronos_date_tl { !c }
251     { \__chronos_year_semi_shorten:x { \int_abs:v { chronos@#1year } } }
252   \tl_replace_all:Nnx \l__chronos_date_tl { !d }
253     { \csname chronos@#1day\endcsname }
254   \tl_replace_all:Nnx \l__chronos_date_tl { !E }
255     { \__chronos_dateformat_era:v { chronos@#1year } }
256   \tl_replace_all:Nnx \l__chronos_date_tl { !m }
257     { \csname chronos@#1month\endcsname }
258   \tl_replace_all:Nnx \l__chronos_date_tl { !q }
259     { \__chronos_dateformat_sign:v { chronos@#1year } }
260   \tl_replace_all:Nnx \l__chronos_date_tl { !Q }
261     { \__chronos_dateformat_signs:v { chronos@#1year } }
262   \tl_replace_all:Nnx \l__chronos_date_tl { !y }

```

```

263 { \__chronos_year_shorten:x { \int_abs:v { chronos@#1year } } }
264 \tl_replace_all:Nnx \l__chronos_date_tl { !Y }
265 { \int_abs:v { chronos@#1year } }
266 \l__chronos_date_tl
267 }
268 \cs_new_protected_nopar:Npn \__chronos_show_year:n #1
269 {% ateb Joseph Wright: \url{http://tex.stackexchange.com/a/327642/} ; PD/CCO at \url{https://
270 \tl_set_eq:NN \l__chronos_year_tl \l__chronos_yearformat_tl
271 \tl_replace_all:Nnx \l__chronos_year_tl { !c }
272 { \__chronos_year_semi_shorten:x { \int_abs:n { #1 } } }
273 \tl_replace_all:Nnx \l__chronos_year_tl { !E }
274 { \__chronos_dateformat_era:n { #1 } }
275 \tl_replace_all:Nnx \l__chronos_year_tl { !q }
276 { \__chronos_dateformat_sign:n { #1 } }
277 \tl_replace_all:Nnx \l__chronos_year_tl { !Q }
278 { \__chronos_dateformat_signs:n { #1 } }
279 \tl_replace_all:Nnx \l__chronos_year_tl { !y }
280 { \__chronos_year_shorten:x { \int_abs:n { #1 } } }
281 \tl_replace_all:Nnx \l__chronos_year_tl { !Y }
282 { \int_abs:n { #1 } }
283 \l__chronos_year_tl
284 }
285 \cs_new_protected_nopar:Npn \__chronos_dateformat_sign:n #1
286 {
287 \int_compare:nT { #1 < 0 } { - }
288 }
289 \cs_generate_variant:Nn \__chronos_dateformat_sign:n { v }
290 \cs_new_protected_nopar:Npn \__chronos_dateformat_signs:n #1
291 {
292 \int_compare:nTF
293 { #1 < 0 } { - }
294 {
295 \int_compare:nT { #1 > 0 }
296 {
297 +
298 }
299 }
300 }
301 \cs_generate_variant:Nn \__chronos_dateformat_signs:n { v }
302 \cs_new_protected_nopar:Npn \__chronos_dateformat_era:n #1
303 {
304 \int_compare:nTF
305 { #1 < 0 } { \chronos@yearbce }
306 {
307 \int_compare:nT { #1 > 0 }
308 {
309 \chronos@yearce
310 }
311 }
312 }
313 \cs_generate_variant:Nn \__chronos_dateformat_era:n { v }
314 \cs_new_protected_nopar:Npn \__chronos_set_dateformat:n #1
315 {
316 \tl_set:Nn \l__chronos_dateformat_tl { #1 }
317 \tl_replace_all:Nnn \l__chronos_dateformat_tl { ~ } { \c_space_token }
318 }
319 \cs_generate_variant:Nn \__chronos_set_dateformat:n { v }
320 \cs_new_protected_nopar:Npn \__chronos_set_yearformat:n #1
321 {
322 \tl_set:Nn \l__chronos_yearformat_tl { #1 }
323 \tl_replace_all:Nnn \l__chronos_yearformat_tl { ~ } { \c_space_token }

```

```

324 }
325 \cs_generate_variant:Nn \__chronos_set_yearformat:n { V }
326 \cs_new_protected_nopar:Npn \__chronos_set_minoryearformat:n #1
327 {
328   \tl_set:Nn \l__chronos_minoryearformat_tl { #1 }
329   \tl_replace_all:Nnn \l__chronos_minoryearformat_tl { ~ } { \c_space_token }
330 }
331 \cs_generate_variant:Nn \__chronos_set_minoryearformat:n { V }
332 \cs_generate_variant:Nn \regex_match:NnTF { NVTF }
333 \cs_new_protected_nopar:Nn \__chronos_set_date_aux:n
334 {
335   \tl_set:Nx \l__chronos_tmpc_tl { #1 }
336   \regex_replace_all:NnN \c__chronos_curly_bracket {} \l__chronos_tmpc_tl
337   \regex_match:NVTF \c__chronos_initial_minus \l__chronos_tmpc_tl
338   {
339     \exp_last_unbraced:NV \__chronos_set_date_aux_bce:w \l__chronos_tmpc_tl \q_stop
340   }{
341     \exp_last_unbraced:NV \__chronos_set_date_aux_ce:w \l__chronos_tmpc_tl \q_stop
342   }
343 }
344 \cs_new_protected_nopar:Nn \__chronos_set_date:nnnn
345 {
346   \pgfcalendardatetojulian{#{1}-#2-#3}{\c@chronos@date}%
347   \setcounter{chronos@#4date}{\thechronos@date}%
348   \legacy_if:nF { chronos@yearzero }
349   {
350     \int_compare:nNnT { 0 } < { #1 }
351     {
352       \addtocounter{chronos@#4date}{-366}%
353     }
354   }
355   \expandafter\def\csname chronos@#4year\endcsname{#1}%
356   \expandafter\def\csname chronos@#4month\endcsname{#2}%
357   \expandafter\def\csname chronos@#4day\endcsname{#3}%
358 }
359 \cs_new_protected_nopar:Npn \__chronos_set_date_aux_bce:w -#1 - #2 - #3 - #4 @#5 \q_stop
360 {
361   \__chronos_set_date:nnnn {-#1} {#2} {#3} {#5}
362 }
363 \cs_new_protected_nopar:Npn \__chronos_set_date_aux_ce:w #1 - #2 - #3 - #4 @#5 \q_stop
364 {
365   \__chronos_set_date:nnnn {#1} {#2} {#3} {#5}
366 }

367 \cs_new_protected_nopar:Nn \__chronos_troilliwiau:nn
368 {
369   \clist_if_empty:cTF { g__chronos_lliwiau_#1_#2_clist }
370   {
371     \clist_gpop:cN { g__chronos_lliwiau_#2_clist } \l__chronos_lliw_tl
372     \clist_gput_right:cV { g__chronos_lliwiau_#2_clist } \l__chronos_lliw_tl
373   }{
374     \clist_gpop:cN { g__chronos_lliwiau_#1_#2_clist } \l__chronos_lliw_tl
375     \clist_gput_right:cV { g__chronos_lliwiau_#1_#2_clist } \l__chronos_lliw_tl
376   }
377 }
378 \cs_new_nopar:Nn \__chronos_color_set_from_existing:nn { \colorlet {#1} {#2} }

379 \cs_new_protected_nopar:Nn \__chronos_creu_tikzname:n
380 {
381   \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.)

```
382 {
383   \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?)

```
384 }{
385   \tl_set:Nn \l__chronos_tikzname_tl { #1 }
386 }
387 \regex_replace_all:NnN \c__chronos_enw_regex { } \l__chronos_tikzname_tl
388 }
389 \cs_new_protected_nopar:Nn \__chronos_enw_priflythrennu_eraill:n
390 {
391   \clist_if_in:NnTF \l__chronos_llythrennau_bach_clist { #1 } { #1 }
392   {
393     \str_uppercase:n #1
394   }
395 }
396 \cs_new_protected_nopar:Nn \__chronos_enw_priflythrennu:n
397 {
398   \tl_set:Nn \l__chronos_tmpc_tl { #1 }
399   \legacy_if:nF {chronos@felymae}
400   {
401     \regex_replace_all:NnN \c__chronos_enw_diogelu_regex
402     {
403       \1 \c{__chronos_enw_priflythrennu_eraill:n} \cB{ \2 \cE} \3
404     } \l__chronos_tmpc_tl
405     \regex_replace_all:NnN \c__chronos_enw_priflythren_cyntaf_regex
406     {
407       \1 \c{str_uppercase:n}\2
408     } \l__chronos_tmpc_tl
409   }
410   \l__chronos_tmpc_tl
411 }
412 \cs_generate_variant:Nn \__chronos_enw_priflythrennu:n { V,o }
```

functions: containment

```
413 \cs_new_protected_nopar:Nn \__chronos_at_begin: %^A <<< functions: containment
414 {
415   \cs_set_eq:NN \chronosset \@@chronosset
416   \pgfsetlayers{\chronos@layers}% cadw newidiadau tu mewn i'r grpw
417   \chronos@baselineskip=\baselineskip
418   \cs_if_free:NT \chronosbaselineskip
419   {
420     \cs_new_eq:NN \chronosbaselineskip \chronos@baselineskip
421   }
422   \int_gincr:N \g__chronos_int
423 } %^A >>> functions: containment
```

pgfkeys

```
424 \cs_new_protected_nopar:Nn \__chronos_cadw_nodweddion:nm
425 {% #1: tag #2 key #3 key-value list
426   \prop_put:cnn { l__chronos_#1_prop } { #2 } { {#3} }
427 }
428 \cs_new_protected_nopar:Nn \__chronos_cadw_nodweddion_rhag:nm
429 {% #1: tag #2 key #3 key-value list
430   \prop_put:Nnn \l__chronos_prop { #1 } { {#2} }
```

```

431 }
432 \cs_generate_variant:Nn \prop_put_from_keyval:Nn { cV }
433 \cs_new_protected_nopar:Nn \__chronos_cadw_nodweddion_rhestr:nnn
434 {
435   \clist_map_inline:nn { #1 }
436   {
437     \prop_put:cnn { l__chronos_##1_prop } { #2 } { {#3} }
438   }
439 }
440 \cs_new_protected_nopar:Nn \__chronos_ychwanegu_nodweddion:nnn
441 { % roedd y problem yn #3 yn eisoes!
442   \prop_get:cnNTF { l__chronos_#1_prop } { #2 } \l__chronos_tmpc_tl
443   {
444     \tl_set:Nn \l__chronos_tmpd_tl { #3 }
445     \regex_replace_all:nnN { \\ } { \\\ } \l__chronos_tmpd_tl
446     \regex_replace_once:nnN { \\z } { , \u{l__chronos_tmpd_tl} \\ } \l__chronos_tmpc_tl
447     \prop_put:cnV { l__chronos_#1_prop } { #2 } \l__chronos_tmpc_tl
448   }{
449     \prop_put:cnn { l__chronos_#1_prop } { #2 } { {#3} }
450   }
451 }
452 \cs_new_protected_nopar:Nn \__chronos_ychwanegu_nodweddion_rhestr:nnn
453 { % ## #1 rhestr o prop lists; #2 property; #3 value
454   \clist_map_inline:nn { #1 }
455   {
456     \prop_get:cnNTF { l__chronos_##1_prop } { #2 } \l__chronos_tmpc_tl
457     {
458       \tl_set:Nn \l__chronos_tmpd_tl { #3 }
459       \regex_replace_all:nnN { \\ } { \\\ } \l__chronos_tmpd_tl
460       \regex_replace_once:nnN { \\z } { , \u{l__chronos_tmpd_tl} \\ } \l__chronos_tmpc_tl
461       \prop_put:cnV { l__chronos_##1_prop } { #2 } \l__chronos_tmpc_tl
462     }{
463       \prop_put:cnn { l__chronos_##1_prop } { #2 } { {#3} }
464     }
465   }
466 }
467 \cs_new_protected_nopar:Nn \__chronos_ychwanegu_nodweddion_rhestr_pre:nnn
468 { % ## #1 rhestr o prop lists; #2 property; #3 value
469   \clist_map_inline:nn { #1 }
470   {
471     \prop_get:cnNTF { l__chronos_##1_prop } { #2 } \l__chronos_tmpc_tl
472     {
473       \tl_set:Nn \l__chronos_tmpd_tl { #3 }
474       \regex_replace_all:nnN { \\ } { \\\ } \l__chronos_tmpd_tl
475       \regex_replace_once:nnN { ^\{ } { \{ \u{l__chronos_tmpd_tl} , } \l__chronos_tmpc_tl
476       \prop_put:cnV { l__chronos_##1_prop } { #2 } \l__chronos_tmpc_tl
477     }{
478       \prop_put:cnn { l__chronos_##1_prop } { #2 } { {#3} }
479     }
480   }
481 }
482 \cs_new_protected_nopar:Nn \__chronos_ychwanegu_nodweddion_rhag:nn
483 {
484   \prop_get:cnNTF { l__chronos_prop } { #1 } \l__chronos_tmpc_tl
485   {
486     \tl_set:Nn \l__chronos_tmpd_tl { #2 }
487     \regex_replace_all:nnN { \\ } { \\\ } \l__chronos_tmpd_tl
488
489     \regex_replace_once:nnN { \\z } { , \u{l__chronos_tmpd_tl} \\ } \l__chronos_tmpc_tl
490     \prop_put:NnV \l__chronos_prop { #1 } \l__chronos_tmpc_tl
491   }{

```

```

491   \prop_put:Nnn \l__chronos_prop { #1 } { {#2} }
492 }
493 }
494 \cs_new_protected_nopar:Nn \__chronos_ychwanegu_nodweddion_rhag_pre:nn
495 {
496   \prop_get:cnNTF { l__chronos_prop } { #1 } \l__chronos_tmpc_tl
497   {
498     \tl_set:Nn \l__chronos_tmpd_tl { #2 }
499     \regex_replace_all:nnN { \\\ } { \\\\ } \l__chronos_tmpd_tl
500     \regex_replace_once:nnN { ^\{ } { \{ \u{l__chronos_tmpd_tl} , } \l__chronos_tmpc_tl
501     \prop_put:NnV \l__chronos_prop { #1 } \l__chronos_tmpc_tl
502   }{
503     \prop_put:Nnn \l__chronos_prop { #1 } { {#2} }
504   }
505 }
506 \cs_generate_variant:Nn \prop_concat:NNN { NNc }
507 \cs_new_protected_nopar:Nn \__chronos_gosod_nodweddion:n
508 {

```

cadw status | save status

```

509   \prop_set_eq:NN \l__chronos_rhagosedig_prop \l__chronos_prop
510   \prop_concat:NNc \l__chronos_tmpa_prop \l__chronos_prop { l__chronos_#1_prop }
511   \prop_set_eq:NN \l__chronos_prop \l__chronos_tmpa_prop
512   \prop_map_function:NN \l__chronos_prop \__chronos_tikzset:nn
513 }
514 \cs_generate_variant:Nn \__chronos_gosod_nodweddion:n { V }
515 \cs_new_protected_nopar:Nn \__chronos_ailosod_nodweddion:
516 {
517   \prop_set_eq:NN \l__chronos_prop \l__chronos_rhagosedig_prop
518   \prop_map_function:NN \l__chronos_prop \__chronos_tikzset:nn
519 }
520 \cs_new_protected_nopar:Nn \__chronos_dangos_nodweddion:n
521 {
522   \str_case:nnF { #1 }
523   {
524     { life } { \prop_show:N \l__chronos_byw_prop }
525     { event } { \prop_show:N \l__chronos_digwyddiad_prop }
526     { period } { \prop_show:N \l__chronos_parhad_prop }
527     { theory } { \prop_show:N \l__chronos_theori_prop }
528     { info } { \prop_show:N \l__chronos_gwybodaeth_prop }
529   }{
530     \prop_show:c { l__chronos_#1_prop }
531   }
532 }
533 \cs_new_protected_nopar:Nn \__chronos_dangos_nodweddion_rhag:
534 {
535   \prop_show:N \l__chronos_prop
536 }
537 \cs_new_protected_nopar:Nn \__chronos_tikzset:nn
538 {% \pgfqkeys{#1}{#2} = \pgfkeys{#1/.cd}{#2} ond yn gyflymach (Skillman a t 977)
539   \pgfqkeys {/chronos} { #1/.style = #2 }
540 }

541 \cs_new_protected_nopar:Nn \__chronos_lliwiau_cadw_rhag:
542 {
543   \clist_map_inline:nn { byw, digwyddiad, parhad, theori }
544   {
545     \clist_map_inline:nn { isod, uchod }
546     {
547       \clist_gset_eq:cc { g__chronos_lliwiau_##1_###1_rhag_clist }
548       {

```

```

549     g__chronos_lliwiau_##1_####1_clist
550     }
551   }
552 }
553 \clist_gset_eq:NN \g__chronos_lliwiau_isod_rhag_clist \g__chronos_lliwiau_isod_clist
554 \clist_gset_eq:NN \g__chronos_lliwiau_uchod_rhag_clist \g__chronos_lliwiau_uchod_clist
555 }
556 \cs_new_protected_nopar:Nn \__chronos_lliwiau_clirio:
557 {
558   \clist_map_inline:nn { byw, digwyddiad, parhad, theori }
559   {
560     \clist_map_inline:nn { isod, uchod }
561     {
562       \clist_gset_eq:cc { g__chronos_lliwiau_##1_####1_clist }
563       {
564         g__chronos_lliwiau_##1_####1_rhag_clist
565       }
566     }
567   }
568   \clist_gset_eq:NN \g__chronos_lliwiau_isod_clist \g__chronos_lliwiau_isod_rhag_clist
569   \clist_gset_eq:NN \g__chronos_lliwiau_uchod_clist \g__chronos_lliwiau_uchod_rhag_clist
570 }

571 \cs_new_protected_nopar:Nn \__chronos_at_end:
572 {
573   \clist_if_empty:NF \l__chronos_headings_clist
574   {
575     \clist_remove_duplicates:N \l__chronos_headings_clist
576     \clist_map_inline:Nn \l__chronos_headings_clist
577     {
578       \foreach \i/\j/\k in {##1} {%
579         \testunteitl[/chronos/@amseraumawr]{\i}{\j}{\k}(chronos ~ main ~ headings)}%^A
580         paid â defnyddio ’;’ neu dim byd yma
581         \legacy_if:nT { chronos@placeholders}
582         {
583           \scoped[on ~ chronos ~ foreground ~ layer]
584           {
585             \foreach \i/\j/\k in {##1} {\draw [/chronos/placeholder ~ lines] %
586               (chronos ~ main ~ headings -| \j) edge ~ node {\j} %
587               (chronos ~ bottom -| \j) (chronos ~ main ~ headings -| \k) %
588               edge ~ node {\k} (chronos ~ bottom -| \k);}
589           }
590         }
591       }
592     \clist_if_empty:NF \l__chronos_subheadings_clist
593     {
594       \clist_remove_duplicates:N \l__chronos_subheadings_clist
595       \clist_map_inline:Nn \l__chronos_subheadings_clist
596       {
597         \foreach \i/\j/\k/\m in {##1} {\testunteitl[/chronos/@amserau]{\i}{\j}{\k}{\m)}%^A
598         paid â defnyddio ’;’ neu dim byd yn y fan hon
599       }
600     }
601     \clist_if_empty:NF \g__chronos_century_subheadings_clist
602     {
603       \clist_remove_duplicates:N \g__chronos_century_subheadings_clist
604       \clist_map_inline:Nn \g__chronos_century_subheadings_clist
605       {
606         \seq_set_split:Nnn \l__chronos_tmpa_seq { / } { ##1 }
607         \seq_get_left:NN \l__chronos_tmpa_seq \l__chronos_tmpc_tl

```

```

607     \seq_get_right:Nn \l__chronos_tmpa_seq \l__chronos_tmpd_tl
608     \int_set:Nn \l__chronos_tmpe_int { 100 * \l__chronos_tmpe_tl }
609     \int_set:Nn \l__chronos_tmpe_int { \l__chronos_tmpe_int - 100 }
610     \testunteitl[/chronos/@amserau]{\l__chronos_tmpe_tl\l__chronos_tmpe_tl}%
611     [\l__chronos_tmpe_tl\textsuperscript{\l__chronos_tmpe_tl}c.]%
612     {chronos ~ year ~ \int_to_arabic:n {\l__chronos_tmpe_int}}%
613     {chronos ~ year ~ \int_to_arabic:n {\l__chronos_tmpe_int}}%
614     (chronos ~ lower ~ subheadings)% paid â defnyddio ‘;’ neu dim byd yn y fan hon
615   }
616 }
617 }

```

`__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)

```

618 \cs_new_protected_nopar:Nn \__chronos_kexpander:nnnn
619 { % #1 enw (brif enw) | name (primary name) ;
620   % #2 llwybr/prop tag | path/prop tag ;
621   % #3 rhag | default (' or +) ;
622   % #4 tags
623   \pgfqkeys{/chronos} {
624     #1'/.code={
625       \pgfqkeys{/chronos}{#2/.style={##1}}
626       \__chronos_cadw_nodweddion_rhag:nn { #2 } { ##1 }
627     },
628     #1+/.code={
629       \pgfqkeys{/chronos}{#2/.append ~ style={##1}}
630       \__chronos_ychwanegu_nodweddion_rhag:nn { #2 } { ##1 }
631     },
632     #1/.forward ~ to=/chronos/#1#3,
633     every ~ #1'/.code={
634       \pgfqkeys{/chronos}{#2/.style/.expand ~ once={##1}}
635       \__chronos_cadw_nodweddion_rhestr:nnn { #4 } { #2 } { ##1 }
636       \__chronos_cadw_nodweddion_rhag:nn { #2 } { ##1 }
637     },
638     every ~ #1+/.code={
639       \pgfqkeys{/chronos}{#2/.append ~ style/.expand ~ once={##1}}
640       \__chronos_ychwanegu_nodweddion_rhestr:nnn { #4 } { #2 } { ##1 }
641       \__chronos_ychwanegu_nodweddion_rhag:nn { #2 } { ##1 }
642     },
643     every ~ #1/.forward ~ to=/chronos/every ~ #1#3,
644   }
645 }
646 \cs_new_protected_nopar:Nn \__chronos_kexpander:nnnn
647 { % #1 enw | name ;
648   % #2 enw saesneg | english name ;
649   % #3 llwybr/prop tag | path/property tag ;
650   % #4 rhag | default (' or +) ;
651   % #5 tags
652   \__chronos_kexpander:nnnn { #1 } { #3 } { #4 } { #5 }
653   \pgfqkeys{/chronos} {
654     #2'/.forward ~ to=/chronos/#1',
655     #2+/.forward ~ to=/chronos/#1+,
656     #2/.forward ~ to=/chronos/#1,
657     every ~ #2'/.forward ~ to=/chronos/every ~ #1',
658     every ~ #2+/.forward ~ to=/chronos/every ~ #1+,
659     every ~ #2/.forward ~ to=/chronos/every ~ #1,
660   }
661 }
662 \cs_new_protected_nopar:Nn \__chronos_kexpandtotags:nnn

```

```

663 { % #1 enw | name ;
664 % #2 enw saesneg | english name ;
665 % #3 rhag | default ( ' or +)
666 \pgfqkeys{/chronos} {
667   every ~ #1'/.code={
668     \__chronos_cadw_nodweddion:nnn {#1}{@tag}{##1}
669   },
670   every ~ #1+/.code={
671     \__chronos_ychwanegu_nodweddion:nnn {#1}{@tag}{##1}
672   },
673   every ~ #1/.forward ~ to=/chronos/every ~ #1#3,
674   every ~ #2'/.forward ~ to=/chronos/every ~ #1',
675   every ~ #2+/.forward ~ to=/chronos/every ~ #1+,
676   every ~ #2/.forward ~ to=/chronos/every ~ #1,
677 }
678 }
679 \cs_new_protected_nopar:Nn \__chronos_kextripler:nnnn
680 { % #1 enw | name ;
681 % #2 llwybr/prop tag | path/prop tag ;
682 % #3 rhag | default ;
683 % #4 math e.e. style neu code | type e.g. style or code
684 \pgfqkeys{/chronos} {
685   #2/.#4={},
686   #1+/.code={
687     \pgfqkeys{/chronos}{#2/.append ~ #4={##1}}
688   },
689   #1'/.code={%
690     \pgfqkeys{/chronos}{#2/.#4={##1}}
691   },
692   #1/.forward ~ to=/chronos/#1#3,
693 }
694 }
695 \cs_new_protected_nopar:Nn \__chronos_kexforwardtriple:nn
696 {%
697 \pgfqkeys{/chronos} {
698   #2'/.forward ~ to=/chronos/#1',
699   #2+/.forward ~ to=/chronos/#1+,
700   #2/.forward ~ to=/chronos/#1,
701 }
702 }
703 \cs_new_protected_nopar:Nn \__chronos_kextripler:nnnnn
704 { % #1 enw | name ;
705 % #2 enw saesneg | english name ;
706 % #3 llwybr/prop tag | path/property tag ;
707 % #4 rhag | default ;
708 % #5 math e.e. style neu code | type e.g. style or code
709 \__chronos_kextripler:nnnn { #1 } { #3 } { #4 } { #5 }
710 \__chronos_kexforwardtriple:nn { #1 } { #2 }
711 }
712 \cs_new_protected_nopar:Nn \__chronos_kexforwarder:nn
713 { % #1 llwybr/enw | path/name ;
714 % #2 rhestr allweddau newydd | list of new keys
715 \clist_map_inline:nn { #2 }
716 {
717   \pgfqkeys{/chronos} { ##1/.forward ~ to=/chronos/#1 }
718 }
719 }
720 \cs_new_protected_nopar:Nn \__chronos_kexforwarder:nnn
721 { % #1 llwybr | path ;
722 % #2 enw | name ;
723 % #3 rhestr allweddau newydd ar yr un llwybr | list of new keys on the same path

```

```

724 \clist_map_inline:nn { #3 }
725 {
726   \pgfqkeys{/chronos/#1} { ##1/.forward ~ to=/chronos/#1/#2 }
727 }
728 }
729 \cs_new_protected_nopar:Nn \__chronos_keymaker:nnn
730 {
731   \clist_map_inline:nn { byw, digwyddiad, parhad, theori, gwybodaeth, prif }
732   {
733     \pgfqkeys{/chronos/##1} { #1/.#2={#3} }
734   }
735 }

736 \cs_generate_variant:Nn \legacy_if:nTF { oTF }

```

Joseph Wright: <https://chat.stackexchange.com/transcript/message/65523217#65523217>

```

737 \cs_new_eq:NN \__chronos_keys_set_exclude_groups:nnn \keys_set_exclude_groups:nnn
738 \cs_if_exist:NF \__chronos_keys_set_exclude_groups:nnn
739 {
740   \cs_new_eq:NN \__chronos_keys_set_exclude_groups:nnn \keys_set_filter:nnn
741 }

```

****mewnol hefyd!**** | ****internal also!**** Ddylwn i ddefnyddio `\NewDocumentCommand` (ond ****mewnol?***), `\newcommand/\newcommand*`, `\def/\gdef/\edef/\xdef`, `cs_new_eq:NN`, `\let neu rhywbeth arall?!!`

```

742 \newcommand* \chronos@tikzprefix { \int_to_arabic:n { \g__chronos_int } }
743 \cs_new_eq:NN \chronos@env@begin \__chronos_at_begin:
744 \cs_new_eq:NN \chronos@setdateformat \__chronos_set_dateformat:n
745 \cs_new_eq:NN \chronos@setyearformat \__chronos_set_yearformat:n
746 \cs_new_eq:NN \chronos@setminoryearformat \__chronos_set_minoryearformat:n

```

for pgf/tikz convenience

```

747 \NewDocumentCommand \chronos@showdate { o m }
748 {
749   \group_begin:
750   \IfValueT { #1 }
751   {
752     \__chronos_set_dateformat:n { #1 }
753   }
754   \pgfcalendarjuliantoweekday{\csname thechronos@#2date\endcsname}{\c@chronos@weekday}%
755   \__chronos_show_date:n { #2 }
756   \group_end:
757 }
758 \NewDocumentCommand \chronos@showdate@cs { o m }
759 {
760   \group_begin:
761   \IfValueT { #1 }
762   {
763     \__chronos_set_dateformat:v { #1 }
764   }
765   \pgfcalendarjuliantoweekday{\csname thechronos@#2date\endcsname}{\c@chronos@weekday}%
766   \__chronos_show_date:n { #2 }
767   \group_end:
768 }
769 \NewDocumentCommand \chronos@showyear { o m }
770 {
771   \group_begin:
772   \IfValueT { #1 }
773   {
774     \tl_set:No \l__chronos_tmpc_tl { #1 }

```

```

775     \tl_if_empty:NF \l__chronos_tmpc_tl
776     {
777         \__chronos_set_yearformat:V \l__chronos_tmpc_tl
778     }
779 }
780 \__chronos_show_year:n { #2 }
781 \group_end:
782 }

783 \newcommand* \chronos@minoryearformat { \l__chronos_minoryearformat_tl }
784 \newcommand* \chronos@troilliwiiau@uchod [1] [byw] {% 0 {byw}
785     \__chronos_troilliwiiau:nm { #1 } { uchod }
786     \expandafter\def\csname chronos@#1@lliw\endcsname{\l__chronos_lliw_tl}
787 }
788 \newcommand* \chronos@troilliwiiau@isod [1] [byw] {% 0 {byw}
789     \__chronos_troilliwiiau:nm { #1 } { isod }
790     \expandafter\def\csname chronos@#1@lliw\endcsname{\l__chronos_lliw_tl}
791 }
792 \NewDocumentCommand \chronos@lliwiau@uchod { o m }
793 {
794     \IfValueTF { #1 }
795     { \tl_set:Nn \l__chronos_tmpc_tl { _#1 } }
796     { \tl_clear:N \l__chronos_tmpc_tl }
797     \clist_gset:cn { g__chronos_lliwiau \l__chronos_tmpc_tl _uchod_clist } { #2 }
798 }
799 \NewDocumentCommand \chronos@lliwiau@isod { o m }
800 {
801     \IfValueTF { #1 }
802     { \tl_set:Nn \l__chronos_tmpc_tl { _#1 } }
803     { \tl_clear:N \l__chronos_tmpc_tl }
804     \clist_gset:cn { g__chronos_lliwiau \l__chronos_tmpc_tl _isod_clist } { #2 }
805 }
806 \cs_new_eq:NN \chronos@lliwiau@clear \__chronos_lliwiau_clririo:
807 \cs_new_eq:NN \chronos@lliwiau@cadw@rhag \__chronos_lliwiau_cadw_rhag:

808 \newcommand* \chronos@creu@tikzname [2] {% m m
809     \__chronos_creu_tikzname:n { #2 }
810     \expandafter\let\csname chronos@#1@tikzname\endcsname \l__chronos_tikzname_tl
811 }
812 \cs_new_eq:NN \chronos@enw@priflythrennu \__chronos_enw_priflythrennu:V
813 \cs_new_eq:NN \chronos@testunteitl@priflythrennu \__chronos_enw_priflythrennu:n

814 \cs_new_eq:NN \chronos@cadw@nodweddion@rhag \__chronos_cadw_nodweddion_rhag:nn
815 \cs_new_eq:NN \chronos@cadw@nodweddion \__chronos_cadw_nodweddion:nnn
816 \cs_new_eq:NN \chronos@ychwanegu@nodweddion \__chronos_ychwanegu_nodweddion:nnn
817 \NewDocumentCommand \chronos@ychwanegu@nodweddion@rhestr { s t {^} m m m }
818 {
819     \IfBooleanTF { #2 }
820     {
821         \__chronos_ychwanegu_nodweddion_rhestr_pre:nnn { #3 }{ #4 }{ #5 }
822         \IfBooleanT { #1 } { \__chronos_ychwanegu_nodweddion_rhag_pre:nn { #4 }{ #5 } }
823     }{
824         \__chronos_ychwanegu_nodweddion_rhestr:nnn { #3 }{ #4 }{ #5 }
825         \IfBooleanT { #1 } { \__chronos_ychwanegu_nodweddion_rhag:nn { #4 }{ #5 } }
826     }
827 }
828 \NewDocumentCommand \chronos@cadw@nodweddion@rhestr { s m m m }
829 {
830     \__chronos_cadw_nodweddion_rhestr:nnn { #2 }{ #3 }{ #4 }
831     \IfBooleanT { #1 } { \__chronos_cadw_nodweddion_rhag:nn { #3 }{ #4 } }
832 }
833 \cs_new_eq:NN \chronos@ychwanegu@nodweddion@rhag \__chronos_ychwanegu_nodweddion_rhag:nn

```



```

834 \cs_new_eq:NN \chronos@gosod@nodweddion \__chronos_gosod_nodweddion:n
835 \cs_new_eq:NN \chronos@gosod@nodweddion@var \__chronos_gosod_nodweddion:V
836 \cs_new_eq:NN \chronos@ailosod@nodweddion \__chronos_ailosod_nodweddion:
837 \cs_new_eq:NN \chronos@dangos@nodweddion \__chronos_dangos_nodweddion:n
838 \cs_new_eq:NN \chronos@dangos@nodweddion@rhag \__chronos_dangos_nodweddion_rhag:
839 \newcommand* \chronos@ychwanegu@gosod [1]
840 {
841   \legacy_if:nF { chronos@preset } {
842     \clist_map_inline:nn { #1 }
843     {
844       \seq_put_right:Nn \l__chronos_gosod_seq {##1}
845     }
846   }
847 }%
848 \newcommand* \chronos@dangos@gosod
849 {
850   \seq_show:N \l__chronos_gosod_seq
851 }
852 \newcommand* \chronos@if@gosodTF [3]
853 {
854   \seq_if_in:NnTF \l__chronos_gosod_seq { #1 } { #2 } { #3 }
855 }

856 \newcommand* \chronos@if@gosodF [2]
857 {
858   \chronos@presettrue
859   \seq_if_in:NnF \l__chronos_gosod_seq { #1 } { #2 }
860   \chronos@presetfalse
861 }
862 \NewDocumentCommand \chronos@dangos@lliwiau {
863   s 0 { byw, digwyddiad, parhad, theori } D () { isod, uchod }
864 } {
865   \clist_set:Nn \l__chronos_tmpb_clist { #2 }
866   \clist_set:Nn \l__chronos_tmpc_clist { #3 }
867   \clist_map_inline:Nn \l__chronos_tmpb_clist
868   {
869     \clist_map_inline:Nn \l__chronos_tmpc_clist
870     {
871       \clist_show:c { g__chronos_lliwiau_##1_####1_clist }
872     }
873   }
874   \IfBooleanT { #1 }
875   {
876     \clist_map_inline:Nn \l__chronos_tmpc_clist
877     {
878       \clist_show:c {g__chronos_lliwiau_##1_clist}
879     }
880   }
881 }
882 \NewDocumentCommand \chronos@dangos@lliwiau@rhag
883 {
884   s 0 { byw, digwyddiad, parhad, theori } D () { isod, uchod }
885 } {
886   \clist_set:Nn \l__chronos_tmpb_clist { #2 }
887   \clist_set:Nn \l__chronos_tmpc_clist { #3 }
888   \clist_map_inline:Nn \l__chronos_tmpb_clist
889   {
890     \clist_map_inline:Nn \l__chronos_tmpc_clist
891     {
892       \clist_show:c { g__chronos_lliwiau_##1_####1_rhag_clist }
893     }

```

```

894 }
895 \IfBooleanT { #1 }
896 {
897   \clist_map_inline:Nn \l__chronos_tmpe_clist
898   {
899     \clist_show:c {g__chronos_lliwiau_##1_rhag_clist}
900   }
901 }
902 }
903 \cs_new_eq:NN \chronosdangoslliwiau \chronos@dangos@lliwiau
904 \cs_new_eq:NN \chronosdangoslliwiaurhag \chronos@dangos@lliwiau@rhag
905 \newcommand* \chronos@dangos@fformatiau\dyddiadau{%
906   \clist_map_inline:nn
907   { \l__chronos_dateformat_tl, \l__chronos_yearformat_tl, \l__chronos_minoryearformat_tl}
908   { \tl_show:N ##1 }
909 }
910 \cs_new_eq:NN \chronosdangosfformatiau\dyddiadau \chronos@dangos@fformatiau\dyddiadau
911 \NewDocumentCommand \chronos@to@clist { t {+} m m }
912 {
913   \IfBooleanTF { #1 }
914   {
915     \clist_put_right:co { l__chronos_#2_clist } { #3 }
916   }{
917     \clist_set:co { l__chronos_#2_clist } { #3 }
918   }
919 }
920 \NewDocumentCommand \chronos@global@to@clist { s t {+} m m }
921 {
922   \IfBooleanTF { #2 }
923   {
924     \IfBooleanTF { #1 }
925     {
926       \clist_gput_right:cx { g__chronos_#3_clist } { #4 }
927     }{
928       \clist_gput_right:co { g__chronos_#3_clist } { #4 }
929     }
930   }{
931     \IfBooleanTF { #1 }
932     {
933       \clist_gset:cx { g__chronos_#3_clist } { #4 }
934     }{
935       \clist_gset:co { g__chronos_#3_clist } { #4 }
936     }
937   }
938 }
939 \newcommand* \chronos@global@clear@to@clist [1] {% m
940   \clist_gclear:c { g__chronos_#1_clist }
941 }
942 \newcommand* \chronos@from@clist [2] {% m m
943   \clist_remove_duplicates:c { l__chronos_#1_clist }
944   \clist_if_empty:cTF { l__chronos_#1_clist }
945   {
946     \expandafter\let#2\@empty
947   }{
948     \expandafter\let\expandafter#2\csname l__chronos_#1_clist\endcsname
949   }
950 }
951 \newcommand* \chronos@global@from@clist [1] {
952   \clist_use:cn { g__chronos_#1_clist } { , }
953 }
954 \newcommand* \chronos@global@eq@clist [2] {

```

```

955 \clist_gset_eq:cc { g__chronos_#1_clist } { g__chronos_#2_clist }
956 }
957 \newcommand* \chronos@dangos@clist [1] { \clist_show:c { #1_clist } }
958 \cs_new_eq:NN \chronos@at@end \__chronos_at_end:
959 \cs_new_eq:NN \chronos@set@date@aux \__chronos_set_date_aux:n
960 \cs_new_eq:NN \chronos@set@date \__chronos_set_date:nmn % blwyddyn; mis; dydd; tag for
    macro

961 \cs_new_eq:NN \chronos@legacy@if \legacy_if:oTF

962 \newcommand* \chronos@legacy@if@set [2] {\cs:w #1#2\cs_end:}
963 \def\chronos@datetojulian@extractyear #1-#2-#3 {#1}
964 \NewDocumentCommand \chronos@dangoslliw
965 { s 0 {\chronos@temp@lliw} m }
966 {\extractcolorspec{#3}{#2}\IfBooleanT{#1}{\show#2}}
967 \cs_new_eq:NN \chronos@keymaker \__chronos_kexkeymaker:nmn

```

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

```

\IfFreeTF
\IfFreeT
\IfFreeF
968 \cs_if_exist:NTF \IfFreeTF {\PackageWarning{chronos}{
969 Refusing ~ to ~ overwrite ~ existing ~ \protect\IfFreeTF.
970 ~ This ~ may ~ not ~ work}
971 } { \cs_new_eq:NN \IfFreeTF \cs_if_free:NTF }
972 \cs_if_exist:NTF \IfFreeT {\PackageWarning{chronos}{
973 Refusing ~ to ~ overwrite ~ existing ~ \protect\IfFreeT.
974 ~ This ~ may ~ not ~ work}
975 } { \cs_new_eq:NN \IfFreeT \cs_if_free:NT }
976 \cs_if_exist:NTF \IfFreeF {\PackageWarning{chronos}{
977 Refusing ~ to ~ overwrite ~ existing ~ \protect\IfFreeF.
978 ~ This ~ may ~ not ~ work}
979 } { \cs_new_eq:NN \IfFreeF \cs_if_free:NF }

```

`\IfExistTF` yn lle `\ifdef` o `etoolbox` - in place of `\ifdef` from `etoolbox`

```

\IfExistTF
\IfExistT
\IfExistF
980 \cs_if_exist:NTF \IfExistTF {\PackageWarning{chronos}{
981 Refusing ~ to ~ overwrite ~ existing ~ \protect\IfExistTF.
982 ~ This ~ may ~ not ~ work}
983 } { \cs_new_eq:NN \IfExistTF \cs_if_exist:NTF }
984 \cs_if_exist:NTF \IfExistT {\PackageWarning{chronos}{
985 Refusing ~ to ~ overwrite ~ existing ~ \protect\IfExistT.
986 ~ This ~ may ~ not ~ work}
987 } { \cs_new_eq:NN \IfExistT \cs_if_exist:NT }
988 \cs_if_exist:NTF \IfExistF {\PackageWarning{chronos}{
989 Refusing ~ to ~ overwrite ~ existing ~ \protect\IfExistF.
990 ~ This ~ may ~ not ~ work}
991 } { \cs_new_eq:NN \IfExistF \cs_if_exist:NF }

```

`\IfCSFreeTF` yn lle `\ifcsundef` o `etoolbox` - instead of `\ifcsundef`

```

\IfCSFreeTF
\IfCSFreeT
\IfCSFreeF
992 \cs_if_exist:NTF \IfCSFreeTF {\PackageWarning{chronos}{
993 Refusing ~ to ~ overwrite ~ existing ~ \protect\IfCSFreeTF.
994 ~ This ~ may ~ not ~ work}
995 } { \cs_new_eq:NN \IfCSFreeTF \cs_if_free:cTF }
996 \cs_if_exist:NTF \IfCSFreeT {\PackageWarning{chronos}{
997 Refusing ~ to ~ overwrite ~ existing ~ \protect\IfCSFreeT.
998 ~ This ~ may ~ not ~ work}
999 } { \cs_new_eq:NN \IfCSFreeT \cs_if_free:cT }
1000 \cs_if_exist:NTF \IfCSFreeF {\PackageWarning{chronos}{
1001 Refusing ~ to ~ overwrite ~ existing ~ \protect\IfCSFreeF.
1002 ~ This ~ may ~ not ~ work}
1003 } { \cs_new_eq:NN \IfCSFreeF \cs_if_free:cF }

```

```

\IfCSEexistTF yn lle \ifcsdef o etoolbox - instead of \ifcsdef
\IfCSEexistT
\IfCSEexistF 1004 \cs_if_exist:NTF \IfCSEexistTF {\PackageWarning{chronos}{
1005 Refusing ~ to ~ overwrite ~ existing ~ \protect\IfCSEexistTF.
1006 ~ This ~ may ~ not ~ work}
1007 } { \cs_new_eq:NN \IfCSEexistTF \cs_if_exist:cTF }
1008 \cs_if_exist:NTF \IfCSEexistT {\PackageWarning{chronos}{
1009 Refusing ~ to ~ overwrite ~ existing ~ \protect\IfCSEexistT.
1010 ~ This ~ may ~ not ~ work}
1011 } { \cs_new_eq:NN \IfCSEexistT \cs_if_exist:cT }
1012 \cs_if_exist:NTF \IfCSEexistF {\PackageWarning{chronos}{
1013 Refusing ~ to ~ overwrite ~ existing ~ \protect\IfCSEexistF.
1014 ~ This ~ may ~ not ~ work}
1015 } { \cs_new_eq:NN \IfCSEexistF \cs_if_exist:cF }

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

1016 \cs_if_exist:NTF \Undefine {\PackageWarning{chronos}{
1017 Refusing ~ to ~ overwrite ~ existing ~ \protect\Undefine.
1018 ~ This ~ may ~ not ~ work}
1019 } { \cs_new_eq:NN \Undefine \cs_undefine:N }

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

1020 \cs_if_exist:NTF \CSletCS {\PackageWarning{chronos}{
1021 Refusing ~ to ~ overwrite ~ existing ~ \protect\CSletCS.
1022 ~ This ~ may ~ not ~ work}
1023 } { \cs_new_eq:NN \CSletCS \cs_set_eq:cc }

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

1024 \cs_if_exist:NTF \CSlet {\PackageWarning{chronos}{
1025 Refusing ~ to ~ overwrite ~ existing ~ \protect\CSlet.
1026 ~ This ~ may ~ not ~ work}
1027 } { \cs_new_eq:NN \CSlet \cs_set_eq:cN }

\IfBooleanExprTF yn lle \ifbooleanexpr o etoolbox (ish) - instead of \ifbooleanexpr
\IfBooleanExprT
\IfBooleanExprF 1028 \cs_if_exist:NTF \IfBooleanExprTF {\PackageWarning{chronos}{
1029 Refusing ~ to ~ overwrite ~ existing ~ \protect\IfBooleanExprTF.
1030 ~ This ~ may ~ not ~ work}
1031 } { \cs_new_eq:NN \IfBooleanExprTF \bool_if:nTF }
1032 \cs_if_exist:NTF \IfBooleanExprT {\PackageWarning{chronos}{
1033 Refusing ~ to ~ overwrite ~ existing ~ \protect\IfBooleanExprT.
1034 ~ This ~ may ~ not ~ work}
1035 } { \cs_new_eq:NN \IfBooleanExprT \bool_if:nT }
1036 \cs_if_exist:NTF \IfBooleanExprF {\PackageWarning{chronos}{
1037 Refusing ~ to ~ overwrite ~ existing ~ \protect\IfBooleanExprF.
1038 ~ This ~ may ~ not ~ work}
1039 } { \cs_new_eq:NN \IfBooleanExprF \bool_if:nF }

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

1040 \cs_if_exist:NTF \LegacyBoolean {\PackageWarning{chronos}{
1041 Refusing ~ to ~ overwrite ~ existing ~ \protect\LegacyBoolean.
1042 ~ This ~ may ~ not ~ work}
1043 } { \cs_new_eq:NN \LegacyBoolean \legacy_if_p:n }

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

1044 \cs_if_exist:NTF \CSFreeBoolean {\PackageWarning{chronos}{
1045 Refusing ~ to ~ overwrite ~ existing ~ \protect\CSFreeBoolean.

```

```

1046 ~ This ~ may ~ not ~ work}
1047 } { \cs_new_eq:NN \CSFreeBoolean \cs_if_free_p:N }

```

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

```

\IfIntCompareTF
\IfIntCompareT
\IfIntCompareF
1048 \cs_if_exist:NTF \IntCompareBoolean {\PackageWarning{chronos}{
1049 Refusing ~ to ~ overwrite ~ existing ~ \protect\IntCompareBoolean.
1050 ~ This ~ may ~ not ~ work}
1051 } { \cs_new_eq:NN \IntCompareBoolean \int_compare_p:nNn }
1052 \cs_if_exist:NTF \IfIntCompareTF {\PackageWarning{chronos}{
1053 Refusing ~ to ~ overwrite ~ existing ~ \protect\IfIntCompareTF.
1054 ~ This ~ may ~ not ~ work}
1055 } { \cs_new_eq:NN \IfIntCompareTF \int_compare:nTF }
1056 \cs_if_exist:NTF \IfIntCompareT {\PackageWarning{chronos}{
1057 Refusing ~ to ~ overwrite ~ existing ~ \protect\IfIntCompareT.
1058 ~ This ~ may ~ not ~ work}
1059 } { \cs_new_eq:NN \IfIntCompareT \int_compare:nT }
1060 \cs_if_exist:NTF \IfIntCompareF {\PackageWarning{chronos}{
1061 Refusing ~ to ~ overwrite ~ existing ~ \protect\IfIntCompareF.
1062 ~ This ~ may ~ not ~ work}
1063 } { \cs_new_eq:NN \IfIntCompareF \int_compare:nF }

```

`\chronosnewcolourscheme`

`\chronosnewcolorscheme`

```

1064 \NewDocumentCommand \chronosnewcolourscheme { 0 {rhagosedig} m m }
1065 {
1066 \group_begin:
1067 \cs_new_nopar:cn { __chronos_lliwiau_#2 : }
1068 {
1069 \cs:w chronos@lliwiau@#1 \cs_end:
1070 \keys_set_groups:nnn { chronos / lliwiau } { core } { #3 }
1071 \__chronos_color_set_from_existing:nn { chronos@lliw@cefndir@llinell }
1072 { chronos@prifliw }
1073 \__chronos_color_set_from_existing:nn { chronos@lliw@llinell }
1074 { chronos@prifliw@cefndir }
1075 \keys_set_groups:nnn { chronos / lliwiau } { core ~ derivative } { #3 }
1076 \__chronos_color_set_from_existing:nn { chronos@borderinner }
1077 { chronos@lliw@cefndir@llinell }
1078 \__chronos_color_set_from_existing:nn { chronos@borderouter }
1079 { chronos@prifliw@cefndir }
1080 \__chronos_color_set_from_existing:nn { chronos@bordermiddle }
1081 { chronos@borderinner!50!chronos@borderouter }
1082 \keys_set_groups:nnn { chronos / lliwiau } { core ~ border } { #3 }
1083 \__chronos_color_set_from_existing:nn { chronos@byw@lliw@rhagosodedig }
1084 { chronos@prifliw }
1085 \__chronos_color_set_from_existing:nn { chronos@digwyddiad@lliw@rhagosodedig }
1086 { chronos@prifliw }
1087 \__chronos_color_set_from_existing:nn { chronos@parhad@lliw@rhagosodedig }
1088 { chronos@prifliw }
1089 \__chronos_color_set_from_existing:nn { chronos@theori@lliw@rhagosodedig }
1090 { chronos@prifliw }
1091 \__chronos_color_set_from_existing:nn { chronos@gwybodaeth@lliw@rhagosodedig }
1092 { chronos@prifliw }

1093 \__chronos_keys_set_exclude_groups:nnn { chronos / lliwiau }
1094 { core, core ~ derivative, core ~ border } { #3 }
1095 \ifpackageloaded{memoize}
1096 {
1097 \mmzset { csname ~ meaning ~ to ~ context={ __chronos_lliwiau_#2 : } }
1098 }{}
1099 }
1100 \cs_new_eq:cc { chronos@lliwiau@#2 } { __chronos_lliwiau_#2 : }

```

```
1101 \group_end:
1102 }
1103 \cs_new_eq:NN \chronosnewcolorscheme \chronosnewcolourscheme

1104 \ExplSyntaxOff

1105 \newlength{\chronos@diwedd@diwedd}
1106 \newlength{\chronos@dechrau@dechrau}
1107 \newlength{\chronos@byw@border}
1108 \newlength{\chronos@parhad@border}
1109 \newlength{\chronos@digwyddiad@border}
1110 \newlength{\chronos@byw@border@inv}
1111 \newlength{\chronos@parhad@border@inv}
1112 \newlength{\chronos@digwyddiad@border@inv}

1113 \newlength{\chronos@templgtha}
1114 \newlength{\chronos@templgthb}
1115 \newlength{\chronos@templgthc}

1116 \newdimen\chronos@borderheight
1117 \newdimen\chronos@height
1118 \newdimen\chronos@width
1119 \chronos@width=\textwidth
1120 \newdimen\chronos@eramargin
1121 \newdimen\chronos@timelinemargin
1122 \newdimen\chronos@inner@halfheight
1123 \newdimen\chronos@outer@halfheight

1124 \newdimen\chronos@pgflinewidth@saved
1125 \newdimen\chronos@border@de
1126 \newdimen\chronos@border@chwith
1127 \newdimen\chronos@border@penawdau
1128 \newdimen\chronos@border@pen
1129 \newdimen\chronos@border@gwaelod
1130 \newdimen\chronos@border@allanol
1131 \newdimen\chronos@subheading@drop@uchod
1132 \newdimen\chronos@subheading@drop@isod
1133 \newdimen\chronos@heading@drop
1134 \newdimen\chronos@llinell@yshift
1135 \newdimen\chronos@testun@yshift
1136 \newdimen\chronos@baselineskip
1137 \newdimen\chronos@cylchtheori@mawr
1138 \newdimen\chronos@cylchtheori@bach
1139 \newdimen\chronos@tmpdimena
1140 \newdimen\chronos@tmpdimenb
1141 \chronos@testun@yshift=5pt
1142 \chronos@height=\pi pt
1143 \chronos@borderheight=\pi pt
1144 \chronos@llinell@yshift=\pi pt
1145 \chronos@timelinemargin=15pt
1146 \chronos@eramargin=15pt
1147 \chronos@border@allanol=5pt
1148 \chronos@border@penawdau=\pi pt
1149 \chronos@border@pen=0pt
1150 \chronos@border@de=0pt
1151 \chronos@border@gwaelod=0pt
1152 \chronos@border@chwith=0pt
1153 \chronos@cylchtheori@mawr=15pt
1154 \chronos@cylchtheori@bach=9pt

1155 \newcounter{chronos@date}
1156 \newcounter{chronos@startdate}
1157 \newcounter{chronos@enddate}
```

1158 \newcounter{chronos@startyear}
1159 \newcounter{chronos@startmarkyear}
1160 \newcounter{chronos@endyear}
1161 \newcounter{chronos@yeardate}
1162 \newcounter{chronos@thingdate}
1163 \newcounter{chronos@otherthingdate}
1164 \newcounter{chronos@genidate}
1165 \newcounter{chronos@marwdate}
1166 \newcounter{chronos@digdate}
1167 \newcounter{chronos@weekday}
1168 \newcounter{chronos@theori@countanchors}
1169 \newcounter{chronos@tempcnta}
1170 \newcounter{chronos@tempcntb}
1171 \newcounter{chronos@tempcntc}
1172 \newcounter{chronos@tempdate}
1173 \newcounter{chronos@tempbdate}
1174 \newcounter{chronos@bagpuss}

1175 \newif\ifchronos@marks
1176 \chronos@markstrue
1177 \newif\ifchronos@marks@minor
1178 \chronos@marks@minortrue
1179 \newif\ifchronos@marks@bare
1180 \chronos@marks@barefalse
1181 \newif\ifchronos@timeline@showyears
1182 \chronos@timeline@showyearstrue
1183 \newif\ifchronos@eventyearsonline
1184 \chronos@eventyearsonlinefalse
1185 \newif\ifchronos@yearzero
1186 \chronos@yearzerofalse
1187 \newif\ifchronos@markateraswitch
1188 \chronos@markateraswitchfalse
1189 \newif\ifchronos@onlytext
1190 \chronos@onlytextfalse
1191 \newif\ifchronos@markeras
1192 \chronos@markerasfalse
1193 \newif\ifchronos@yearsonline
1194 \chronos@yearsonlinefalse
1195 \newif\ifchronos@eventdatessplit
1196 \chronos@eventdatessplitfalse
1197 \newif\ifchronos@minoryears
1198 \chronos@minoryearstrue
1199 \newif\ifchronos@byw@isod
1200 \chronos@byw@isodfalse
1201 \newif\ifchronos@byw@isod@rhag
1202 \chronos@byw@isod@rhagfalse
1203 \newif\ifchronos@every@byw@isod
1204 \chronos@every@byw@isodfalse
1205 \newif\ifchronos@every@byw@uchod
1206 \chronos@every@byw@uchodfalse
1207 \newif\ifchronos@byw@cysylltiad
1208 \chronos@byw@cysylltiadtrue
1209 \newif\ifchronos@byw@cysylltiadtheori
1210 \chronos@byw@cysylltiadtheorifalse
1211 \newif\ifchronos@digwyddiad@isod
1212 \chronos@digwyddiad@isodfalse
1213 \newif\ifchronos@digwyddiad@isod@rhag
1214 \chronos@digwyddiad@isod@rhagfalse
1215 \newif\ifchronos@every@digwyddiad@isod
1216 \chronos@every@digwyddiad@isodfalse
1217 \newif\ifchronos@every@digwyddiad@uchod

1218 \chronos@every@digwyddiad@uchodfalse
1219 \newif\ifchronos@digwyddiad@cysylltiad
1220 \chronos@digwyddiad@cysylltiadtrue
1221 \newif\ifchronos@digwyddiad@cysylltiadtheori
1222 \chronos@digwyddiad@cysylltiadtheorifalse
1223 \newif\ifchronos@parhad@isod
1224 \chronos@parhad@isodfalse
1225 \newif\ifchronos@parhad@isod@rhag
1226 \chronos@parhad@isod@rhagfalse
1227 \newif\ifchronos@every@parhad@isod
1228 \chronos@every@parhad@isodfalse
1229 \newif\ifchronos@every@parhad@uchod
1230 \chronos@every@parhad@uchodfalse
1231 \newif\ifchronos@parhad@cysylltiad
1232 \chronos@parhad@cysylltiadtrue
1233 \newif\ifchronos@parhad@cysylltiadtheori
1234 \chronos@parhad@cysylltiadtheorifalse
1235 \newif\ifchronos@theori@isod
1236 \chronos@theori@isodfalse
1237 \newif\ifchronos@theori@cysylltiadtheori
1238 \chronos@theori@cysylltiadtheorifalse
1239 \newif\ifchronos@cam@mod
1240 \newif\ifchronos@middleanchorborder
1241 \newif\ifchronos@troilliwiiau
1242 \chronos@troilliwiiautrue
1243 \newif\ifchronos@dangoscyfnodau
1244 \chronos@dangoscyfnodautrue
1245 \newif\ifchronos@felymae
1246 \chronos@felymaefalse
1247 \newif\ifchronos@temp
1248 \chronos@temptrue
1249 \newif\ifchronos@headings
1250 \chronos@headingsfalse
1251 \newif\ifchronos@frame
1252 \chronos@framefalse
1253 \newif\ifchronos@framedefnyddiobb
1254 \chronos@framedefnyddiobbtrue
1255 \newif\ifchronos@placeholders
1256 \chronos@placeholdersfalse
1257 \newif\ifchronos@showcoords
1258 \chronos@showcoordsfalse
1259 \newif\ifchronos@showbb
1260 \chronos@showbbfalse
1261 \newif\ifchronos@shownodes
1262 \chronos@shownodesfalse
1263 \newif\ifchronos@bufarw
1264 \chronos@bufarwtrue
1265 \newif\ifchronos@gorffenedig
1266 \chronos@gorffenedigtrue
1267 \newif\ifchronos@preset
1268 \chronos@presettrue
1269 \newif\ifchronos@blynyddoedduchod
1270 \chronos@blynyddoedduchodfalse
1271 \newif\ifchronos@blynyddoeddisod
1272 \chronos@blynyddoeddisodfalse
1273 \newif\ifchronos@dimondblynyddoedd
1274 \chronos@dimondblynyddoeddfalse
1275 \newif\ifchronos@tag@cysylltu
1276 \chronos@tag@cysylltuttrue
1277 \newif\ifchronos@copyleft
1278 \chronos@copyleftfalse


```

1279 \newif\ifchronos@phantom
1280 \chronos@phantomfalse
1281 \newif\ifchronostimelinearrow
1282 \chronostimelinearrowfalse

1283 \let\chronos@coords\@empty
1284 \def\chronos@ce{CE}
1285 \def\chronos@bce{BCE}
1286 \def\chronos@yearce{\textsc{ce}}
1287 \def\chronos@yearbce{\textsc{bce}}
1288 \def\chronos@yshift{0pt}
1289 \def\chronos@ffont@camaumawr{\sffamily\bfseries}
1290 \def\chronos@ffont@camaubach{\sffamily}
1291 \def\chronos@ffont@cyfnodau{\sffamily\bfseries}

1292 \def\chronos@uchod{0}
1293 \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

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

```

1294 \let\orig@settodim\@settodim
1295 \let\chronos@settodim\@settodim
1296 \patchcmd{\chronos@settodim}{\setbox\@tempboxa\hbox}{\chronos@tikz@setbox}{}{}
1297 \def\chronos@tikz@setbox#1{%
1298   \setbox\@tempboxa\hbox{\pgfinterruptpicture #1\endpgfinterruptpicture}%
1299 }
1300 \appto\tikz@installcommands{%
1301   \let\@settodim\chronos@settodim
1302 }
1303 \appto\tikz@uninstallcommands{%
1304   \let\@settodim\orig@settodim
1305 }

```

```

Blue Copied from xcolor.sty, x11names.def, svgnames.def
Blue3
DarkGoldenrod1 1306 \definecolorset{rgb}{chronos}{}{% xcolor.sty, x11names.def, svgnames.def
DarkGray 1307 Blue,0,0,1;%
DarkOrange1 1308 Blue3,0,0,.804;%
DarkOrchid3 1309 DarkGoldenrod1,1,.725,.06;%
DarkSlateGrey 1310 DarkGray,.664,.664,.664;%
DeepPink2 1311 DarkOrange1,1,.498,0;%
DeepSkyBlue2 1312 DarkOrchid3,.604,.196,.804;%
DodgerBlue1 1313 DarkSlateGrey,.185,.31,.31;%
DodgerBlue2 1314 DeepPink2,.932,.07,.536;%
DodgerBlue3 1315 DeepSkyBlue2,0,.698,.932;%
DodgerBlue4 1316 DodgerBlue1,.116,.565,1;%
Firebrick1 1317 DodgerBlue3,.094,.455,.804;%
ForestGreen 1318 DodgerBlue4,.064,.305,.545;%
Green 1319 Firebrick1,1,.19,.19;%
Green3 1320 ForestGreen,.132,.545,.132;%
Ivory2 1321 Green,0,.5,0;%
Ivory3 1322 Green3,0,.804,0;%
Ivory4 1323 Ivory2,.932,.932,.88;%
Lavender 1324 Ivory3,.804,.804,.756;%
LavenderBlush1 1325 Ivory4,.545,.545,.512;%
LavenderBlush2 1326 Lavender,.9,.9,.98;%
LavenderBlush3 1327 LavenderBlush1,1,.94,.96;%
LavenderBlush4
MediumPurple
MidnightBlue
MistyRose2
MistyRose3
MistyRose4
Orange

```

```

1329 LavenderBlush2,.932,.88,.898;%
1330 LavenderBlush3,.804,.756,.772;%
1331 LavenderBlush4,.545,.512,.525;%
1332 MediumPurple,.576,.44,.86;%
1333 MidnightBlue,.098,.098,.44;%
1334 MistyRose2,.932,.835,.824;%
1335 MistyRose3,.804,.716,.71;%
1336 MistyRose4,.545,.49,.484;%
1337 Orange,1,.648,0;%
1338 OrangeRed1,1,.27,0;%
1339 Purple0,.628,.125,.94;%
1340 Red,1,0,0;%
1341 SeaGreen3,.264,.804,.5;%
1342 Seashell2,.932,.898,.87;%
1343 Seashell3,.804,.772,.75;%
1344 Seashell4,.545,.525,.51;%
1345 Silver,.752,.752,.752;%
1346 SpringGreen4,0,.545,.27;%
1347 Thistle2,.932,.824,.932;%
1348 Thistle3,.804,.71,.804;%
1349 Thistle4,.545,.484,.545;%
1350 Violet,.932,.51,.932;%
1351 Yellow,1,1,0;%
1352 darkgray,.25,.25,.25%
1353 }

```

`chronosCerulean` From `dvipsnames.def`

`chronosPeriwinkle`
`chronosWildStrawberry`

```

1354 %^A dvipsnames.def
1355 \definecolor{chronosCerulean} {cmyk}{0.94,0.11,0,0}
1356 \definecolor{chronosPeriwinkle} {cmyk}{0.57,0.55,0,0}
1357 \definecolor{chronosWildStrawberry}{cmyk}{0,0.96,0.39,0}

```

`cronoleg` colours

```

1358 \newcommand*\chronos@lliwiau@cronoleg{%
1359 \chronos@lliwiau@isod{%
1360 chronosRed,%
1361 chronosOrange,%
1362 chronosYellow,%
1363 chronosGreen,%
1364 chronosBlue,%
1365 chronosMidnightBlue,%
1366 chronosViolet%
1367 }%
1368 \chronos@lliwiau@uchod{%
1369 chronosRed,%
1370 chronosOrange,%
1371 chronosYellow,%
1372 chronosGreen,%
1373 chronosBlue,%
1374 chronosMidnightBlue,%
1375 chronosViolet%
1376 }%
1377 \chronos@lliwiau@isod[byw]{%
1378 chronosDodgerBlue3,%
1379 chronosGreen3,%
1380 chronosBlue3,%
1381 chronosSpringGreen4,%
1382 chronosDeepSkyBlue2,%
1383 chronosForestGreen,%
1384 chronosPeriwinkle,%

```

```

1385     chronosSeaGreen3%
1386 }%
1387 \chronos@lliwiau@uchod[byw]{%
1388     chronosDeepPink2,%
1389     chronosDarkOrange1,%
1390     chronosFirebrick1,%
1391     chronosPurple0,%
1392     chronosWildStrawberry,%
1393     chronosOrangeRed1,%
1394     chronosDarkGoldenrod1,%
1395     chronosDarkOrchid3%
1396 }%
1397 \chronos@lliwiau@isod[digwyddiad]{%
1398     chronosSeashell4,%
1399     chronosSeashell4!.5!chronosSeashell3,%
1400     chronosSeashell3,%
1401     chronosSeashell3!.5!chronosSeashell2,%
1402     chronosSeashell2%
1403 }%
1404 \chronos@lliwiau@uchod[digwyddiad]{%
1405     chronosThistle4,%
1406     chronosThistle4!.5!chronosThistle3,%
1407     chronosThistle3,%
1408     chronosThistle3!.5!chronosThistle2,%
1409     chronosThistle2%
1410 }%
1411 \chronos@lliwiau@isod[parhad]{%
1412     chronosIvory4,%
1413     chronosIvory4!.5!chronosIvory3,%
1414     chronosIvory3,%
1415     chronosIvory3!.5!chronosIvory2,%
1416     chronosIvory2%
1417 }%
1418 \chronos@lliwiau@uchod[parhad]{%
1419     chronosMistyRose4,%
1420     chronosMistyRose4!.5!chronosMistyRose3,%
1421     chronosMistyRose3,%
1422     chronosMistyRose3!.5!chronosMistyRose2,%
1423     chronosMistyRose2%
1424 }%

1425 \colorlet{chronos@prifliw}{black}% prifliw
1426 \colorlet{chronos@prifliw@cefndir}{white}% prifliw cefndir
1427 \colorlet{chronos@lliw@cefndir@llinell}{black}%^^A oedd lliw cefndir amser?
1428 \colorlet{chronos@lliw@llinell}{white}%^^A oedd lliw amser

1429 \colorlet{chronos@lliw@theori}{white}%
1430 \colorlet{chronos@lliw@cefndir@theori}{black}%
1431 \colorlet{chronos@lliw@cefndir@gwybodaeth}{chronos@prifliw!25!chronos@prifliw@cefndir}%^^A
    lliw cefndir ee = prifliw!25!prifliw cefndir
1432 \colorlet{chronos@lliw@gwybodaeth}{chronos@prifliw}% lliw ee = prifliw

1433 }

default colours

1434 \newcommand*\chronos@lliwiau@rhagosodedig{%
1435     \chronos@lliwiau@isod{%
1436         chronosRed,%
1437         chronosOrange,%
1438         chronosYellow,%
1439         chronosGreen,%
1440         chronosBlue,%

```

```

1441     chronosMidnightBlue,%
1442     chronosViolet%
1443 }%
1444 \chronos@lliwiau@uchod{%
1445     chronosRed,%
1446     chronosOrange,%
1447     chronosYellow,%
1448     chronosGreen,%
1449     chronosBlue,%
1450     chronosMidnightBlue,%
1451     chronosViolet%
1452 }%

1453 \colorlet{chronos@prifliw}{black}%^^A prifliw
1454 \colorlet{chronos@prifliw@cefndir}{white}%^^A prifliw cefndir
1455 \colorlet{chronos@lliw@cefndir@llinell}{black}%^^A oedd lliw cefndir amser?
1456 \colorlet{chronos@lliw@llinell}{white}%^^A oedd lliw amser

1457 \colorlet{chronos@lliw@theori}{white}%
1458 \colorlet{chronos@lliw@cefndir@theori}{black}%
1459 \colorlet{chronos@lliw@cefndir@gwybodaeth}
1460 {chronos@prifliw!25!chronos@prifliw@cefndir}%^^A lliw cefndir ee = prifliw!25!prifliw
    cefndir
1461 \colorlet{chronos@lliw@gwybodaeth}{chronos@prifliw}%^^A lliw ee = prifliw

1462 \colorlet{chronos@borderouter}{chronos@prifliw@cefndir}%
1463 \colorlet{chronos@borderinner}{chronos@lliw@cefndir@llinell}%
1464 \colorlet{chronos@bordermiddle}{chronos@borderouter!50!chronos@borderinner}%

1465 }

```

we need an English alias here

```

1466 \chronos@lliwiau@rhagosodedig
1467 \let\chronos@lliwiau@default\chronos@lliwiau@rhagosedig

```

`\testunteitl` Main title tag.

```

1468
1469 \NewDocumentCommand \testunteitl { 0 {/chronos/@amserau} m o m m r() }{%^^A <<<

1470 \coordinate (chronos@coord@temp) at ($(#4)!1/2!(#5)$);
1471 \IfValueTF {#3}{\def\chronos@tempa{#3}}{%
1472   \edef\chronos@tempa{\chronos@testunteitl@priflythrennu{#2}}%
1473 }%
1474 \node (#2) [anchor=base,#1] at (#6 -| chronos@coord@temp) {\chronos@tempa};
1475 \ifchronos@shownodes
1476   \begin{scope}[on chronos overlay layer]
1477     \draw [help lines, draw=chronos@lliw@node] (#2.north east)
1478       -| (#2.south west) -| cycle;
1479   \end{scope}%
1480 \fi
1481 }% >>>

```

Number format from fixedpointarithmetic.

```

1482 \pgfkeys{/pgf/number format,
1483   int detect,
1484   set thousands separator={},
1485 }

```

Layers

```

1486 \pgfqkeys{/chronos}{%

```

```

1487 declare layer/.code={%\DeclareDocumentCommand
1488   \pgfdeclarelayer{chronos #1}%
1489 },
1490 declare layer/.list={background,middle ground,foreground,overlay},
1491 }
1492 \IfFileExists{tikzlibrarycfrforeground.code.tex}{%
1493   \def\chronos@layers{%
1494     background,%
1495     chronos background,%
1496     chronos middle ground,%
1497     main,%
1498     chronos foreground,%
1499     chronos overlay,%
1500     foreground%
1501   }%
1502 }{%
1503   \def\chronos@layers{%
1504     background,%
1505     chronos background,%
1506     chronos middle ground,%
1507     main,%
1508     chronos foreground,%
1509     chronos overlay%
1510   }%
1511 }
1512 \pgfkeys{/chronos}{%
1513   create layer/.code={%
1514     \tikzset{%

```

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

```

1515     on chronos #1 layer/.style={%
1516       execute at begin scope={%
1517         \pgfonlayer{chronos #1}%
1518         \let\tikz@options=\pgfutil@empty%
1519         \tikzset{every on chronos #1 layer/.try,##1}%
1520         \tikz@options%
1521       },
1522       execute at end scope={\endpgfonlayer}
1523     },
1524   }%
1525 },
1526 create layer/.list={background,middle ground,foreground,overlay},
1527 }

```

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/>

```

1528 \def\pgf@sm@shape@name{rectangle}
1529 \pgf@sh@savedanchor\middlenortheast{%
1530   \pgf@x=\the\wd\pgfnodeparttextbox%
1531   \pgfmathsetlength\pgf@xc{\pgfkeysvalueof{/pgf/inner xsep}}%
1532   \advance\pgf@x by 2\pgf@xc%
1533   \pgfmathsetlength\pgf@xb{\pgfkeysvalueof{/pgf/minimum width}}%
1534   \ifdim\pgf@x<\pgf@xb
1535     \pgf@x=\pgf@xb
1536   \fi
1537   \pgf@x=.5\pgf@x\advance\pgf@x by.5\wd\pgfnodeparttextbox%
1538   \pgf@y=\ht\pgfnodeparttextbox\advance\pgf@y by\dp\pgfnodeparttextbox%
1539   \pgfmathsetlength\pgf@yc{\pgfkeysvalueof{/pgf/inner ysep}}%

```

```

1540 \advance\pgf@y by 2\pgf@yc%
1541 \pgfmathsetlength\pgf@yb{\pgfkeysvalueof{/pgf/minimum height}}%
1542 \ifdim\pgf@y<\pgf@yb
1543   \pgf@y=\pgf@yb
1544 \fi
1545 \pgf@y=.5\pgf@y\advance\pgf@y by-.5\dp\pgfnodeparttextbox%
1546 \advance\pgf@y by.5\ht\pgfnodeparttextbox%
1547 }
1548 \pgf@sh@savedanchor\middlesouthwest{%
1549   \pgf@x=\wd\pgfnodeparttextbox%
1550   \pgfmathsetlength\pgf@xc{\pgfkeysvalueof{/pgf/inner xsep}}
1551   \advance\pgf@x by 2\pgf@xc%
1552   \pgfmathsetlength\pgf@xb{\pgfkeysvalueof{/pgf/minimum width}}%
1553   \ifdim\pgf@x<\pgf@xb
1554     \pgf@x=\pgf@xb
1555 \fi
1556 \pgf@x=-.5\pgf@x\advance\pgf@x by.5\wd\pgfnodeparttextbox%
1557 \pgf@y=\ht\pgfnodeparttextbox%
1558 \advance\pgf@y by\dp\pgfnodeparttextbox%
1559 \pgfmathsetlength\pgf@yc{\pgfkeysvalueof{/pgf/inner ysep}}%
1560 \advance\pgf@y by 2\pgf@yc%
1561 \pgfmathsetlength\pgf@yb{\pgfkeysvalueof{/pgf/minimum height}}%
1562 \ifdim\pgf@y<\pgf@yb
1563   \pgf@y=\pgf@yb
1564 \fi
1565 \pgf@y=-.5\pgf@y%
1566 \advance\pgf@y by-.5\dp\pgfnodeparttextbox%
1567 \advance\pgf@y by.5\ht\pgfnodeparttextbox%
1568 }
1569 \pgf@sh@anchor{middle north east}{\middlenortheast}
1570 \pgf@sh@anchor{middle south west}{\middlesouthwest}
1571 \pgf@sh@anchor{middle south east}{\middlenortheast\pgf@xa=\pgf@x%
1572   \middlesouthwest\pgf@x=\pgf@xa}
1573 \pgf@sh@anchor{middle north west}{\middlesouthwest\pgf@xa=\pgf@x%
1574   \middlenortheast\pgf@x=\pgf@xa}
1575 \pgf@sh@anchor{middle north}{%
1576   \pgf@process{\middlesouthwest}}%
1577   \pgf@xa=.5\pgf@x%
1578   \pgf@process{\middlenortheast}}%
1579   \pgf@x=.5\pgf@x\advance\pgf@x by \pgf@xa
1580 }
1581 \pgf@sh@anchor{middle south}{%
1582   \pgf@process{\middlenortheast}}%
1583   \pgf@xa=.5\pgf@x%
1584   \pgf@process{\middlesouthwest}}%
1585   \pgf@x=.5\pgf@x\advance\pgf@x by \pgf@xa
1586 }
1587 \pgf@sh@anchor{middle west}{%
1588   \pgf@process{\middlenortheast}}%
1589   \pgf@ya=.5\pgf@y%
1590   \pgf@process{\middlesouthwest}}%
1591   \pgf@y=.5\pgf@y%
1592   \advance\pgf@y by \pgf@ya
1593 }
1594 \pgf@sh@anchor{middle east}{%
1595   \pgf@process{\middlesouthwest}}%
1596   \pgf@ya=.5\pgf@y%
1597   \pgf@process{\middlenortheast}}%
1598   \pgf@y=.5\pgf@y%
1599   \advance\pgf@y by \pgf@ya
1600 }

```

```

1601 \pgf@sh@anchorborder{%
1602   \pgf@xb=\pgf@x\pgf@yb=\pgf@y%
1603   \ifchronos@middleanchorborder
1604     \middlesouthwest%
1605   \else
1606     \southwest
1607   \fi
1608   \pgf@xa=\pgf@x\pgf@ya=\pgf@y
1609   \ifchronos@middleanchorborder
1610     \middenortheast%
1611   \else
1612     \northeast%
1613   \fi
1614   \advance\pgf@x by-\pgf@xa%
1615   \advance\pgf@y by-\pgf@ya%
1616   \pgf@xc=.5\pgf@x\pgf@yc=.5\pgf@y%
1617   \advance\pgf@xa by\pgf@xc%
1618   \advance\pgf@ya by\pgf@yc%
1619   \edef\pgf@marshal{\noexpand\pgfpointborderrectangle
1620     {\noexpand\pgfpoint{\the\pgf@xb}{\the\pgf@yb}}%
1621     {\noexpand\pgfpoint{\the\pgf@xc}{\the\pgf@yc}}%
1622   }%
1623   \pgf@process{\pgf@marshal}\advance\pgf@x by\pgf@xa\advance\pgf@y by\pgf@ya%
1624 }
1625 \tikzset{%
1626 /chronos/middle anchorborder/.is if=chronos@middleanchorborder,
1627 }

```

Context initialisation.

```

1628 \NewDocumentCommand \chronos@cyd@destun@init { s t {+} o m m } {% chronos context initialisa
    <<<
1629   \renewcommand* \chronos@ychwanegu@nodweddion [3]{\relax}%
1630   \renewcommand* \chronos@ychwanegu@nodweddion@rhag [2]{\relax}%
1631   \renewcommand* \chronos@cadw@nodweddion [3]{\relax}%
1632   \renewcommand* \chronos@cadw@nodweddion@rhag [2]{\relax}%
1633   \IfBooleanT {#2} {%
1634     \pgfqkeys{/chronos}{% paid ag ychwanegu i property lists rhagosodedig mewn cyd-destun
       lleoll

```

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

```

1635     blynyddoedd yn unig/.code={%
1636       \chronos@dimondblynyddoeddtrue
1637       \ifchronos@dangoscyfnodau
1638         \pgfqkeys{/chronos/#4/dangos cyfnodau}{@blynyddoedd yn unig}%
1639       \else
1640         \pgfqkeys{/chronos/#4/heb gyfnodau}{@blynyddoedd yn unig}%
1641       \fi
1642     },
1643     dyddiadau llawn/.code={%
1644       \chronos@dimondblynyddoeddfalse
1645       \ifchronos@dangoscyfnodau
1646         \pgfqkeys{/chronos/#4/dangos cyfnodau}{@llawn}%
1647       \else
1648         \pgfqkeys{/chronos/#4/heb gyfnodau}{@llawn}%
1649       \fi
1650     },
1651     dangos cyfnodau/.code={%
1652       \chronos@dangoscyfnodautrue
1653       \ifchronos@dimondblynyddoedd
1654         \pgfqkeys{/chronos/#4/dangos cyfnodau}{@blynyddoedd yn unig}%

```

```

1655     \else
1656     \pgfqkeys{/chronos/#4/dangos cyfnodau}{@llawn}%
1657     \fi
1658   },
1659   heb gyfnodau/.code={%
1660     \chronos@dangoscyfnodaufalse
1661     \ifchronos@dimondblynyddoedd
1662     \pgfqkeys{/chronos/#4/heb gyfnodau}{@blynyddoedd yn unig}%
1663     \else
1664     \pgfqkeys{/chronos/#4/heb gyfnodau}{@llawn}%
1665     \fi
1666   },
1667 }%
1668 }%
1669 \pgfqkeys{/chronos}{%^^A paid ag ychwanegu i property lists rhagosodedig mewn cyd-destun
lleoll | ditto
1670   tags/.code={\pgfqkeys{/chronos}{@tag/.style={##1}}},
1671   tags+/.code={\pgfqkeys{/chronos}{@tag/.append style={##1}}},
1672   testunau/.code={\pgfqkeys{/chronos}{@testun/.style={##1}}},
1673   testunau+/.code={\pgfqkeys{/chronos}{@testun/.append style={##1}}},
1674   cysylltiadau/.code={\pgfqkeys{/chronos}{@cysylltiad/.style={##1}}},
1675   cysylltiadau+/.code={\pgfqkeys{/chronos}{@cysylltiad/.append style={##1}}},
1676   cysylltwyr chronos'/.code={\pgfqkeys{/chronos}{@cysylltwr@chronos/.style={##1}}},
1677   cysylltwyr chronos+/.code={%
1678     \pgfqkeys{/chronos}{@cysylltwr@chronos/.append style={##1}}%
1679   },
1680   cysylltwyr testun'/.code={\pgfqkeys{/chronos}{@cysylltwr@testun/.style={##1}}},
1681   cysylltwyr testun+/.code={\pgfqkeys{/chronos}{@cysylltwr@testun/.append style={##1}}},
1682   prif gysylltwyr testun'/.code={%
1683     \pgfqkeys{/chronos}{@cysylltwr@testun@prif/.style={##1}}%
1684   },
1685   prif gysylltwyr testun+/.code={%
1686     \pgfqkeys{/chronos}{@cysylltwr@testun@prif/.append style={##1}}%
1687   },
1688   llinellau/.code={\pgfqkeys{/chronos}{@llinell/.style={##1}}},
1689   llinellau+/.code={\pgfqkeys{/chronos}{@llinell/.append style={##1}}},
1690   phantom/.is if=chronos@phantom,
1691   phantom/.default=true,
1692   troi lliwiau/.is if=chronos@troilliwiau,
1693   troi lliwiau/.default=true,
1694   testun yshift/.chronos dimen=\chronos@testun@yshift,
1695   #4/tag'/.code={\pgfqkeys{/chronos}{@tag/.style={##1}}},
1696   #4/testun'/.code={\pgfqkeys{/chronos}{@testun/.style={##1}}},
1697   #4/cysylltiad'/.code={\pgfqkeys{/chronos}{@cysylltiad/.style={##1}}},
1698   #4/llinell'/.code={\pgfqkeys{/chronos}{@llinell/.style={##1}}},
1699   #4/cysylltwyr chronos'/.code={%
1700     \pgfqkeys{/chronos}{@cysylltwr@chronos/.style={##1}}%
1701   },
1702   #4/cysylltwyr testun'/.code={%
1703     \pgfqkeys{/chronos}{@cysylltwr@testun/.style={##1}}%
1704   },
1705   #4/prif gysylltwyr testun'/.code={%
1706     \pgfqkeys{/chronos}{@cysylltwr@testun@prif/.style={##1}}%
1707   },
1708   #4/tag+/.code={\pgfqkeys{/chronos}{@tag/.append style={##1}}},
1709   #4/testun+/.code={\pgfqkeys{/chronos}{@testun/.append style={##1}}},
1710   #4/cysylltiad+/.code={\pgfqkeys{/chronos}{@cysylltiad/.append style={##1}}},
1711   #4/llinell+/.code={\pgfqkeys{/chronos}{@llinell/.append style={##1}}},
1712   #4/cysylltwyr chronos+/.code={%
1713     \pgfqkeys{/chronos}{@cysylltwr@chronos/.append style={##1}}%
1714   },

```



```

1715 #4/cysylltwr testun+/.code={%
1716 \pgfqkeys{/chronos}{@cysylltwr@testun/.append style={##1}}%
1717 },
1718 #4/prif gysylltwr testun+/.code={%
1719 \pgfqkeys{/chronos}{@cysylltwr@testun@prif/.append style={##1}}%
1720 },
1721 #4/blynyddoedd yn unig/.forward to=/chronos/blynyddoedd yn unig,
1722 #4/dyddiadau llawn/.forward to=/chronos/dyddiadau llawn,
1723 #4/dangos cyfnodau/.forward to=/chronos/dangos cyfnodau,
1724 #4/heb gyfnodau/.forward to=/chronos/heb gyfnodau,
1725 #4/testun yn unig/.forward to=/chronos/testun yn unig,
1726 #4/troi lliwiau/.is if=chronos@troilliwiau,
1727 #4/troi lliwiau/.default=true,
1728 #4/phantom/.is if=chronos@phantom,
1729 #4/phantom/.default=true,
1730 #4/testun yshift/.chronos dimen=\chronos@testun@yshift,
1731 #4/lliw rhagosodedig/.code={%
1732 \edef\tempa{\csname chronos@#4@lliw\endcsname}%
1733 \edef\tempb{\csname chronos@#4@lliw@rhagosodedig\endcsname}%
1734 \expandafter\let\tempa\tempb
1735 },
1736 }%
1737 \def\chronos@cadw{}% clirio'r macro
1738 \IfBooleanF {#1}{%
1739 \chronos@gosod@nodweddion{#4}%
1740 }%
1741 \pgfqkeys{/pgf}{%
1742 key filters/defined/.install key filter,
1743 key filter handlers/append filtered to/.install key filter handler=\chronos@cadw,
1744 }%
1745 \IfValueTF {#3}{% defnyddio'r allweddau sy'n diffinio | define defined keys
1746 \pgfkeysfiltered{/chronos/#3/.cd,/chronos/@tag,#5}%
1747 }{%
1748 \pgfkeysfiltered{/chronos/#4/.cd,/chronos/@tag,#5}%
1749 }%

1750 \IfBooleanT {#2}{% set date formats, whether showing eras, whether using full dates
1751 \chronos@if@gosodF{@#4@fformatiau@dyddiadau}{%
1752 \ifchronos@dimondblynyddoedd
1753 \ifchronos@dangoscyfnodau
1754 \pgfqkeys{/chronos/#4/dangos cyfnodau}{@blynyddoedd yn unig}%
1755 \else
1756 \pgfqkeys{/chronos/#4/heb gyfnodau}{@blynyddoedd yn unig}%
1757 \fi
1758 \else
1759 \ifchronos@dangoscyfnodau
1760 \pgfqkeys{/chronos/#4/dangos cyfnodau}{@llawn}%
1761 \else
1762 \pgfqkeys{/chronos/#4/heb gyfnodau}{@llawn}%
1763 \fi
1764 \fi
1765 }%
1766 }%
1767 }% >>>

1768 \tikzset{%

1769 /handlers/.chronos dimen/.code={%
1770 \pgfkeysdef{\pgfkeyscurrentpath}{%
1771 \pgfmathparse{##1}%
1772 #1=\pgfmathresult pt
1773 }%

```

```

1774 \pgfkeysdef{\pgfkeyscurrentpath'}{#1=#1}%
1775 \pgfkeysdef{\pgfkeyscurrentpath'+}{\advance #1 by ##1}%
1776 \pgfkeysdef{\pgfkeyscurrentpath'-}{\advance #1 by -##1}%
1777 \pgfkeysdef{\pgfkeyscurrentpath+}{%
1778   \pgfmathparse{##1}%
1779   \advance #1 by \pgfmathresult pt
1780 }%
1781 \pgfkeysdef{\pgfkeyscurrentpath-}{%
1782   \pgfmathparse{##1}%
1783   \advance #1 by -\pgfmathresult pt
1784 }%
1785 },
1786 /handlers/.chronos 2 dims/.code 2 args={%
1787   \pgfkeysdefargs{\pgfkeyscurrentpath}{##1:##2}{%
1788     \pgfmathparse{##1}%
1789     #1=\pgfmathresult pt
1790     \pgfmathparse{##2}%
1791     #2=\pgfmathresult pt
1792   }%
1793   \pgfkeysdefargs{\pgfkeyscurrentpath'}{##1:##2}{%
1794     #1=#1
1795     #2=#2
1796   }%
1797   \pgfkeysdefargs{\pgfkeyscurrentpath'+}{##1:##2}{%
1798     \advance #1 by ##1
1799     \advance #2 by ##2
1800   }%
1801   \pgfkeysdefargs{\pgfkeyscurrentpath'-}{##1:##2}{%
1802     \advance #1 by -##1
1803     \advance #2 by -##2
1804   }%
1805   \pgfkeysdefargs{\pgfkeyscurrentpath+}{##1:##2}{%
1806     \pgfmathparse{##1}\advance #1 by \pgfmathresult pt
1807     \pgfmathparse{##2}\advance #2 by \pgfmathresult pt
1808   }%
1809   \pgfkeysdefargs{\pgfkeyscurrentpath-}{##1:##2}{%
1810     \pgfmathparse{##1}\advance #1 by -\pgfmathresult pt
1811     \pgfmathparse{##2}\advance #2 by -\pgfmathresult pt
1812   }%
1813 },
1814 /handlers/.chronos layer choice/.code={%

```

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

```

1815 \edef\chronos@temppgfpfpath{\pgfkeyscurrentpath}%
1816 \pgfkeys{%^^A set the layer to put all things of some kind on e.g. connections, lines,
    timeline border
1817   \pgfkeyscurrentpath/.is choice,
1818   \chronos@temppgfpfpath/.cd,
1819   background/.code={%
1820     \pgfkeys{/chronos/chronos@#1@haenen/.style={on chronos background layer}}%
1821     \chronos@ychwanegu@gosod{#1}%
1822   },
1823   middle ground/.code={%
1824     \pgfkeys{/chronos/chronos@#1@haenen/.style={on chronos middle ground layer}}%
1825     \chronos@ychwanegu@gosod{#1}%
1826   },
1827   foreground/.code={%
1828     \pgfkeys{/chronos/chronos@#1@haenen/.style={on chronos foreground layer}}%
1829     \chronos@ychwanegu@gosod{#1}%
1830   },

```

```

1831 overlay/.code={%
1832   \pgfkeys{/chronos/chronos@#1@haenen/.style=on chronos overlay layer}%
1833   \chronos@ychwanegu@gosod{#1}%
1834 },
1835 main/.code={%
1836   \pgfkeys{/chronos/chronos@#1@haenen/.style={}}%
1837   \chronos@ychwanegu@gosod{#1}%
1838 },
1839 }%
1840 },
1841 /handlers/.chronos lliw/.code={% chronos colour
1842   \pgfkeysdef{\pgfkeyscurrentpath}{\colorlet{chronos@#1}{##1}}%
1843 },
1844 /handlers/.chronos track/.code={% track setting of property by user
1845   \pgfkeys{%
1846     \pgfkeyscurrentpath/.append code={\chronos@ychwanegu@gosod{#1}},
1847   }%
1848 },
1849 /handlers/.chronos search/.code={%^^A set up search so english paths work e.g. /chronos/li
1850   \pgfkeys{%
1851     \pgfkeyscurrentpath/.unknown/.code={%
1852       \let\searchname=\pgfkeyscurrentname%
1853       \pgfkeysalso{%^^A **angen** y {} o gwmpas ##1 isod! | **need** the {} around ##1
below!
1854         /chronos/#1/\searchname/.try={##1},
1855         /chronos/\searchname/.retry={##1},
1856         /tikz/\searchname/.retry={##1},
1857         /pgf/\searchname/.lastretry={##1}%
1858       }%
1859     },
1860   }%
1861 },
1862 /handlers/.chronos tag init/.code 2 args={%^^A initialise a chronos 'tag' e.g. life,
event, period
1863   \pgfkeys{%
1864     \pgfkeyscurrentpath/.cd,
english translations below
1865     enw/.store in/.expand once=\csname chronos@#1@enw\endcsname,
create a tikz-friendly version of name, in case name contains anything problematic
1866     chronos@tikzname/.code={\chronos@creu@tikzname {#1}{##1}},
1867     enw/.forward to=/chronos/#1/chronos@tikzname,
1868     fel y mae/.is if=chronos@felymae,
1869     fel y mae/.default=true,
1870     llinell'/.code={\chronos@cadw@nodweddion{#1}{@llinell}{##1}},
1871     llinell+/.code={\chronos@ychwanegu@nodweddion{#1}{@llinell}{##1}},
1872     llinell/.forward to=/chronos/#1/llinell',
1873     lliw/.store in/.expand once=\csname chronos@#1@lliw\endcsname,
1874     lliw rhagosodedig/.store in/.expand once=\csname chronos@#1@lliw@rhagosodedig\endcsname,
1875     lliw rhagosodedig=chronos@prifliw,
1876     lliwiau uchod/.code={\chronos@lliwiau@uchod[#1]{##1}},
1877     lliwiau isod/.code={\chronos@lliwiau@isod[#1]{##1}},
1878     lliwiau uchod o clist/.code={\chronos@global@eq@clist{lliwiau_#1_uchod}{##1}},
1879     lliwiau isod o clist/.code={\chronos@global@eq@clist{lliwiau_#1_isod}{##1}},
1880     isod/.is if=chronos@#1@isod,
1881     uchod/.code/.expand once={\csname chronos@#1@isodfalse\endcsname},
1882     at/.store in/.expand once=\csname chronos@#1@at\endcsname,
1883     at/.expand once=\csname chronos@#1@tikzname\endcsname,

```

```

1884     angor/.store in/.expand once=\csname chronos@#1@angor\endcsname,
1885     angor/.forward to=/tikz/anchor,
1886     cysylltu/.is if=chronos@#1@cysylltiad,
1887     cysylltiad'/.code={\chronos@cadw@nodweddion{#1}{@cysylltiad}{##1}},
1888     cysylltiad+/.code={\chronos@ychwanegu@nodweddion{#1}{@cysylltiad}{##1}},
1889     cysylltiad/.forward to=/chronos/#1/cysylltiad',
1890     cysylltwr chronos'/.code={%
1891       \chronos@cadw@nodweddion{#1}{@cysylltwr@chronos}{##1}},
1892     cysylltwr chronos+/.code={%
1893       \chronos@ychwanegu@nodweddion{#1}{@cysylltwr@chronos}{##1}},
1894     cysylltwr chronos/.forward to=/chronos/#1/cysylltwr chronos+,
1895     cysylltwr testun'/.code={%
1896       \chronos@cadw@nodweddion{#1}{@cysylltwr@testun}{##1}},
1897     cysylltwr testun+/.code={%
1898       \chronos@ychwanegu@nodweddion{#1}{@cysylltwr@testun}{##1}},
1899     cysylltwr testun/.forward to=/chronos/#1/cysylltwr testun+,
1900     ffont testun/.code={%
1901       \expandafter\def\csname chronos@#1@ffonttestun\endcsname{##1}},
1902     ffont testun=,
1903     prif gysylltwr testun'/.code={%
1904       \chronos@cadw@nodweddion{#1}{@cysylltwr@testun@prif}{##1}},
1905     prif gysylltwr testun+/.code={%
1906       \chronos@ychwanegu@nodweddion{#1}{@cysylltwr@testun@prif}{##1}},
1907     prif gysylltwr testun/.forward to=/chronos/#1/prif gysylltwr testun',
1908     tag'/.code={\chronos@cadw@nodweddion{#1}{@tag}{##1}},
1909     tag+/.code={\chronos@ychwanegu@nodweddion{#1}{@tag}{##1}},
1910     tag/.forward to=/chronos/#1/tag+,
1911     testun'/.code={\chronos@cadw@nodweddion{#1}{@testun}{##1}},
1912     testun+/.code={\chronos@ychwanegu@nodweddion{#1}{@testun}{##1}},
1913     testun/.forward to=/chronos/#1/testun',
1914     cysylltwyr+/.code={%~A rhan o /chronos/#1; paid â ddileu fe!! | part of /chronos/#1;
don't delete it!!
1915       \csname chronos@#1@cysylltiadtheorittrue\endcsname
1916       \IfExistTF \chronos@cysylltwyr {%
1917         \expandafter\def\expandafter\chronos@cysylltwyr\expandafter{%
1918           \chronos@cysylltwyr,##1}%
1919       }\def \chronos@cysylltwyr{##1}%
1920     },
1921     cysylltwyr'/.code={%
1922       \csname chronos@#1@cysylltiadtheorittrue\endcsname
1923       \def \chronos@cysylltwyr{##1}%
1924     },
1925     cysylltwyr/.forward to=/chronos/#1/cysylltwyr+,
1926     testun yn unig/.code={%
1927       \chronos@ychwanegu@nodweddion{#1}{@tag}{/chronos/testun yn unig}},
1928     troi lliwiau/.code={%
1929       \chronos@ychwanegu@nodweddion{#1}{@tag}{/chronos/troi lliwiau=##1}},
1930     troi lliwiau/.default=true,
1931     phantom/.code={%
1932       \chronos@ychwanegu@nodweddion{#1}{@tag}{/chronos/phantom=##1}},
1933     phantom/.default=true,
1934     cynnwys testun/.store in=\chronos@cynnwys@testun,
1935     cynnwys enw/.store in=\chronos@cynnwys@enw,
1936     cynnwys dyddiadau/.store in=\chronos@cynnwys@dyddiadau,
1937     yshift/.store in=\chronos@yshift,
1938     yshift/.forward to=yshift,
1939     testun yshift/.code={%
1940       \chronos@ychwanegu@nodweddion{#1}{@tag}{/chronos/testun yshift=##1}},
1941     testun yshift'/.code={%
1942       \chronos@ychwanegu@nodweddion{#1}{@tag}{/chronos/testun yshift'=##1}},
1943     testun yshift+/.code={%

```

```

1944     \chronos@ychwanegu@nodweddion{#1}{@tag}{/chronos/testun yshift+##1}},
1945     testun yshift-/.code={%
1946     \chronos@ychwanegu@nodweddion{#1}{@tag}{/chronos/testun yshift-##1}},
1947     testun yshift'+/.code={%
1948     \chronos@ychwanegu@nodweddion{#1}{@tag}{/chronos/testun yshift'+##1}},
1949     testun yshift'-/.code={%
1950     \chronos@ychwanegu@nodweddion{#1}{@tag}{/chronos/testun yshift'-##1}},

1951     name/.forward to=/chronos/#1/enw,

1952     as is/.forward to=/chronos/#1/fel y mae,
1953     colour/.forward to=/chronos/#1/lliw,
1954     color/.forward to=/chronos/#1/lliw,
1955     default colour/.forward to=/chronos/#1/lliw rhagosodedig,
1956     default color/.forward to=/chronos/#1/lliw rhagosodedig,
1957     colours above/.forward to=/chronos/#1/lliwiau uchod,
1958     colours below/.forward to=/chronos/#1/lliwiau isod,
1959     colors above/.forward to=/chronos/#1/lliwiau uchod,
1960     colors below/.forward to=/chronos/#1/lliwiau isod,
1961     colours above from clist/.forward to=/chronos/#1/lliwiau uchod o clist,
1962     colours below from clist/.forward to=/chronos/#1/lliwiau isod o clist,
1963     colors above from clist/.forward to=/chronos/#1/lliwiau uchod o clist,
1964     colors below from clist/.forward to=/chronos/#1/lliwiau isod o clist,
1965     place below/.forward to=/chronos/#1/isod,
1966     place above/.forward to=/chronos/#1/uchod,
1967     tag anchor/.forward to=/chronos/#1/angor,
1968     connect/.forward to=/chronos/#1/cysylltu,
1969     connection/.forward to=/chronos/#1/cysylltiad,
1970     connection'/.forward to=/chronos/#1/cysylltiad',
1971     connection+/.forward to=/chronos/#1/cysylltiad+,
1972     connectors/.forward to=/chronos/#1/cysylltwyr,
1973     connectors+/.forward to=/chronos/#1/cysylltwyr+,
1974     connectors'/.forward to=/chronos/#1/cysylltwyr',
1975     text font/.forward to=/chronos/#1/ffont testun,
1976     text tag connector+/.forward to=/chronos/#1/cysylltwr testun+,
1977     text tag connector'/.forward to=/chronos/#1/cysylltwr testun',
1978     text tag connector/.forward to=/chronos/#1/cysylltwr testun,
1979     main text tag connector+/.forward to=/chronos/#1/prif gysylltwr testun+,
1980     main text tag connector'/.forward to=/chronos/#1/prif gysylltwr testun',
1981     main text tag connector/.forward to=/chronos/#1/prif gysylltwr testun,
1982     chronos connector+/.forward to=/chronos/#1/cysylltwr chronos+,
1983     chronos connector'/.forward to=/chronos/#1/cysylltwr chronos',
1984     chronos connector/.forward to=/chronos/#1/cysylltwr chronos,
1985     colour rotation/.forward to=/chronos/#1/troi lliwiau,
1986     color rotation/.forward to=/chronos/#1/troi lliwiau,
1987     line/.forward to=/chronos/#1/llinell,
1988     line'/.forward to=/chronos/#1/llinell',
1989     line+/.forward to=/chronos/#1/llinell+,
1990     only text/.forward to=/chronos/#1/testun yn unig,
1991     text tag/.forward to=/chronos/#1/testun,
1992     text tag'/.forward to=/chronos/#1/testun',
1993     text tag+/.forward to=/chronos/#1/testun+,
1994     text tag yshift/.forward to=/chronos/#1/testun yshift,
1995     text tag yshift'/.forward to=/chronos/#1/testun yshift',
1996     text tag yshift+/.forward to=/chronos/#1/testun yshift+,
1997     text tag yshift-/.forward to=/chronos/#1/testun yshift-,
1998     text tag yshift'+/.forward to=/chronos/#1/testun yshift'+,
1999     text tag yshift'-/.forward to=/chronos/#1/testun yshift'-,
2000     text content/.forward to=/chronos/#1/cynnwys testun,
2001     name content/.forward to=/chronos/#1/cynnwys enw,
2002     dates content/.forward to=/chronos/#1/cynnwys dyddiadau,

```

```

2003 /chronos/.cd,
2004 cysylltiad #1+/.forward to=/chronos/#1/cysylltiad+,
2005 cysylltiad #1'/.forward to=/chronos/#1/cysylltiad',
2006 cysylltiad #1/.forward to=/chronos/#1/cysylltiad,
2007 cysylltwr chronos #1+/.forward to=/chronos/#1/cysylltwr chronos+,
2008 cysylltwr chronos #1'/.forward to=/chronos/#1/cysylltwr chronos',
2009 cysylltwr chronos #1/.forward to=/chronos/#1/cysylltwr chronos,
2010 cysylltwr testun #1+/.forward to=/chronos/#1/cysylltwr testun+,
2011 cysylltwr testun #1'/.forward to=/chronos/#1/cysylltwr testun',
2012 cysylltwr testun #1/.forward to=/chronos/#1/cysylltwr testun,
2013 prif gysylltwr testun #1+/.forward to=/chronos/#1/prif gysylltwr testun+,
2014 prif gysylltwr testun #1'/.forward to=/chronos/#1/prif gysylltwr testun',
2015 prif gysylltwr testun #1/.forward to=/chronos/#1/prif gysylltwr testun,
2016 llinell #1+/.forward to=/chronos/#1/llinell+,
2017 llinell #1'/.forward to=/chronos/#1/llinell',
2018 llinell #1/.forward to=/chronos/#1/llinell,
2019 testun #1+/.forward to=/chronos/#1/testun+,
2020 testun #1'/.forward to=/chronos/#1/testun',
2021 testun #1/.forward to=/chronos/#1/testun,

2022 #2 connection+/.forward to=/chronos/#1/cysylltiad+,
2023 #2 connection'/.forward to=/chronos/#1/cysylltiad',
2024 #2 connection/.forward to=/chronos/#1/cysylltiad,
2025 #2 chronos connector+/.forward to=/chronos/#1/cysylltwr chronos+,
2026 #2 chronos connector'/.forward to=/chronos/#1/cysylltwr chronos',
2027 #2 chronos connector/.forward to=/chronos/#1/cysylltwr chronos,
2028 #2 text tag connector+/.forward to=/chronos/#1/cysylltwr testun+,
2029 #2 text tag connector'/.forward to=/chronos/#1/cysylltwr testun',
2030 #2 text tag connector/.forward to=/chronos/#1/cysylltwr testun,
2031 #2 main text tag connector+/.forward to=/chronos/#1/prif gysylltwr testun+,
2032 #2 main text tag connector'/.forward to=/chronos/#1/prif gysylltwr testun',
2033 #2 main text tag connector/.forward to=/chronos/#1/prif gysylltwr testun,
2034 #2 line+/.forward to=/chronos/#1/llinell+,
2035 #2 line'/.forward to=/chronos/#1/llinell',
2036 #2 line/.forward to=/chronos/#1/llinell,
2037 #2 text tag+/.forward to=/chronos/#1/testun+,
2038 #2 text tag'/.forward to=/chronos/#1/testun',
2039 #2 text tag/.forward to=/chronos/#1/testun,

2040 /chronos/#2/.chronos search=#1,
2041 /chronos/#1/.chronos search=#2,% heb bwrpas | pointless
2042 /chronos/#1/.code={\pgfqkeys{/chronos/#1}{##1}},
2043 /chronos/#2/.forward to=/chronos/#1,
2044 }%
2045 },

2046 /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).

2047 \pgfqkeys{\pgfkeyscurrentpath/.cd,
2048 dyddiadau/.code args={##1:##2}{%^A angen y llinell nesaf am y saesneg yn unig
2049 \pgfqkeys{/chronos/#1}{#2=##1}}%^A needed only for the english ?? (why?)
2050 \edef\tempa{##2}\edef\tempb{}}%
2051 \ifx\tempa\tempb
2052 \else
2053 \pgfqkeys{/chronos/#1}{#3=##2}%
2054 \fi
2055 },

```

2056 #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

```

2057 #2/.style={/chronos/set date aux/.expanded={##1-01-01-0@#6}},
2058 #3/.style={/chronos/set date aux/.expanded={##1-12-31-0@#7},/chronos/#1/#4=true},
2059 #3={\year-\month-\day},
2060 label #2/.store in/.expand once=\csname chronos@#1@label#2\endcsname,
2061 label #3/.store in/.expand once=\csname chronos@#1@label#3\endcsname,
2062 fformatiau dyddiadau/.style args={##1:##2:##3}{%
2063 /chronos/#1/fformat #2 yr un gyfnod={##1},
2064 /chronos/#1/fformat #2 cyfnodau gwahanol={##2},
2065 /chronos/#1/fformat #3={##3},
2066 },
2067 fformatiau dyddiadau/.chronos track={@#1@fformatiau@dyddiadau,@#1@cyfnodau,@#1@llawn},
2068 fformat #2 yr un gyfnod/.code={%
2069 \expandafter\def\csname chronos@#1@fformat#2@cyfnod\endcsname{##1}%
2070 \chronos@ychwanegu@nodweddion{#1}{@tag}{/chronos/#1/fformat #2 yr un gyfnod={##1}}%
2071 },
2072 fformat #2 cyfnodau gwahanol/.code={%
2073 \expandafter\def\csname chronos@#1@fformat#2@cyfnodau\endcsname{##1}%
2074 \chronos@ychwanegu@nodweddion{#1}{@tag}{%
2075 /chronos/#1/fformat #2 cyfnodau gwahanol={##1}}%
2076 },
2077 fformat #2/.forward to=/chronos/#1/fformat #2 yr un gyfnod,
2078 fformat #2/.forward to=/chronos/#1/fformat #2 cyfnodau gwahanol,
2079 fformat #3/.code={%
2080 \expandafter\def\csname chronos@#1@fformat#3\endcsname{##1}%
2081 \chronos@ychwanegu@nodweddion{#1}{@tag}{/chronos/#1/fformat #3={##1}}%
2082 },
2083 fformat #2 yr un gyfnod/.chronos track={%
2084 @#1@fformatiau@dyddiadau,@#1@cyfnodau,@#1@llawn},
2085 fformat #2 cyfnodau gwahanol/.chronos track={%
2086 @#1@fformatiau@dyddiadau,@#1@cyfnodau,@#1@llawn},
2087 fformat #2/.chronos track={%
2088 @#1@fformatiau@dyddiadau,@#1@cyfnodau,@#1@llawn},
2089 fformat #3/.chronos track={%
2090 @#1@fformatiau@dyddiadau,@#1@cyfnodau,@#1@llawn},
2091 dangos cyfnodau/@blynyddoedd yn unig/.code={%~^A show eras + only years formats
2092 \expandafter\def\csname chronos@#1@fformat#2@cyfnod\endcsname{!Y}%
2093 \expandafter\def\csname chronos@#1@fformat#2@cyfnodau\endcsname{%
2094 !Y\thinspace !E}%
2095 \expandafter\def\csname chronos@#1@fformat#3\endcsname{!Y\thinspace !E}%
2096 },
2097 dangos cyfnodau/@llawn/.code={% show eras + full dates formats
2098 \expandafter\def\csname chronos@#1@fformat#2@cyfnod\endcsname{!d/!/!Y}%
2099 \expandafter\def\csname chronos@#1@fformat#2@cyfnodau\endcsname{%
2100 !d/!/m/!Y\thinspace !E}%
2101 \expandafter\def\csname chronos@#1@fformat#3\endcsname{%
2102 !d/!/m/!Y\thinspace !E}%
2103 },
2104 dangos cyfnodau/@llawn/.code n args=3{%~^A show eras + full dates set formats
2105 \pgfqkeys{/chronos/#1/dangos cyfnodau}{%
2106 @llawn/.code={%
2107 \expandafter\def\csname chronos@#1@fformat#2@cyfnod\endcsname{##1}%
2108 \expandafter\def\csname chronos@#1@fformat#2@cyfnodau\endcsname{##2}%
2109 \expandafter\def\csname chronos@#1@fformat#3\endcsname{##3}%
2110 }%
2111 }%
2112 },

```

```

2113     dangos cyfnodau/blynyddoedd yn unig/.code n args=3{%^A show eras + only years set
formats
2114     \pgfqkeys{/chronos/#1/dangos cyfnodau}{%
2115     @blynyddoedd yn unig/.code={%
2116     \expandafter\def\csname chronos@#1@fformat#2@cyfnod\endcsname{##1}%
2117     \expandafter\def\csname chronos@#1@fformat#2@cyfnodau\endcsname{##2}%
2118     \expandafter\def\csname chronos@#1@fformat#3\endcsname{##3}%
2119     }%
2120     }%
2121     },
2122     heb gyfnodau/@blynyddoedd yn unig/.code={%^A w/o eras + only years formats
2123     \expandafter\def\csname chronos@#1@fformat#2@cyfnod\endcsname{!Y}%
2124     \expandafter\def\csname chronos@#1@fformat#2@cyfnodau\endcsname{!Y}%
2125     \expandafter\def\csname chronos@#1@fformat#3\endcsname{!Y}%
2126     },
2127     heb gyfnodau/@llawn/.code={%^A w/o eras + full dates formats
2128     \expandafter\def\csname chronos@#1@fformat#2@cyfnod\endcsname{!d/!m/!Y}%
2129     \expandafter\def\csname chronos@#1@fformat#2@cyfnodau\endcsname{!d/!m/!Y}%
2130     \expandafter\def\csname chronos@#1@fformat#3\endcsname{!d/!m/!Y}%
2131     },
2132     heb gyfnodau/llawn/.code n args=3{%^A w/o eras + full dates set formats
2133     \pgfqkeys{/chronos/#1/heb gyfnodau}{%
2134     @llawn/.code={%
2135     \expandafter\def\csname chronos@#1@fformat#2@cyfnod\endcsname{##1}%
2136     \expandafter\def\csname chronos@#1@fformat#2@cyfnodau\endcsname{##2}%
2137     \expandafter\def\csname chronos@#1@fformat#3\endcsname{##3}%
2138     }%
2139     }%
2140     },
2141     heb gyfnodau/blynyddoedd yn unig/.code n args=3{%^A w/o eras + only years set formats
2142     \pgfqkeys{/chronos/#1/heb gyfnodau}{%
2143     @blynyddoedd yn unig/.code={%
2144     \expandafter\def\csname chronos@#1@fformat#2@cyfnod\endcsname{##1}%
2145     \expandafter\def\csname chronos@#1@fformat#2@cyfnodau\endcsname{##2}%
2146     \expandafter\def\csname chronos@#1@fformat#3\endcsname{##3}%
2147     }%
2148     }%
2149     },

```

english translations below

```

2150     blynyddoedd yn unig/.code={%
2151     \chronos@ychwanegu@nodweddion{#1}{@tag}{/chronos/blynyddoedd yn unig}},
2152     dyddiadau llawn/.code={%
2153     \chronos@ychwanegu@nodweddion{#1}{@tag}{/chronos/dyddiadau llawn}},
2154     dangos cyfnodau/.code={%
2155     \chronos@ychwanegu@nodweddion{#1}{@tag}{/chronos/dangos cyfnodau}},
2156     heb gyfnodau/.code={%
2157     \chronos@ychwanegu@nodweddion{#1}{@tag}{/chronos/heb gyfnodau}},
2158     dangos cyfnodau/.chronos track={@#1@cyfnodau},
2159     dyddiadau llawn/.chronos track={@#1@llawn},
2160     heb gyfnodau/.chronos track={@#1@cyfnodau},
2161     blynyddoedd yn unig/.chronos track={@#1@llawn},
2162     ffont dyddiad/.code={%
2163     \expandafter\def\csname chronos@#1@ffontdyddiad\endcsname{##1}},
2164     ffont dyddiad=,

2165     dates/.forward to=/chronos/#1/dyddiadau,
2166     #8/.forward to=/chronos/#1/#2,
2167     #9/.forward to=/chronos/#1/#3,
2168     date formats/.forward to=/chronos/#1/fformatiau dyddiadau,
2169     #8 format/.forward to=/chronos/#1/fformat #2,

```



```

2170     same era #8 format/.forward to=/chronos/#1/fformat #2 yr un gyfnod,
2171     different eras #8 format/.forward to=/chronos/#1/fformat #2 cyfnodau gwahanol,
2172     #9 format/.forward to=/chronos/#1/fformat #3,
2173     show eras/full/.forward to=/chronos/#1/dangos cyfnodau/llawn,
2174     show eras/only years/.forward to=/chronos/#1/dangos cyfnodau/blynyddoedd yn unig,
2175     without eras/full/.forward to=/chronos/#1/heb gyfnodau/llawn,
2176     without eras/only years/.forward to=/chronos/#1/heb gyfnodau/blynyddoedd yn unig,
2177     #8 label/.forward to=/chronos/#1/label #2,
2178     #9 label/.forward to=/chronos/#1/label #3,
2179     only years/.forward to=/chronos/#1/blynyddoedd yn unig,
2180     full dates/.forward to=/chronos/#1/dyddiadau llawn,
2181     without eras/.forward to=/chronos/#1/heb gyfnodau,
2182     show eras/.forward to=/chronos/#1/dangos cyfnodau,
2183     date font/.forward to=/chronos/#1/ffont dyddiad,

2184     }%
2185 },

2186 /handlers/.chronos key maker/.code n args=3{%
2187     \chronos@keymaker{#1}{#2}{#3}%
2188 },

2189 chronos/.code={\PackageError{chronos}{%
2190     The key chronos is deprecated.\MessageBreak
2191     Use the environment chronos instead.}},

2192 byw/.code={\chronos@cyd@destun@init+{byw}{#1}},
2193 byw/.default={},

2194 digwyddiad/.code={\chronos@cyd@destun@init+{digwyddiad}{#1}},
2195 digwyddiad/.default={},

2196 parhad/.code={\chronos@cyd@destun@init+{parhad}{#1}},
2197 parhad/.default={},

2198 theori/.code={\chronos@cyd@destun@init{theori}{#1}\chronos@tag@cysylltufalse},
2199 theori/.default={},

2200 cylch theori/.code={%
2201     \chronos@cyd@destun@init[theori/cylchau]{theori}{#1}%
2202     \chronos@tag@cysylltufalse},
2203 cylch theori/.default={},

2204 gwybodaeth/.code={%
2205     \chronos@cyd@destun@init{gwybodaeth}{#1}\chronos@tag@cysylltufalse},
2206 gwybodaeth/.default={},

2207 prif/.code={\chronos@cyd@destun@init*{prif}{#1}},
2208 prif/.default={},

2209 hawlfraint/.code={\chronos@cyd@destun@init*{hawlfraint}{#1}},
2210 hawlfraint/.default={},

2211 life/.forward to=/tikz/byw,
2212 event/.forward to=/tikz/digwyddiad,
2213 period/.forward to=/tikz/parhad,
2214 theory/.forward to=/tikz/theori,
2215 theory circle/.forward to=/tikz/cylch theori,
2216 main/.forward to=/tikz/prif,
2217 copyright/.forward to=/tikz/hawlfraint,
2218 copyleft/.forward to=/tikz/hawlfraint,

2219 chronos connect/.style args={#1:#2}{#1,/chronos/@cysylltiad=lliw #2},
2220 chronos create chronos connector/.style args={#1:#2}{%
2221     #1,/chronos/@cysylltwr@chronos=lliw #2},

```

```

2222 chronos create text tag connector/.style args={#1:#2}{%
2223   #1,/chronos/@cysylltwr@testun=lliw #2},
2224 chronos mark line/.style args={#1:#2}{#1,/chronos/@llinell=lliw #2},
2225 chronos text tag/.style args={#1:#2}{#1,/chronos/@testun=lliw #2},
2226 chronos tikz'/.code={\pgfkeysdef{/chronos/@tikz}{#1}},
2227 chronos tikz+/.code={\pgfkeys{/chronos}{@tikz/.append code={#1}}},
2228 chronos tikz/.forward to=/chronos tikz+,
2229 chronos tikz outside bb'/.code={\pgfkeysdef{/chronos/@@tikz}{#1}},
2230 chronos tikz outside bb+/.code={\pgfkeys{/chronos}{@@tikz/.append code={#1}}},
2231 chronos tikz outside bb/.forward to=/chronos tikz outside bb+,

2232 /chronos/.search also={/chronos/lilinell amser,/tikz,/pgf},
2233 /chronos/lilinell amser/.search also={/chronos,/tikz,/pgf},
2234 /chronos/byw/.search also={/chronos,/tikz,/pgf},
2235 /chronos/digwyddiad/.search also={/chronos,/tikz,/pgf},
2236 /chronos/parhad/.search also={/chronos,/tikz,/pgf},
2237 /chronos/theori/.search also={/chronos,/tikz,/pgf},
2238 /chronos/theori/cylchau/.search also={/chronos/theori,/chronos,/tikz,/pgf},

2239 /chronos/.cd,
2240 @before@headings/.code={},
2241 before headings+/.code={\pgfkeys{/chronos}{@before@headings/.append code={#1}}},
2242 before headings'/.code={\pgfkeys{/chronos}{@before@headings/.code={#1}}},
2243 before headings/.forward to=/chronos/before headings+,
2244 @before@frame/.code={},
2245 before drawing frame+/.code={%
2246   \pgfkeys{/chronos}{@before@frame/.append code={#1}}},
2247 before drawing frame'/.code={\pgfkeys{/chronos}{@before@frame/.code={#1}}},
2248 before drawing frame/.forward to=/chronos/before drawing frame+,
2249 tikz'/.forward to=/tikz/chronos tikz',
2250 tikz+/.forward to=/tikz/chronos tikz+,
2251 tikz/.forward to=/tikz/chronos tikz,
2252 tikz outside bb'/.forward to=/tikz/chronos tikz outside bb',
2253 tikz outside bb+/.forward to=/tikz/chronos tikz outside bb+,
2254 tikz outside bb/.forward to=/tikz/chronos tikz outside bb,

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

2255 @tikz/.style={},
2256 @@tikz/.style={},

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

2257 @timeline@config/.code={},
2258 @@timeline@config/.code={%
2259   \chronos@if@gosodF {@byw@cyfnodau}
2260     {\pgfkeys{/chronos/byw}{dangos cyfnodau}}%
2261   \chronos@if@gosodF {@parhad@cyfnodau}
2262     {\pgfkeys{/chronos/parhad}{dangos cyfnodau}}%
2263   \chronos@if@gosodF {@digwyddiad@cyfnodau}
2264     {\pgfkeys{/chronos/digwyddiad}{dangos cyfnodau}}%
2265   \chronos@if@gosodF {@byw@llawn}
2266     {\pgfkeys{/chronos/byw}{blynyddoedd yn unig}}%
2267   \chronos@if@gosodF {@parhad@llawn}
2268     {\pgfkeys{/chronos/parhad}{blynyddoedd yn unig}}%
2269   \chronos@if@gosodF {@digwyddiad@llawn}
2270     {\pgfkeys{/chronos/digwyddiad}{dyddiadau llawn}}%
2271   \chronos@if@gosodF{timeline@years}
2272     {\pgfkeys{/chronos/lilinell amser}{blynyddoedd=ar y llinell}}%
2273   \ifchronos@yearsonline
2274     \chronos@ychwanegu@nodweddion@rhestr^{byw,parhad}{@llinell}%
2275     {fill=####1,fill opacity=.25,draw=none}%
2276     \chronos@ychwanegu@nodweddion@rhestr^{digwyddiad}{@llinell}%

```

```

2277     {draw=###1,fill=none,opacity=.25}%
2278 \else
2279     \chronos@ychwanegu@nodweddion@rhestr^{byw,parhad}{@llinell}%
2280     {draw=###1,thick,fill opacity=.75}%
2281     \chronos@ychwanegu@nodweddion@rhestr^{digwyddiad}{@llinell}%
2282     {draw=###1,draw opacity=.75,fill=none}%
2283 \fi

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

2284 \let\timelineht\chronos@height
2285 },
2286 @style/.style={},
2287 @@timeline@config@diwedd/.style={},
2288 @@timeline@config@dechrau/.style={},
2289 chronos tweak/.code={\pgfqkeys{/chronos}{@style/.append style={#1}}},
2290 chronos opacity/.code={%
2291     \ifchronos@preset\chronos@temptrue\else\chronos@tempfalse\fi
2292     \chronos@presettrue
2293     \pgfqkeys{/chronos}{%
2294         @style/.append style={transparency group,opacity=#1},
2295         every cysylltiadau+={opacity=#1},
2296         every cysylltwyr chronos+={opacity=#1},
2297         /chronos/prif/@frame/.append style={opacity=#1},
2298         /chronos/llinell amser/.cd,
2299         llinell+={draw opacity=#1,fill opacity=#1},
2300         timeline@bare@mark@on@line/.append style={opacity=#1},
2301         timeline@minor@mark@on@line/.append style={opacity=#1},
2302         timeline@mark@on@line/.append style={opacity=#1},
2303         timeline@bare@mark@off@line/.append style={opacity=#1},
2304         timeline@minor@mark@off@line/.append style={opacity=#1},
2305         timeline@mark@off@line/.append style={opacity=#1},
2306         timeline@year@on@line/.append style={opacity=#1},
2307         timeline@year@ff@line/.append style={opacity=#1},
2308         border+={opacity=#1}}%
2309     \ifchronos@temp\chronos@presettrue\else\chronos@presetfalse\fi
2310 },

2311 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 ...
2312     \chronos@set@date@aux{#1}%
2313 },

2314 headings+/.code={%
2315     \chronos@headingstrue
2316     \chronos@to@clist+{headings}{#1}%
2317 },
2318 heading+/.code n args=3{% name/content; start ; end
2319     \chronos@headingstrue
2320     \chronos@to@clist+{headings}{#1/#2/#3}%
2321 },
2322 subheading+/.code n args=4{% name/content; start ; end; pos
2323     \chronos@headingstrue
2324     \chronos@to@clist+{subheadings}{#1/#2/#3/#4}%
2325 },
2326 subheadings+/.code={% name/content; start ; end; pos
2327     \chronos@headingstrue
2328     \chronos@to@clist+{subheadings}{#1}%
2329 },
2330 heading'/.code n args=3{%
2331     \chronos@headingstrue
2332     \chronos@to@clist{headings}{#1/#2/#3}%

```

```

2333 },
2334 headings'/.code={%
2335   \chronos@headingstrue
2336   \chronos@to@clist{headings}{#1}%
2337 },
2338 subheading'/.code n args=4{%
2339   \chronos@headingstrue
2340   \chronos@to@clist{subheadings}{#1/#2/#3/#4}%
2341 },
2342 subheadings'/.code={%
2343   \chronos@headingstrue
2344   \chronos@to@clist{subheadings}{#1}%
2345 },
2346 century subheading+/.code 2 args={% name/content; start ; end; pos
2347   \chronos@headingstrue
2348   \chronos@global@to@clist+{century_subheadings}{#1/#2}%
2349 },
2350 century subheadings+/.code 2 args={% name/content; start ; end; pos
2351   \chronos@headingstrue
2352   \foreach \i in {#1} {\chronos@global@to@clist+{century_subheadings}{\i/#2}}%
2353 },
2354 century subheading'/.code 2 args={% name/content; start ; end; pos
2355   \chronos@headingstrue
2356   \chronos@global@to@clist{century_subheadings}{#1/#2}%
2357 },
2358 century subheadings'/.code 2 args={% name/content; start ; end; pos
2359   \chronos@headingstrue
2360   \chronos@global@clear@to@clist{century_subheadings}%
2361   \foreach \i in {#1} {\chronos@global@to@clist{century_subheadings}{\i/#2}}%
2362 },
2363 heading/.forward to=/chronos/heading+,
2364 headings/.forward to=/chronos/headings+,
2365 subheading/.forward to=/chronos/subheading+,
2366 subheadings/.forward to=/chronos/subheadings+,
2367 century subheading/.forward to=/chronos/century subheading+,
2368 century subheadings/.forward to=/chronos/century subheadings+,
2369 subheadings drops/.chronos 2 dimens={\chronos@subheading@drop@uchod}%
2370   {\chronos@subheading@drop@isod},
2371 heading drop/.chronos dimen=\chronos@heading@drop,
2372 headings drops'/.code args={#1:#2:#3}{%
2373   \chronos@heading@drop=#1
2374   \chronos@subheading@drop@uchod=#2
2375   \chronos@subheading@drop@isod=#3%
2376 },
2377 headings drops'+/.code args={#1:#2:#3}{%
2378   \advance \chronos@heading@drop by #1
2379   \advance \chronos@subheading@drop@uchod by #2
2380   \advance\chronos@subheading@drop@isod by #3%
2381 },
2382 headings drops'-/.code args={#1:#2:#3}{%
2383   \advance \chronos@heading@drop by -#1
2384   \advance \chronos@subheading@drop@uchod by -#2
2385   \advance\chronos@subheading@drop@isod by -#3%
2386 },
2387 headings drops'=Opt:Opt:Opt,
2388 chronos coords'/.code={\chronos@to@clist{dyddiadau_coords}{#1}},
2389 chronos coords+/.code={\chronos@to@clist+{dyddiadau_coords}{#1}},
2390 chronos coords/.forward to=/chronos/chronos coords+,
2391 frame/.is if=chronos@frame,
2392 frame/.default=true,
2393 frame uses bb/.is if=chronos@framedefnyddiobb,

```

```

2394   frame/.default=true,
2395 }
2396 \ExplSyntaxOn

```

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

```

2397 \__chronos_kexpandtotags:nmn { byw } { life } { + }
2398 \__chronos_kexpandtotags:nmn { digwyddiad } { event } { + }
2399 \__chronos_kexpandtotags:nmn { parhad } { period } { + }
2400 \__chronos_kexpandtotags:nmn { theori } { theory } { + }
2401 \__chronos_kexpandtotags:nmn { gwybodaeth } { info } { + }

```

like kexpander but without every keys

```

2402 \__chronos_kextripler:nnnnn { every ~ cylch ~ cylch ~ theori }
2403   { every ~ theory ~ circle ~ text } { every@cylch ~ cylch ~ theori } { + }
2404   { style }
2405 \__chronos_kextripler:nnnnn { every ~ testun ~ cylch ~ theori }
2406   { every ~ theory ~ circle ~ circle } { every@testun ~ cylch ~ theori }
2407   { + } { style }
2408 \__chronos_kextripler:nnnnn { llinell ~ amser / llinell } { timeline ~ line }
2409   { llinell ~ amser / timeline@line } { ' } { style }
2410 \__chronos_kextripler:nnnnn { llinell ~ amser / border } { timeline ~ border }
2411   { llinell ~ amser / timeline@border } { ' } { style }
2412 \__chronos_kextripler:nnnnn { prif / teitl } { prif / title } { prif / @teitl }
2413   { ' } { style }
2414 \__chronos_kextripler:nnnnn { amserau } { subheadings ~ style } { @amserau }
2415   { ' } { style }
2416 \__chronos_kextripler:nnnnn { amseraumawr } { headings ~ style }
2417   { @amseraumawr } { ' } { style }
2418 \__chronos_kextripler:nnnnn { hawlfraint } { copyright } { @hawlfraint }
2419   { ' } { style }
2420 \__chronos_kextripler:nnnnn { hawlfraint } { copyright } { @hawlfraint } { ' }
2421   { style }
2422 \__chronos_kexforwardtriple:nn { hawlfraint } { copleft }
2423 \__chronos_kextripler:nnnn { timeline ~ config } {@timeline@config} { + } { code }
2424 \__chronos_kextripler:nnnn { gwybodaeth / label } { gwybodaeth / @label } { ' }
2425   { style }
2426 \__chronos_kextripler:nnnn { prif / frame } { prif / @frame } { ' } { style }
2427 \__chronos_kextripler:nnnn { theori / cylchau / label }
2428   { theori / cylchau / @label } { ' } { style }
2429 \ExplSyntaxOff
2430 \pgfqkeys{/chronos}{%

2431   every@cylch cylch theori/.style={%
2432     fill=chronos@prifliw, draw=chronos@prifliw, even odd rule},
2433   every@testun cylch theori/.style={%
2434     decoration={text effects along path, text={#1}, text effects/.cd,%
2435       fit text to path, text=chronos@prifliw@cefndir,%
2436       characters={text along path, font=\scriptsize\scshape}}, decorate},
2437   every byw isod/.code={%
2438     \chronos@every@byw@isodtrue
2439     \chronos@every@byw@uchodfalse
2440     \chronos@byw@isodtrue
2441   },
2442   every digwyddiad isod/.code={%
2443     \chronos@every@digwyddiad@isodtrue
2444     \chronos@every@digwyddiad@uchodfalse
2445     \chronos@digwyddiad@isodtrue
2446   },
2447   every parhad isod/.code={%

```

```

2448     \chronos@every@parhad@isodtrue
2449     \chronos@every@parhad@uchodfalse
2450     \chronos@parhad@isodtrue
2451   },
2452   every byw uchod/.code={%
2453     \chronos@every@byw@uchodtrue
2454     \chronos@every@byw@isodfalse
2455     \chronos@byw@isodfalse
2456   },
2457   every digwyddiad uchod/.code={%
2458     \chronos@every@digwyddiad@uchodtrue
2459     \chronos@every@digwyddiad@isodfalse
2460     \chronos@digwyddiad@isodfalse
2461   },
2462   every parhad uchod/.code={%
2463     \chronos@every@parhad@uchodtrue
2464     \chronos@every@parhad@isodfalse
2465     \chronos@parhad@isodfalse
2466   },

2467   every life below/.forward to=/chronos/every byw isod,
2468   every period below/.forward to=/chronos/every parhad isod,
2469   every event below/.forward to=/chronos/every digwyddiad isod,
2470   every life above/.forward to=/chronos/every byw uchod,
2471   every period above/.forward to=/chronos/every parhad uchod,
2472   every event above/.forward to=/chronos/every digwyddiad uchod,

2473 }
2474 \tikzset{%

2475 /chronos/llynell amser/.code={\pgfqkeys{/chronos/llynell amser}{#1}},
2476 /chronos/timeline/.forward to=/chronos/llynell amser,
2477 /chronos/timeline/.chronos search=llynell amser,
2478 /chronos/llynell amser/.cd,
2479 timeline arrow/.is if=chronostimelinearrow,
2480 timeline arrow/.default=true,
2481 no timeline arrow/.code={\chronostimelinearrowfalse},
2482 timeline@arrow/.style={},
2483 no@timeline@arrow/.style={},
2484 do timeline arrow/.code={},
2485 conditional timeline arrow/.code 2 args={%
2486   \pgfqkeys{/chronos}{%
2487     llynell amser/.cd,
2488     timeline@arrow/.style={/chronos/.cd,#1},
2489     no@timeline@arrow/.style={/chronos/.cd,#2},
2490     do timeline arrow/.add code={%
2491       \ifchronostimelinearrow
2492         \tikzset{/chronos/llynell amser/timeline@arrow}%
2493       \else
2494         \tikzset{/chronos/llynell amser/no@timeline@arrow}%
2495       \fi
2496     },
2497   }%
2498 },

2499 ffont camau mawr/.store in=\chronos@ffont@camaumawr,
2500 ffont camau bach/.store in=\chronos@ffont@camaubach,
2501 ffont cyfnodau/.store in=\chronos@ffont@cyfnodau,
2502 ffont/.forward to=/chronos/llynell amser/ffont cyfnodau,
2503 ffont/.forward to=/chronos/llynell amser/ffont camau bach,
2504 ffont/.forward to=/chronos/llynell amser/ffont camau mawr,

2505 major step font/.forward to=/chronos/llynell amser/ffont camau mawr,

```

```

2506 minor step font/.forward to=/chronos/llinell amser/ffont camau bach,
2507 eras font/.forward to=/chronos/llinell amser/ffont cyfnodau,
2508 timeline font/.forward to=/chronos/llinell amser/ffont,

2509 border ar/.chronos layer choice=border,
2510 border ar=background,
2511 llinell amser ar/.chronos layer choice=llinell amser,
2512 llinell amser ar=foreground,

2513 border on/.forward to=/chronos/llinell amser/border ar,
2514 timeline on/.forward to=/chronos/llinell amser/llinell amser ar,

2515 dyddiad diwedd/.style={%
2516   /chronos/@@timeline@config@diwedd/.code={%
2517     \pgfqkeys{/chronos}{set date aux/.expanded={#1-12-31-0@end}}%
2518   },
2519 },
2520 dyddiad dechrau/.style={%
2521   /chronos/@@timeline@config@dechrau/.code={%
2522     \pgfqkeys{/chronos}{set date aux/.expanded={#1-01-01-0@start}}%
2523   },
2524 },
2525 dyddiadau/.code args={#1:#2}{%^A angen y llinell nesaf am y saesneg yn unig <= ???!!
2526   \pgfqkeys{/chronos/llinell amser}{dyddiad dechrau=#1,dyddiad diwedd=#2}%
2527 },

2528 cam blwyddyn fawr/.store in=\chronos@cam@blwyddyn@fawr, %^A oedd cam mawr
2529 cam blwyddyn fach/.store in=\chronos@cam@blwyddyn@fach, %^A oedd cam bach
2530 rhaniadau cam/.store in=\chronos@camrhaniadau,%^A cam rhaniadau %^A oedd camau bach
/ \chronos@minorsteps
2531 camu o flwyddyn/.store in=\chronos@stepfrom,
2532 cam blwyddyn/.code={%
2533   \pgfqkeys{/chronos/llinell amser}{cam blwyddyn fawr=#1}%
2534   \Undefine\chronos@cam@blwyddyn@fach
2535 },

2536 lliw mewnol y border/.chronos lliw=borderinner,
2537 timeline border inner colour/.forward to=/chronos/llinell amser/lliw mewnol y border,
2538 timeline border inner color/.forward to=/chronos/llinell amser/lliw mewnol y border,
2539 lliw allanol y border/.chronos lliw=borderouter,
2540 timeline border outer colour/.forward to=/chronos/llinell amser/lliw allanol y border,
2541 timeline border outer color/.forward to=/chronos/llinell amser/lliw allanol y border,
2542 lliw canol y border/.chronos lliw=bordermiddle,
2543 timeline border middle colour/.forward to=/chronos/llinell amser/lliw canol y border,
2544 timeline border middle color/.forward to=/chronos/llinell amser/lliw canol y border,
2545 cefndir/.chronos lliw=lliw@cefndir@llinell,
2546 blaendir/.chronos lliw=lliw@llinell,
2547 timeline background/.forward to=/chronos/llinell amser/cefndir,
2548 timeline foreground/.forward to=/chronos/llinell amser/blaendir,
2549 background/.forward to=/chronos/llinell amser/cefndir,
2550 foreground/.forward to=/chronos/llinell amser/blaendir,

2551 nodi cyfnodau/.is if=chronos@markeras,% cyfnodau ar y llinell amser
2552 @nodi cyfnodau/.code={\chronos@ychwanegu@gosod{markeras}},
2553 nodi cyfnodau/.forward to=/chronos/llinell amser/@nodi cyfnodau,
2554 timeline mark eras/.forward to=/chronos/llinell amser/nodi cyfnodau,
2555 mark eras/.forward to=/chronos/llinell amser/nodi cyfnodau,
2556 timeline years set/.store in=\chronos@timelineyears,
2557 blynyddoedd/.is choice,
2558 timeline years/.forward to=/chronos/llinell amser/blynyddoedd,

2559 blynyddoedd/.forward to=/chronos/llinell amser/timeline years set,
2560 blynyddoedd/dim/.code={%

```

```

2561 \chronos@timeline@showyearsfalse
2562 \chronos@blynyddoedduchodfalse
2563 \chronos@blynyddoeddisodfalse
2564 \pgfqkeys{/chronos/llynell amser}{%
2565   timeline@years/.style={},
2566   angor blynyddoedd=base,
2567 }%
2568 },% oedd /chronos/llynell amser/heb flynyddoedd
2569 blynyddoedd/none/.forward to=/chronos/llynell amser/blynyddoedd/dim,%^^A oedd /chronos/tim
no years
2570 blynyddoedd/uchod/.code={%
2571   \chronos@yearsonlinefalse
2572   \chronos@blynyddoedduchodtrue
2573   \chronos@blynyddoeddisodfalse
2574   \pgfqkeys{/chronos/llynell amser}{%
2575     timeline@years/.style={%
2576       above, anchor=\chronos@timelinyearsanchor, yshift=.5*\chronos@height},
2577     angor blynyddoedd=south,
2578   }%
2579 },
2580 blynyddoedd/above/.forward to=/chronos/llynell amser/blynyddoedd/uchod,
2581 blynyddoedd/isod/.code={%
2582   \chronos@yearsonlinefalse
2583   \chronos@blynyddoedduchodfalse
2584   \chronos@blynyddoeddisodtrue
2585   \pgfqkeys{/chronos/llynell amser}{%
2586     timeline@years/.style={%
2587       below, anchor=\chronos@timelinyearsanchor, yshift=-.5*\chronos@height},
2588     angor blynyddoedd=north,
2589   }%
2590 },
2591 blynyddoedd/below/.forward to=/chronos/llynell amser/blynyddoedd/isod,
2592 blynyddoedd/ar y llynell/.code={%
2593   \chronos@yearsonlinetrue
2594   \chronos@blynyddoedduchodfalse
2595   \chronos@blynyddoeddisodfalse
2596   \pgfqkeys{/chronos/llynell amser}{%
2597     timeline@years/.style={anchor=\chronos@timelinyearsanchor},
2598     angor blynyddoedd=center,
2599   }%
2600 },
2601 blynyddoedd/on line/.forward to=/chronos/llynell amser/blynyddoedd/ar y llynell,
2602 blynyddoedd/off line/.code={%
2603   \IfBooleanExprTF {%
2604     ! ( \LegacyBoolean {chronos@blynyddoedduchod} %
2605     || \LegacyBoolean {chronos@blynyddoeddisod} )
2606   }{%
2607     \pgfqkeys{/chronos/llynell amser}{blynyddoedd=uchod}%
2608   }{%
2609     \chronos@yearsonlinefalse
2610   }%
2611 },
2612 blynyddoedd/.chronos track=timeline@years,
2613 angor blynyddoedd/.store in=\chronos@timelinyearsanchor,
2614 angor blynyddoedd/.chronos track={angor@blynyddoedd},
2615 timeline years anchor/.forward to=/chronos/llynell amser/angor blynyddoedd,
2616 blwyddyn sero/.is if=chronos@yearzero,
2617 year zero/.forward to=/chronos/llynell amser/blwyddyn sero,
2618 mark at era switch/.is if=chronos@markateraswitch,
2619 mark at era switch/.default=true,
2620 @mark at era switch/.code={\chronos@ychwanegu@gosod{markateraswitch}},

```



```

2621 mark at era switch/.forward to=/chronos/llynell amser/@mark at era switch,
2622 year at era switch/.code={%
2623   \chronos@legacy@if@set{chronos@temp}{#1}%
2624   \ifchronos@temp
2625     \chronos@markateraswitchfalse
2626   \else
2627     \chronos@markateraswitchtrue
2628   \fi
2629   \chronos@ychwanegu@gosod{markateraswitch}},
2630 year at era switch/.default=true,
2631 blynyddoedd bychain/.is if=chronos@minoryears,
2632 blynyddoedd bychain/.default=true,
2633 minor years/.forward to=/chronos/llynell amser/blynyddoedd bychain,
2634 nodau/.is if=chronos@marks,
2635 nodau/.default=true,
2636 timeline marks/.forward to=/chronos/llynell amser/nodau,
2637 nodau bach/.is if=chronos@marks@minor,
2638 nodau bach/.default=true,
2639 timeline minor marks/.forward to=/chronos/llynell amser/nodau bach,
2640 dangos blynyddoedd/.is if=chronos@timeline@showyears,
2641 dangos blynyddoedd/.default=true,
2642 timeline show years/.forward to=/chronos/llynell amser/dangos blynyddoedd,
2643 nodau noeth/.is if=chronos@marks@bare,
2644 nodau noeth/.default=true,
2645 nodau noeth/.chronos track={@bare},
2646 timeline bare marks/.forward to=/chronos/llynell amser/nodau noeth,
2647 timeline@year@off@line/.style={%
2648   text=chronos@lliw@llynell, text opacity=1, align=center, %
2649   fill opacity=.75, anchor=\chronos@timelineyearsanchor},
2650 timeline@mark@off@line/.style={draw=chronos@lliw@llynell,%
2651   {Triangle[width=0pt 3,reversed,length=0pt 1.5]}-, thin, shorten >=-2.5pt},
2652 timeline@minor@mark@off@line/.style={draw=chronos@lliw@llynell,%
2653   {Triangle[width=0pt 3,reversed,length=0pt 1.5]}-, very thin,%
2654   shorten >=-2.5pt},
2655 era switch off line/.style={thick, shorten >=0pt},
2656 timeline@bare@mark@off@line/.style={draw=chronos@lliw@llynell,%
2657   {Triangle[width=0pt 3,reversed,length=0pt 1.5]}-, very thin,%
2658   shorten >=-1.5pt},
2659 timeline@year@on@line/.style={text=chronos@lliw@llynell, anchor=center},
2660 timeline@mark@on@line/.style={draw=chronos@lliw@llynell},
2661 timeline@minor@mark@on@line/.style={draw=chronos@lliw@llynell, thin},
2662 timeline@bare@mark@on@line/.style={draw=chronos@lliw@llynell, thick},
2663 timeline mark@too/.code={%
2664   \pgfqkeys{/chronos/llynell amser}{%
2665     timeline@mark@on@line/.append style={#1},
2666     timeline@mark@off@line/.append style={#1},
2667   }%
2668 },
2669 timeline minor mark@too/.code={%
2670   \pgfqkeys{/chronos/llynell amser}{%
2671     timeline minor marks,
2672     timeline@minor@mark@on@line/.append style={#1},
2673     timeline@minor@mark@off@line/.append style={#1},
2674   }%
2675 },
2676 timeline bare mark@too/.code={%
2677   \pgfqkeys{/chronos/llynell amser}{%
2678     timeline bare marks,
2679     timeline@bare@mark@on@line/.append style={#1},
2680     timeline@bare@mark@off@line/.append style={#1},
2681   }%

```

```

2682 },
2683 timeline year@too/.code={%
2684   \pgfqkeys{/chronos/llinell amser}{%
2685     timeline@year@on@line/.append style={#1},
2686     timeline@year@off@line/.append style={#1},
2687   }%
2688 },

2689 }
2690 \ExplSyntaxOn

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

2691 \__chronos_kexforwarder:nnn { llinell ~ amser } { timeline ~ mark@too }
2692 { timeline ~ mark, timeline ~ all ~ marks }
2693 \__chronos_kexforwarder:nnn { llinell ~ amser } { timeline ~ minor ~ mark@too }
2694 { timeline ~ minor ~ mark, timeline ~ all ~ marks }
2695 \__chronos_kexforwarder:nnn { llinell ~ amser } { timeline ~ bare ~ mark@too }
2696 { timeline ~ bare ~ mark, timeline ~ all ~ marks }
2697 \__chronos_kexforwarder:nnn { llinell ~ amser } { timeline ~ year@too }
2698 { timeline ~ year, timeline ~ all ~ marks }
2699 \__chronos_kexforwarder:nnn { llinell ~ amser } {dyddiadau } { dates }
2700 \__chronos_kexforwarder:nnn { llinell ~ amser } {dyddiad ~ dechrau }
2701 { dechrau, start ~ date, start }
2702 \__chronos_kexforwarder:nnn { llinell ~ amser } {dyddiad ~ diwedd }
2703 { diwedd, end ~ date, end }
2704 \__chronos_kexforwarder:nnn { llinell ~ amser } {cam ~ blwyddyn ~ fawr }
2705 { step ~ major ~ years, step ~ major ~ year, cam ~ blwyddyn ~ mawr }
2706 \__chronos_kexforwarder:nnn { llinell ~ amser } {cam ~ blwyddyn ~ fach }
2707 { cam ~ blynyddoedd ~ bach, step ~ minor ~ years, step ~ minor ~ year }
2708 \__chronos_kexforwarder:nnn { llinell ~ amser } {rhaniadau ~ cam }
2709 { step ~ divisions } %^A oedd camau bach, minor steps
2710 \__chronos_kexforwarder:nnn { llinell ~ amser } {cam ~ blwyddyn }
2711 { cam ~ blynyddoedd, step ~ years, step ~ year }
2712 \__chronos_kexforwarder:nnn { llinell ~ amser } {camu ~ o ~ flwyddyn }
2713 { step ~ from ~ year }
2714 \ExplSyntaxOff
2715 \pgfqkeys{/chronos}{%

2716 ce year label/.store in=\chronos@yearce,
2717 bce year label/.store in=\chronos@yearbce,
2718 timeline ce label/.store in=\chronos@ce,
2719 timeline bce label/.store in=\chronos@bce,

2720 cefndir/.chronos lliw=prifliw@cefndir,
2721 background/.forward to=/chronos/cefndir,
2722 blaendir/.chronos lliw=prifliw,
2723 foreground/.forward to=/chronos/blaendir,
2724 troi lliwiau/.code={%
2725   \chronos@ychwanegu@nodweddion@rhag{tag}{/chronos/troi lliwiau=#1}%
2726   \chronos@legacy@if@set{chronos@troilliwiau}{#1}%
2727 },
2728 troi lliwiau/.default=true,
2729 colour rotation/.forward to=/chronos/troi lliwiau,
2730 color rotation/.forward to=/chronos/troi lliwiau,
2731 heb droi lliwiau/.code={%
2732   \chronos@ychwanegu@nodweddion@rhag{tag}{/chronos/troi lliwiau=false}%
2733   \chronos@troilliwiaufalse
2734 },
2735 no colour rotation/.forward to=/chronos/heb droi lliwiau,
2736 no color rotation/.forward to=/chronos/heb droi lliwiau,
2737 troi pob liw/.style={/chronos/.cd, byw/troi lliwiau=true,%
2738   digwyddiad/troi lliwiau=true, parhad/troi lliwiau=true, %

```

```

2739     theori/troi lliwiau=true, troi lliwiau=true},
2740 rotate all colours/.forward to=/chronos/troi pob liw,
2741 rotate all colors/.forward to=/chronos/troi pob liw,
2742 troi dim lliwiau/.style={/chronos/.cd, byw/troi lliwiau=false,%
2743 digwyddiad/troi lliwiau=false, parhad/troi lliwiau=false,%
2744 theori/troi lliwiau=false, heb droi lliwiau},
2745 rotate no colours/.forward to=/chronos/troi dim lliwiau,
2746 rotate no colors/.forward to=/chronos/troi dim lliwiau,

2747 lefelau/.style args={#1:#2}{
2748 /chronos/uchod=#1,
2749 /chronos/isod=#2,
2750 },
2751 lefelau at/.store in=\chronos@lefelau@at,
2752 lefelau at=chronos mid,
2753 uchod/.store in=\chronos@uchod,
2754 isod/.store in=\chronos@isod,

2755 fformat dyddiad/.code={\chronos@setdateformat{#1}},
2756 date format/.forward to=/chronos/ffformat dyddiad,
2757 year format/.code={\chronos@setyearformat{#1}},
2758 minor year format/.code={\chronos@setminoryearformat{#1}},
2759 dangos cyfnodau/@blynyddoedd yn unig/.code={%
2760 \chronos@setdateformat{!Y\thinspace !E}%
2761 },
2762 dangos cyfnodau/@llawn/.code={\chronos@setdateformat{!d!/m!/Y\thinspace !E}},
2763 dangos cyfnodau/llawn/.code={%
2764 \pgfqkeys{/chronos/dangos cyfnodau}{%
2765 @llawn/.code={\chronos@setdateformat{#1}}%
2766 }%
2767 },
2768 dangos cyfnodau/blynyddoedd yn unig/.code={%
2769 \pgfqkeys{/chronos/dangos cyfnodau}{%
2770 @blynyddoedd yn unig/.code={\chronos@setdateformat{#1}}%
2771 }%
2772 },
2773 heb gyfnodau/@blynyddoedd yn unig/.code={\chronos@setdateformat{!Y}},
2774 heb gyfnodau/@llawn/.code={\chronos@setdateformat{!d!/m!/Y}},
2775 heb gyfnodau/llawn/.code={%
2776 \pgfqkeys{/chronos/heb gyfnodau}{@llawn/.code={\chronos@setdateformat{#1}}}%
2777 },
2778 heb gyfnodau/blynyddoedd yn unig/.code={%
2779 \pgfqkeys{/chronos/heb gyfnodau}{%
2780 @blynyddoedd yn unig/.code={\chronos@setdateformat{#1}}%
2781 }%
2782 },
2783 blynyddoedd yn unig/.code={%
2784 \chronos@ychwanegu@nodweddion@rhag{tag}{/chronos/blynyddoedd yn unig}%
2785 \chronos@ychwanegu@nodweddion{byw}{tag}{/chronos/blynyddoedd yn unig}%
2786 \chronos@ychwanegu@nodweddion{digwyddiad}{tag}{/chronos/blynyddoedd yn unig}%
2787 \chronos@ychwanegu@nodweddion{parhad}{tag}{/chronos/blynyddoedd yn unig}%
2788 \chronos@dimondblynyddoeddtrue
2789 \ifchronos@dangoscyfnodau
2790 \pgfqkeys{/chronos}{%
2791 dangos cyfnodau/@blynyddoedd yn unig,
2792 }%
2793 \else
2794 \pgfqkeys{/chronos}{%
2795 heb gyfnodau/@blynyddoedd yn unig,
2796 }%
2797 \fi
2798 },

```

```

2799 only years/.forward to=/chronos/blynyddoedd yn unig,
2800 dyddiadau llawn/.code={%
2801   \chronos@ychwanegu@nodweddion@rhag{@tag}{/chronos/dyddiadau llawn}%
2802   \chronos@ychwanegu@nodweddion{byw}{@tag}{/chronos/dyddiadau llawn}%
2803   \chronos@ychwanegu@nodweddion{digwyddiad}{@tag}{/chronos/dyddiadau llawn}%
2804   \chronos@ychwanegu@nodweddion{parhad}{@tag}{/chronos/dyddiadau llawn}%
2805   \chronos@dimondblynyddoeddfalse
2806   \ifchronos@dangoscyfnodau
2807     \pgfqkeys{/chronos}{%
2808       dangos cyfnodau/@llawn,
2809     }%
2810   \else
2811     \pgfqkeys{/chronos}{%
2812       heb gyfnodau/@llawn,
2813     }%
2814   \fi
2815 },
2816 full dates/.forward to=/chronos/dyddiadau llawn,
2817 dangos cyfnodau/.code={%
2818   \chronos@ychwanegu@nodweddion@rhag{@tag}{/chronos/dangos cyfnodau}%
2819   \chronos@ychwanegu@nodweddion{byw}{@tag}{/chronos/dangos cyfnodau}%
2820   \chronos@ychwanegu@nodweddion{digwyddiad}{@tag}{/chronos/dangos cyfnodau}%
2821   \chronos@ychwanegu@nodweddion{parhad}{@tag}{/chronos/dangos cyfnodau}%
2822   \chronos@dangoscyfnodaTRUE
2823   \ifchronos@dimondblynyddoedd
2824     \pgfqkeys{/chronos}{%
2825       dangos cyfnodau/@blynyddoedd yn unig,
2826     }%
2827   \else
2828     \pgfqkeys{/chronos}{%
2829       dangos cyfnodau/@llawn,
2830     }%
2831   \fi
2832 },
2833 show eras/.forward to=/chronos/dangos cyfnodau,
2834 heb gyfnodau/.code={%
2835   \chronos@ychwanegu@nodweddion@rhag{@tag}{/chronos/heb gyfnodau}%
2836   \chronos@ychwanegu@nodweddion{byw}{@tag}{/chronos/heb gyfnodau}%
2837   \chronos@ychwanegu@nodweddion{digwyddiad}{@tag}{/chronos/heb gyfnodau}%
2838   \chronos@ychwanegu@nodweddion{parhad}{@tag}{/chronos/heb gyfnodau}%
2839   \chronos@dangoscyfnodaFALSE
2840   \ifchronos@dimondblynyddoedd
2841     \pgfqkeys{/chronos}{%
2842       heb gyfnodau/@blynyddoedd yn unig,
2843     }%
2844   \else
2845     \pgfqkeys{/chronos}{%
2846       heb gyfnodau/@llawn,
2847     }%
2848   \fi
2849 },
2850 without eras/.forward to=/chronos/heb gyfnodau,
2851 show eras/only years/.forward to=/chronos/dangos cyfnodau/blynyddoedd yn unig,
2852 show eras/full dates/.forward to=/chronos/dangos cyfnodau/dyddiadau llawn,
2853 without eras/only years/.forward to=/chronos/heb gyfnodau/blynyddoedd yn unig,
2854 without eras/full dates/.forward to=/chronos/heb gyfnodau/dyddiadau llawn,
2855 heb gyfnodau/.chronos track={@digwyddiad@cyfnodau,@byw@cyfnodau,@parhad@cyfnodau},
2856 dangos cyfnodau/.chronos track={@digwyddiad@cyfnodau,@byw@cyfnodau,@parhad@cyfnodau},
2857 dyddiadau llawn/.chronos track={@digwyddiad@llawn,@byw@llawn,@parhad@llawn},
2858 blynyddoedd yn unig/.chronos track={@digwyddiad@llawn,@byw@llawn,@parhad@llawn},
2859 every date format/.code={%^^A defnyddio macros yn lle allweddau rhag ofn , yn #1 =>

```

```

pam ar ddaear?
2860 \chronos@setdateformat{#1}%
2861 \def\chronos@digwyddiad@fformatdyddiad{#1}%
2862 \def\chronos@parhad@fformatdechrau@cyfnod{#1}%
2863 \def\chronos@parhad@fformatdechrau@cyfnodau{#1}%
2864 \def\chronos@parhad@fformatdiwedd{#1}%
2865 \def\chronos@byw@fformatgeni@cyfnod{#1}%
2866 \def\chronos@byw@fformatgeni@cyfnodau{#1}%
2867 \def\chronos@byw@fformatmarw{#1}%
2868 },
2869 every date format/.chronos track={%
2870 @digwyddiad@fformatiau@dyddiadau,@digwyddiad@cyfnodau,@digwyddiad@llawn},
2871 every date format/.chronos track={%
2872 @byw@fformatiau@dyddiadau,@byw@cyfnodau,@byw@llawn},
2873 every date format/.chronos track={%
2874 @parhad@fformatiau@dyddiadau,@parhad@cyfnodau,@parhad@llawn},
2875 testun yn unig/.code={%
2876 \chronos@ychwanegu@nodweddion@rhag{tag}{/chronos/testun yn unig}%
2877 \chronos@setdateformat}%
2878 \chronos@onlytexttrue
2879 },
2880 only text/.forward to=/chronos/testun yn unig,
2881 event years on line/.code={%
2882 \chronos@eventyearsonlinetrue
2883 \chronos@timeline@showyearsfalse
2884 \pgfqkeys{/chronos/digwyddiad}{blynyddoedd yn unig,heb gyfnodau}%
2885 \chronos@onlytexttrue
2886 },
2887 event year on line/.style={%
2888 /chronos/llinell amser/timeline@years,%
2889 /chronos/llinell amser/timeline@year@on@line,%
2890 font=\chronos@ffont@camaumawr%
2891 },
2892 event year on line skip/.code={\gdef\chronos@specialdate{}},
2893 event dates split/.is if=chronos@eventdatessplit,
2894 event date split/.style={},
2895 testun yshift/.code={%
2896 \pgfmathparse{#1}%
2897 \chronos@ychwanegu@nodweddion@rhag{tag}{/chronos/testun yshift=\pgfmathresult pt}%
2898 \chronos@testun@yshift=\pgfmathresult pt
2899 },
2900 testun yshift'/.code={%
2901 \chronos@ychwanegu@nodweddion@rhag{tag}{/chronos/testun yshift=#1}%
2902 \chronos@testun@yshift=#1
2903 },
2904 testun yshift+/.code={%
2905 \pgfmathparse{#1}%
2906 \chronos@ychwanegu@nodweddion@rhag{tag}{/chronos/testun yshift'+=\pgfmathresult pt}%
2907 \advance \chronos@testun@yshift by \pgfmathresult pt
2908 },
2909 testun yshift'+/.code={%
2910 \chronos@ychwanegu@nodweddion@rhag{tag}{/chronos/testun yshift'+=#1}%
2911 \advance \chronos@testun@yshift by #1
2912 },
2913 text tag yshift/.forward to=/chronos/testun yshift,
2914 text tag yshift'/.forward to=/chronos/testun yshift,
2915 text tag yshift'+/.forward to=/chronos/testun yshift,
2916 text tag yshift'+/.forward to=/chronos/testun yshift,
2917 special date/.code={\gdef\chronos@specialdate{#1}},

```

saesneg: /chronos (mwy uchod)

```
2918 levels/.forward to=/chronos/lefelau,
2919 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

```
2920 discard node/.code={% ^^A
2921   \setbox\pgfutil@tempboxa\box\pgfutil@voidb@x % empty out box
2922   \def\tikz@whichbox{\pgfutil@tempboxa}%
2923 },
```

ateb Qrrbrbirlbel uchod ac ateb arall fe: <https://tex.stackexchange.com/a/688111/> ; defnyddio yn lle \chronosphantom

```
2924 phantom node/.code=\tikz@addoption{%
2925   \expandafter\let\csname pgf@sh@boxes@\tikz@shape\endcsname\pgfutil@empty},
```

sylwad Qrrbrbirlbel: https://tex.stackexchange.com/questions/694799/how-can-i-disable-shadow-noredirect=1#comment1724762_694799

```
2926 zap preactions/.code=\let\tikz@preactions\@empty,
2927 zap postactions/.code=\let\tikz@postactions\@empty,
2928 placeholders/.is choice,
2929 placeholders/off/.code={%
2930   \chronos@placeholdersfalse
2931   \pgfqkeys{/chronos}{%
2932     placeholder/.style={fill=none, draw=none,/chronos/discard node},%^^A phantom node,zap
preactions,zap postactions},
2933   }%
2934 },
2935 placeholders/on/.code={%
2936   \pgfqkeys{/chronos}{%
2937     placeholder/.style={on chronos middle ground layer,fill opacity=.1,%
2938       draw opacity=.25,text opacity=.5,/chronos/.cd,zap preactions,%
2939       zap postactions},
2940     }%
2941 },
2942 placeholders/.default=on,
2943 placeholders=off,
2944 placeholder lines/.style={help lines,%
2945   every node/.append style={rotate=-90,anchor=south,pos=.25,inner sep=0pt}},

2946 show coords/.is if=chronos@showcoords,
2947 show coords/.default=true,
2948 show nodes/.is if=chronos@shownodes,
2949 show nodes/.default=true,
2950 show coordinate/.style n args=5{fill=#1, circle, anchor=center,%
2951   inner sep=1pt, text=#1, pin={[#1, inner sep=0pt, pin edge={draw=#1}],%
2952   pin distance=#4, #5]#2:#3}},
2953 show coord/.style 2 args={%
2954   /chronos/show coordinate={chronos@lliw@coord}{#1}{#2}{30pt}{}},
2955 show node coord/.style 2 args={%
2956   /chronos/show coordinate={chronos@lliw@node}{#1}{#2}{30pt}{}},
2957 show node/.style={},
2958 show bounding box/.is if=chronos@showbb,
2959 show bounding box/.default=true,
2960 show node colour/.chronos lliw=lliw@node,
2961 show bb colour/.chronos lliw=lliw@bb,
2962 show coordinate colour/.chronos lliw=lliw@coord,
2963 show node color/.forward to=/chronos/show node colour,
```

```

2964 show coordinate color/.forward to=/chronos/show coordinate colour,
2965 show bb color/.forward to=/chronos/show bb colour,
2966 show node colour=blue,
2967 show coordinate colour=red,
2968 show bb colour=chronosGreen,

2969 dadfygio/.code={%
2970   \pgfqkeys{/chronos}{%
2971     placeholders,show coords,show node colour=blue,show coordinate colour=red,%
2972     show bounding box,show nodes,show node/.style={draw=chronos@lliw@node}},
2973 debug/.forward to=/chronos/dadfygio,

2974 enwau lliw syml/.is if=chronos@enwaulliwssyml,
2975 enwau lliw syml/.default=true,
2976 dim enwau lliw syml/.code={\chronos@enwaulliwssymlfalse},
2977 tags/.code={%
2978   \pgfqkeys{/chronos}{@tag/.style={#1}}%
2979   \chronos@cadw@nodweddion@rhag{@tag}{#1}},
2980 tags+/.code={%
2981   \pgfqkeys{/chronos}{@tag/.append style={#1}}%
2982   \chronos@ychwanegu@nodweddion@rhag{@tag}{#1}},
2983 tags={},
2984 cysylltiad ar/.chronos layer choice=cysylltiad,
2985 cysylltiadau ar/.forward to=/chronos/cysylltiad ar,
2986 cysylltiad ar=main,
2987 llinell ar/.chronos layer choice=llinell,
2988 llinellau ar/.forward to=/chronos/llinell ar,
2989 llinell ar=middle ground,

2990 cysylltwyr theori/.forward to=/chronos/theori/cysylltwr testun,

2991 theori dash/.style={},
2992 lliwiau uchod/.code={\chronos@lliwiau@uchod{#1}},
2993 lliwiau isod/.code={\chronos@lliwiau@isod{#1}},
2994 lliwiau uchod o clist/.code={\chronos@global@eq@clist{lliwiau_uchod}{#1}},
2995 lliwiau isod o clist/.code={\chronos@global@eq@clist{lliwiau_isod}{#1}},
2996 }
2997 \ExplSyntaxOn

2998 \__chronos_kexpander:nnnn { llinellau } { lines } { @llinell } { ' }
2999 { byw, digwyddiad, parhad }
3000 \__chronos_kexpander:nnnn { cysylltwyr ~ chronos } { chronos ~ connectors }
3001 { @cysylltwr@chronos } { + } { byw, digwyddiad, parhad }
3002 \__chronos_kexpander:nnnn { cysylltwyr ~ testun } { text ~ tag ~ connectors }
3003 { @cysylltwr@testun } { + } { byw, digwyddiad, parhad, theori }
3004 \__chronos_kexpander:nnnn { prif ~ gysylltwyr ~ testun }
3005 { main ~ text ~ tag ~ connectors } { @cysylltwr@testun@prif } { ' }
3006 { byw, digwyddiad, parhad, theori }
3007 \__chronos_kexpander:nnnn { cysylltiadau } { connections } { @cysylltiad }
3008 { ' } { byw, digwyddiad, parhad, theori }
3009 \__chronos_kexpander:nnnn { testunau } { text ~ tags } { @testun }
3010 { ' } { byw, digwyddiad, parhad, theori, gwybodaeth }
3011 \__chronos_kexpander:nnnn { fformat ~ dyddiad } { date ~ format }
3012 { @fformat@dyddiad } { ' } { byw, digwyddiad, parhad, theori, gwybodaeth }
3013 \ExplSyntaxOff
3014 \pgfqkeys{/chronos}{%
3015   llinell amser/.cd,
3016   lled/.chronos dimen=\chronos@width,
3017   uchder/.chronos dimen=\chronos@height,
3018   uchder y border/.chronos dimen=\chronos@borderheight,
3019   timeline era margin/.chronos dimen=\chronos@eramargin,
3020   timeline margin/.chronos dimen=\chronos@timelinemargin,
3021   timeline width/.chronos dimen=\chronos@width,

```

```

3022 width/.chronos dimen=\chronos@width,
3023 timeline height/.chronos dimen=\chronos@height,
3024 height/.chronos dimen=\chronos@height,
3025 timeline border height/.chronos dimen=\chronos@borderheight,
3026 /chronos/.cd,
3027 llinell yshift/.chronos dimen=\chronos@llinell@yshift,
3028 line yshift/.chronos dimen=\chronos@llinell@yshift,
3029 border penawdau/.chronos dimen=\chronos@border@penawdau,
3030 border pen/.chronos dimen=\chronos@border@pen,
3031 border gwaelod/.chronos dimen=\chronos@border@gwaelod,
3032 border de/.chronos dimen=\chronos@border@de,
3033 border chwith/.chronos dimen=\chronos@border@chwith,
3034 border allanol/.chronos dimen=\chronos@border@allanol,
3035 headings border/.chronos dimen=\chronos@border@penawdau,
3036 top border/.chronos dimen=\chronos@border@penawdau,
3037 bottom border/.chronos dimen=\chronos@border@gwaelod,
3038 right border/.chronos dimen=\chronos@border@de,
3039 left border/.chronos dimen=\chronos@border@chwith,
3040 outer border/.chronos dimen=\chronos@border@allanol,
3041 }
3042 \tikzset{/chronos/.cd,
3043 no connections/.code={%
3044     \chronos@byw@cysylltiadfals
3045     \chronos@digwyddiad@cysylltiadfals
3046     \chronos@parhad@cysylltiadfals
3047 },
3048 no connectors/.code={%
3049     \pgfqkeys{/chronos}{every cysylltwyr testun'={coordinate},%
3050     every cysylltwyr chronos'={coordinate}}},
3051 no text tag connectors/.code={%
3052     \pgfqkeys{/chronos}{every cysylltwyr testun'={coordinate}}},

3053 simple colour names/.forward to=/chronos/enwau lliw syml,
3054 simple color names/.forward to=/chronos/enwau lliw syml,
3055 no simple colour names/.forward to=/chronos/dim enwau lliw syml,
3056 no simple color names/.forward to=/chronos/dim enwau lliw syml,
3057 connection/.forward to=/chronos/@cysylltiad,
3058 connection on/.forward to=/chronos/cysylltiad ar,
3059 connections on/.forward to=/chronos/cysylltiadau ar,
3060 colours above/.forward to=/chronos/lliwiau uchod,
3061 colours below/.forward to=/chronos/lliwiau isod,
3062 colors above/.forward to=/chronos/lliwiau uchod,
3063 colors below/.forward to=/chronos/lliwiau isod,
3064 colours above from clist/.forward to=/chronos/lliwiau uchod o clist,
3065 colours below from clist/.forward to=/chronos/lliwiau isod o clist,
3066 colors above from clist/.forward to=/chronos/lliwiau uchod o clist,
3067 colors below from clist/.forward to=/chronos/lliwiau isod o clist,
3068 lines on/.forward to=/chronos/llinell ar,
3069 line on/.forward to=/chronos/llinell ar,

3070 }
3071 \tikzset{%

3072 /chronos/byw/.chronos tag init={byw}{life},
3073 /chronos/byw/.chronos tag dyddiadau init=byw:geni:marw:bu farw:bufarw:geni:marw:birth:deat
3074 /chronos/byw/.cd,

3075 /chronos/digwyddiad/.chronos tag init={digwyddiad}{event},
3076 /chronos/digwyddiad/.cd,
3077 dyddiad/.style={/chronos/set date aux/.expanded={#1-01-01-0@dig}},
3078 ffont dyddiad/.code={\def\chronos@digwyddiad@ffontdyddiad{#1}},
3079 ffont dyddiad=,
3080 fformat dyddiad/.code={%

```



```

3081     \def\chronos@digwyddiad@fformatdyddiad{#1}%
3082     \chronos@ychwanegu@nodweddion{digwyddiad}{@tag}%
3083     {/chronos/digwyddiad/fformat dyddiad={#1}}%
3084 },
3085 fformat dyddiad/.chronos track={%
3086 @digwyddiad@fformatiau@dyddiadau,@digwyddiad@cyfnodau,@digwyddiad@llawn},
3087 dangos cyfnodau/@blynyddoedd yn unig/.code={%
3088     \def\chronos@digwyddiad@fformatdyddiad{!Y\thinspace !E}},
3089 dangos cyfnodau/@llawn/.code={%
3090     \def\chronos@digwyddiad@fformatdyddiad{!d/!m/!Y\thinspace !E}},
3091 dangos cyfnodau/llawn/.code={%
3092     \pgfqkeys{/chronos/digwyddiad/dangos cyfnodau}{%
3093         @llawn/.code={\def\chronos@digwyddiad@fformatdyddiad{#1}}}},
3094 dangos cyfnodau/blynyddoedd yn unig/.code={%
3095     \pgfqkeys{/chronos/digwyddiad/dangos cyfnodau}{%
3096         @blynyddoedd yn unig/.code={\def\chronos@digwyddiad@fformatdyddiad{#1}}}},
3097 heb gyfnodau/@blynyddoedd yn unig/.code={\def\chronos@digwyddiad@fformatdyddiad{!Y}},
3098 heb gyfnodau/@llawn/.code={\def\chronos@digwyddiad@fformatdyddiad{!d/!m/!Y}},
3099 heb gyfnodau/llawn/.code={%
3100     \pgfqkeys{/chronos/digwyddiad/heb gyfnodau}{%
3101         @llawn/.code={\def\chronos@digwyddiad@fformatdyddiad{#1}},@llawn/.show code}},
3102 heb gyfnodau/blynyddoedd yn unig/.code={%
3103     \pgfqkeys{/chronos/digwyddiad/heb gyfnodau}{%
3104         @blynyddoedd yn unig/.code={\def\chronos@digwyddiad@fformatdyddiad{#1}}}},
3105 dangos cyfnodau/.code={%
3106     \chronos@ychwanegu@nodweddion{digwyddiad}{@tag}{/chronos/dangos cyfnodau}},
3107 heb gyfnodau/.code={%
3108     \chronos@ychwanegu@nodweddion{digwyddiad}{@tag}{/chronos/heb gyfnodau}},
3109 dyddiadau llawn/.code={%
3110     \chronos@ychwanegu@nodweddion{digwyddiad}{@tag}{/chronos/dyddiadau llawn}},
3111 blynyddoedd yn unig/.code={%
3112     \chronos@ychwanegu@nodweddion{digwyddiad}{@tag}{/chronos/blynyddoedd yn unig}},
3113 dangos cyfnodau/.chronos track={@digwyddiad@cyfnodau},
3114 dyddiadau llawn/.chronos track={@digwyddiad@llawn},
3115 heb gyfnodau/.chronos track={@digwyddiad@cyfnodau},
3116 blynyddoedd yn unig/.chronos track={@digwyddiad@llawn},

3117 date/.forward to=/chronos/digwyddiad/dyddiad,
3118 date font/.forward to=/chronos/digwyddiad/ffont dyddiad,
3119 date format/.forward to=/chronos/digwyddiad/fformat dyddiad,
3120 show eras/.forward to=/chronos/digwyddiad/dangos cyfnodau,
3121 only years/.forward to=/chronos/digwyddiad/blynyddoedd yn unig,
3122 full dates/.forward to=/chronos/digwyddiad/dyddiadau llawn,
3123 without eras/.forward to=/chronos/digwyddiad/heb gyfnodau,
3124 show eras/only years/.forward to=/chronos/digwyddiad/dangos cyfnodau/blynyddoedd yn
unig,
3125 show eras/full dates/.forward to=/chronos/digwyddiad/dangos cyfnodau/dyddiadau llawn,
3126 without eras/only years/.forward to=/chronos/digwyddiad/heb gyfnodau/blynyddoedd yn
unig,
3127 without eras/full dates/.forward to=/chronos/digwyddiad/heb gyfnodau/dyddiadau llawn,

3128 /chronos/parhad/.chronos tag init={parhad}{period},
3129 /chronos/parhad/.chronos tag dyddiadau init=parhad:dechrau:diwedd:gorffenedig:gorffenedig:
3130 /chronos/parhad/.cd,

3131 /chronos/theori/.chronos tag init={theori}{theory},
3132 /chronos/theori/.cd,

3133 /chronos/theori/cylchau/.cd,
3134 enw/.store in=\chronos@cylchtheori@enw,

3135 chronos@tikzname/.code={%
3136     \chronos@creu@tikzname {cylchtheori}{#1}

```

```

3137   },
3138   enw/.forward to=/chronos/theori/cylchau/chronos@tikzname,
3139   at/.code={\coordinate (chronos@cylchtheori@at) at (#1);},
3140   meintiau/.chronos 2 dimens={\chronos@cylchtheori@mawr}{\chronos@cylchtheori@bach},
3141   mawr/.chronos dimen=\chronos@cylchtheori@mawr,
3142   bach/.chronos dimen=\chronos@cylchtheori@bach,
3143   labeli/.style args={#1:#2}{
3144 /chronos/theori/cylchau/label uchod=#1,
3145 /chronos/theori/cylchau/label isod=#2,
3146   },
3147   label uchod/.store in=\chronos@cylchtheori@label@uchod,
3148   label isod/.store in=\chronos@cylchtheori@label@isod,
3149   testunau cylch/.style args={#1:#2}{
3150 /chronos/theori/cylchau/testun cylch uchod=#1,
3151 /chronos/theori/cylchau/testun cylch isod=#2,
3152   },
3153   testun cylch uchod/.store in=\chronos@cylchtheori@circletext@uchod,
3154   testun cylch isod/.store in=\chronos@cylchtheori@circletext@isod,
3155 /chronos/theory/circles/.chronos search=theori/cylchau,
3156 name/.forward to=/chronos/theori/cylchau/enw,
3157 sizes/.chronos 2 dimens={\chronos@cylchtheori@mawr}{\chronos@cylchtheori@bach},
3158 circle texts/.forward to=/chronos/theori/cylchau/testunau cylch,
3159 labels/.forward to=/chronos/theori/cylchau/labeli,
3160 /chronos/gwybodaeth/.cd,
3161   enw/.store in=\chronos@gwybodaeth@enw,
3162   chronos@tikzname/.code={%
3163     \chronos@creu@tikzname {gwybodaeth}{#1}
3164   },
3165   enw/.forward to=/chronos/gwybodaeth/chronos@tikzname,
3166   angor/.store in=\chronos@gwybodaeth@angor,
3167   at/.store in=\chronos@gwybodaeth@at,
3168   capswn/.store in=\chronos@gwybodaeth@capswn,
3169   lliw/.store in=\chronos@gwybodaeth@lliw,
3170   lliw rhagosodedig/.store in=\chronos@gwybodaeth@lliw@rhagosodedig,
3171   lliw rhagosodedig=chronos@lliw@gwybodaeth,
3172   tag'/.code={%
3173     \chronos@cadw@nodweddion{gwybodaeth}{@tag}{#1}%
3174   },
3175   tag+/.code={%
3176     \chronos@ychwanegu@nodweddion{gwybodaeth}{@tag}{#1}%
3177   },
3178   testun'/.code={%
3179     \chronos@cadw@nodweddion{gwybodaeth}{@testun}{#1}%
3180   },
3181   testun+/.code={%
3182     \chronos@ychwanegu@nodweddion{gwybodaeth}{@testun}{#1}%
3183   },
3184   testun/.forward to=/chronos/gwybodaeth/testun',
3185   tag/.forward to=/chronos/gwybodaeth/tag+,
3186   cynnwys testun/.store in=\chronos@cynnwys@testun,
3187   cynnwys enw/.store in=\chronos@cynnwys@enw,
3188 /chronos/info/.chronos search=gwybodaeth,
3189 name/.forward to=/chronos/gwybodaeth/enw,
3190 caption/.forward to=/chronos/gwybodaeth/capswn,
3191 colour/.forward to=/chronos/gwybodaeth/lliw,
3192 color/.forward to=/chronos/gwybodaeth/lliw,

```

```

3193 default colour/.forward to=/chronos/gwybodaeth/lliw rhagosodedig,
3194 default color/.forward to=/chronos/gwybodaeth/lliw rhagosodedig,
3195 text tag/.forward to=/chronos/gwybodaeth/testun,
3196 text tag'/.forward to=/chronos/gwybodaeth/testun',
3197 text tag+/.forward to=/chronos/gwybodaeth/testun+,
3198 tag anchor/.forward to=/chronos/gwybodaeth/angor,
3199 text content/.forward to=/chronos/gwybodaeth/cynnwys testun,
3200 name content/.forward to=/chronos/gwybodaeth/cynnwys enw,

3201 /chronos/prif/.cd,
3202 enw/.store in=\chronos@prifdeitl@enw,
3203 chronos@tikzname/.code={%
3204   \chronos@creu@tikzname {prifdeitl}{#1}
3205 },
3206 enw/.forward to=/chronos/prif/chronos@tikzname,
3207 angor/.store in=\chronos@prifdeitl@angor,
3208 angor/.forward to=/tikz/anchor,
3209 at/.code={\coordinate (chronos@prifdeitl@at) at (#1);},
3210 cynnwys enw/.store in=\chronos@prifdeitl@cynnwys,
3211 llinellau teitl/.style={%
3212   /tikz/.cd,draw=chronos@prifliw,inner xsep=0pt,#1,%
3213   append after command={%
3214     (main title.north west)--(main title.north east) (main title.south west)%
3215     --(main title.south east)},draw=none},

3216 /chronos/main/.chronos search=prif,
3217 name/.forward to=/chronos/prif/enw,
3218 tag anchor/.forward to=/chronos/prif/angor,
3219 name content/.forward to=/chronos/prif/cynnwys enw,
3220 title lines/.forward to=/chronos/prif/llinellau teitl,

3221 /chronos/hawlfraint/.cd,
3222 enw/.store in=\chronos@hawlfraint@enw,
3223 chronos@tikzname/.code={%
3224   \chronos@creu@tikzname {hawlfraint}{#1}
3225 },
3226 enw/.forward to=/chronos/hawlfraint/chronos@tikzname,
3227 angor/.store in=\chronos@hawlfraint@angor,
3228 angor/.forward to=/tikz/anchor,
3229 at/.code={\coordinate (chronos@hawlfraint@at) at (#1);},
3230 awdur/.store in=\chronos@hawlfraint@awdur,
3231 blwyddyn/.store in=\chronos@hawlfraint@blwyddyn,
3232 cynnwys enw/.store in=\chronos@hawlfraint@cynnwys,
3233 cylchdroi/.store in=\chronos@hawlfraint@cylchdroi,
3234 notis/.code={\def\chronos@hawlfraint@notis##1##2{#1}\show\chronos@hawlfraint@notis},
3235 copyleft/.is if=chronos@copyleft,
3236 copyleft/.default=true,

3237 /chronos/copyright/.chronos search=hawlfraint,
3238 /chronos/copyleft/.chronos search=hawlfraint,
3239 author/.forward to=/chronos/hawlfraint/awdur,
3240 name/.forward to=/chronos/hawlfraint/enw,
3241 name content/.forward to=/chronos/hawlfraint/cynnwys enw,
3242 notice/.forward to=/chronos/hawlfraint/notis,
3243 rotate/.forward to=/chronos/hawlfraint/cylchdroi,
3244 tag anchor/.forward to=/chronos/hawlfraint/angor,
3245 year/.forward to=/chronos/hawlfraint/blwyddyn,

3246 /chronos/.cd,

3247 borders'/.code args={#1:#2:#3:#4:#5:#6}{%^^A penawdau:pen:de:gwaelod:chwith:allanol
3248   \chronos@border@penawdau=#1
3249   \chronos@border@pen=#2

```

```

3250 \chronos@border@de=#3
3251 \chronos@border@gwaelod=#4
3252 \chronos@border@chwith=#5
3253 \chronos@border@allanol=#6
3254 },
3255 borders'+/.code args={#1:#2:#3:#4:#5:#6}{%^^A penawdau:pen:de:gwaelod:chwith:allanol
3256 \advance\chronos@border@penawdau by #1
3257 \advance\chronos@border@pen by #2
3258 \advance\chronos@border@de by #3
3259 \advance\chronos@border@gwaelod by #4
3260 \advance\chronos@border@chwith by #5
3261 \advance\chronos@border@allanol by #6
3262 },
3263 borders'-/.code args={#1:#2:#3:#4:#5:#6}{%^^A penawdau:pen:de:gwaelod:chwith:allanol
3264 \advance\chronos@border@penawdau by -#1
3265 \advance\chronos@border@pen by -#2
3266 \advance\chronos@border@de by -#3
3267 \advance\chronos@border@gwaelod by -#4
3268 \advance\chronos@border@chwith by -#5
3269 \advance\chronos@border@allanol by -#6
3270 },
3271 cysylltwyr chronos={anchor=center,inner sep=0pt,outer sep=0pt},%^^A oedd cylch chronos
3272 cysylltwyr testun={anchor=center,inner sep=0pt,outer sep=0pt},%^^A oedd cylch
3273 prif gysylltwyr testun={},
3274 @llinell/.style={},
3275 testunau+={outer sep=0pt,text=#1!75!black},%^^A every eisiau ##
3276 cysylltiadau={draw=#1},

3277 cynllun lliwiau/.code={\csname chronos@lliwiau@#1\endcsname},
3278 colour scheme/.forward to=/chronos/cynllun lliwiau,
3279 color scheme/.forward to=/chronos/cynllun lliwiau,
3280 lliwiau cronoleg/.code={%
3281 \chronos@lliwiau@cronoleg
3282 \@ifpackageloaded{memoize}{%
3283 \mmzset{csname meaning to context={chronos@lliwiau@cronoleg}}%
3284 }{}%
3285 },
3286 lliwiau rhagosodedig/.code={\chronos@lliwiau@rhagosodedig},

3287 }
3288

3289 \pgfqkeys{/chronos}{%
3290 cronoleg/.style={% mewnol | internal
3291 /chronos/.cd,
3292 cronoleg/.meaning to context,
3293 cynllun lliwiau=cronoleg,
3294 byw/troi lliwiau=true,
3295 digwyddiad/troi lliwiau=true,
3296 parhad/troi lliwiau=true,
3297 theori/troi lliwiau=false,
3298 theori/lliw rhagosodedig=chronos@lliw@theori,
3299 digwyddiad/lliw rhagosodedig=chronos@prifliw!75!chronos@prifliw@cefndir,
3300 parhad/lliw rhagosodedig=chronos@prifliw!75!chronos@prifliw@cefndir,
3301 gwybodaeth/lliw rhagosodedig=chronos@lliw@gwybodaeth,
3302 cefndir=chronos@prifliw@cefndir,
3303 blaendir=chronos@prifliw,
3304 blynyddoedd yn unig,
3305 llinell amser={%
3306 timeline years=on line,
3307 llinell={chronos@lliw@cefndir@llinell, opacity=.8},
3308 ffont camau mawr=\normalfont\bfseries,

```

```

3309     ffont camau bach=\normalfont\bfseries\footnotesize,
3310     ffont cyfnodau=\normalfont\normalsize\bfseries,
3311     timeline year={text=chronos@lliw@llynell, align=center},
3312     timeline mark={draw=chronos@lliw@llynell, ultra thick, shorten >=1.5pt},
3313     timeline minor mark={draw=chronos@lliw@llynell, thick, shorten >=3pt},
3314     timeline height'=10mm,
3315     timeline border height'=2.5mm,
3316     width=235mm,
3317     cam blwyddyn fawr=500,
3318     cam blwyddyn fach=100,
3319     timeline border outer colour=chronos@prifliw@cefndir,
3320     timeline border inner colour=chronos@lliw@cefndir@llynell!80!chronos@borderouter,
3321     timeline border middle colour=chronos@lliw@cefndir@llynell!20!chronos@borderouter,
3322     timeline mark eras,
3323     timeline marks,
3324     minor years,
3325     llynell amser ar=foreground,
3326     border ar=background,
3327     start date={-500},
3328     end date=2050,
3329     timeline margin'=10pt,
3330     timeline era margin'=15pt,
3331 },
3332 timeline ce label={CE},
3333 timeline bce label={BCE},
3334 cysylltiadau={draw=##1, opacity=.75, thick},
3335 cysylltwyr testun={fill=##1, fill opacity=1, circle, minimum size=5pt, %
3336     anchor=center, inner sep=0pt, outer sep=0pt},
3337 cyffredin/cysylltiad/.style={draw=##1, opacity=.5, thick},
3338 every cysylltwyr chronos={fill=###1, opacity=.75, circle, %
3339     minimum size=2.5pt, anchor=center, inner sep=0pt, outer sep=0pt},
3340 cyffredin/testun/.style={outer xsep=0pt, rounded corners=2pt, thick, %
3341     text opacity=1, draw opacity=1, inner sep=2pt, fill opacity=.25,%
3342     font=\scshape\footnotesize},
3343 digwyddiad/cysylltiad={/chronos/cyffredin/cysylltiad=##1},
3344 byw/cysylltiad={/chronos/cyffredin/cysylltiad=##1, opacity=.75},
3345 parhad/cysylltiad={/chronos/cyffredin/cysylltiad=##1},
3346 theori/cysylltiad={thick, draw=chronos@prifliw, double=chronos@prifliw@cefndir},

3347 theori/cysylltwr testun={fill=chronos@prifliw@cefndir, circle, %
3348     minimum size=5pt, anchor=center, inner sep=0pt, outer sep=0pt, thick, %
3349     draw=chronos@prifliw},
3350 byw/testun={/chronos/cyffredin/testun, align=left, text=##1!50!black, %
3351     fill=##1, draw=##1},

3352 digwyddiad/testun={/chronos/cyffredin/testun, align=left, text=##1!50!black, %
3353     fill=##1, draw=##1},
3354 parhad/testun={/chronos/cyffredin/testun, align=left, text=##1!50!black, %
3355     fill=##1, draw=##1},
3356 theori/testun={/chronos/cyffredin/testun, align=center, inner sep=3pt, %
3357     text=chronos@lliw@theori, fill=chronos@lliw@cefndir@theori, %
3358     fill opacity=.8, draw=chronos@prifliw, double=chronos@prifliw@cefndir, %
3359     font=\bfseries},
3360 byw/llynell={fill=##1, fill opacity=.25, draw=none},
3361 digwyddiad/llynell={draw=##1, draw opacity=.25, fill=none},
3362 parhad/llynell={fill=##1, fill opacity=.25, draw=none},
3363 llynell ar=main,
3364 cysylltiad ar=middle ground,

3365 theori/cylchau/label={align=center, inner sep=0pt, outer sep=0pt,%
3366     font=\scriptsize\scshape, text=chronos@prifliw},
3367 every cylch cylch theori'={fill=chronos@prifliw, draw=chronos@prifliw, %

```

```

3368     thick, even odd rule, fill opacity=.8},
3369 every testun cylch theori'={decoration={text effects along path, text={##1}, %
3370     text effects/.cd, fit text to path, text=chronos@prifliw@cefndir, %
3371     characters={text along path, font=\scriptsize\scshape}}, decorate},
3372 theori/cylchau/labels=:,
3373 theori/cylchau/circle texts=:,
3374 theori/cylchau/meintiau'=15pt:9pt,
3375 gwybodaeth/label={/chronos/@amserau, font=\itshape\footnotesize, %
3376     anchor=north, yshift=-2.5pt},% oedd pethau
3377 gwybodaeth/testun={/chronos/cyffredin/testun, align=left, text=##1, %
3378     outer sep=0pt, fill=chronos@lliw@cefndir@gwybodaeth, draw opacity=.8, %
3379     text opacity=.8, font=\scriptsize, draw=chronos@prifliw},% oedd ee ? oedd testun
ee?
3380 theori dash/.style={chronos@prifliw, opacity=.75, thick, densely dashed},
3381 theory dash/.link=/chronos/theori dash,
3382 amserau={align=center, anchor=base, inner sep=0pt, outer sep=0pt, %
3383     color=chronos@prifliw!75!chronos@prifliw@cefndir, opacity=.8, %
3384     font=\bfseries\itshape\footnotesize},
3385 amseraumawr={align=center, anchor=base, inner sep=0pt, outer sep=0pt, %
3386     color=chronos@prifliw, opacity=.8, font=\bfseries},
3387 prif/frame={inner sep=5pt, ultra thick, draw=chronos@prifliw, %
3388     double=chronos@prifliw@cefndir, fill=none},% oedd chronos@prifliw@cefndir
3389 prif/teitl={/chronos/prif/@frame, font=\Huge\bfseries, text=chronos@prifliw,%
3390     anchor=center, align=center, rounded corners=5pt},
3391 borders'=55pt:0pt:105pt:15pt:7.5pt:5pt,
3392 headings drops'=10pt:10pt:7.5pt,
3393 hawlfraint={font=\footnotesize\bfseries, inner sep=0pt, outer sep=0pt, %
3394     chronos@prifliw, fill=chronos@prifliw@cefndir},

3395 llinellau={color=black!50, opacity=.5},
3396 lefelau=10:10,
3397 special date=none,
3398 ce year label={\textsc{ce}},
3399 bce year label={\textsc{bce}},
3400 testun yshift=10pt,
3401 frame uses bb=false,
3402 frame,
3403 },
3404 }

3405 \RequirePackage{chronos-lib-colschemes,chronos-lib-styles}

```

chronos Main environment. Avoid expl3 syntax here.

```

3406 \NewDocumentEnvironment {chronos} { > { \TrimSpaces } 0 {} }
3407 {% http://tex.stackexchange.com/a/159856/ - Claudio Fiandrino
3408 \chronos@env@begin
3409 \begin{tikzpicture}[%
3410     align=center,
3411     anchor=mid,
3412     fixed point arithmetic,
3413     /chronos/.cd,
3414     prif/frame/.append code={\chronos@frametrue},
3415     prif/frame+/.append code={\chronos@frametrue},
3416     prif/frame'/.append code={\chronos@frametrue},
3417     #1,
3418     @@timeline@config@diwedd,
3419     @@timeline@config@dechrau,
3420     @@timeline@config@diwedd/.code={},
3421     @@timeline@config@dechrau/.code={},
3422     @@timeline@config,
3423     @@timeline@config/.code={},

```

```

3424 @timeline@config,
3425 @timeline@config/.code={},
3426 name prefix=\chronos@tikzprefix,
3427 ]%

3428 \IfBooleanExprT { \CSFreeBoolean \chronos@startyear || \CSFreeBoolean \chronos@endyear
}
3429 {%
3430 \PackageError{chronos}{%
3431 Missing start and/or end date for timeline.
3432 I will attempt to fathom the concept of a timeline without time,
3433 but I predict unpredictable results}%
3434 {%
3435 You must specify both a start and end date.
3436 If I try to start at the beginning or finish at the end,
3437 I exceed TeX's maximum dimension.
3438 Besides, what if time is cyclical?
3439 My author didn't tell me how to draw a 3D timeline.}%
3440 \IfFreeT \chronos@startyear {\chronos@set@date{1800}{01}{01}{start}}%
3441 \IfFreeT \chronos@endyear {\chronos@set@date{2050}{12}{31}{end}}%
3442 }%
3443 \ifnum\thechronos@startdate>\thechronos@enddate
3444 \PackageWarning{chronos}{%
3445 Sorry, but I cannot reverse time.
3446 Perhaps you could ask a metaphysician?
3447 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

```

3448 \setcounter{chronos@tempcnta}{\thechronos@startdate}%
3449 \setcounter{chronos@startdate}{\thechronos@enddate}%
3450 \setcounter{chronos@enddate}{\thechronos@tempcnta}%
3451 \let\chronos@tmpstartyear\chronos@startyear
3452 \let\chronos@tmpstartmonth\chronos@startmonth
3453 \let\chronos@tmpstartday\chronos@startday
3454 \let\chronos@startyear\chronos@endyear
3455 \let\chronos@startmonth\chronos@endmonth
3456 \let\chronos@startday\chronos@endday
3457 \let\chronos@endyear\chronos@tmpstartyear
3458 \let\chronos@endmonth\chronos@tmpstartmonth
3459 \let\chronos@endday\chronos@tmpstartday
3460 \fi
3461 \begin{scope}[/chronos/@style]
3462 \extractcolorspec{chronos@lliw@llinell}{\chronos@temp1lll}%^^A \show\chronos@temp1lll
3463 \extractcolorspec{chronos@lliw@cefndir@llinell}{\chronos@temp1lllc}%^^A \show\chronos@
3464 \extractcolorspec{white}{\chronos@temp1llw}%^^A \show\chronos@temp1llw
3465 \extractcolorspec{chronos@prifliw}{\chronos@temp1llpl}%^^A \show\chronos@temp1llpl
3466 \extractcolorspec{chronos@prifliw@cefndir}{\chronos@temp1llplc}%^^A \show\chronos@temp1
3467 \ifchronos@yearsonline % BEGIN
3468 \chronos@if@gosodF{border}{\pgfqkeys{/chronos}{border ar=middle ground}}%
3469 \chronos@if@gosodF{llinell}{\pgfqkeys{/chronos}{llinell ar=middle ground}}%
3470 \chronos@if@gosodF{llinell amser}{\pgfqkeys{/chronos}{llinell amser ar=main}}%
3471 \chronos@if@gosodF{cysylltiad}{\pgfqkeys{/chronos}{cysylltiad ar=background}}%

```

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

```

3472 \ifdim\chronos@llinell@yshift=\pi pt
3473 \chronos@llinell@yshift=0pt %
3474 \fi
3475 \ifchronostimelinearrow
3476 \chronostimelinearrowfalse

```

```

3477     \PackageWarning{chronos}{%
3478         A timeline arrow requires a suitable off line style}
3479     \fi
3480 \else
3481     \chronos@if@gosodF{border}{\pgfqkeys{/chronos}{border ar=middle ground}}%
3482     \chronos@if@gosodF{llinell}{\pgfqkeys{/chronos}{llinell ar=main}}%
3483     \chronos@if@gosodF{llinell amser}{\pgfqkeys{/chronos}%
3484         {llinell amser ar=main}}%
3485     \chronos@if@gosodF{cysylltiad}{\pgfqkeys{/chronos}%
3486         {cysylltiad ar=background}}%
3487     \ifx\chronos@templlll\chronos@templllc
3488     \ifx\chronos@templlll\chronos@templllw
3489         \colorlet{chronos@lliw@llinell}{chronos@prifliw}%
3490         \colorlet{chronos@lliw@cefndir@llinell}{chronos@prifliw@cefndir}%
3491     \fi
3492     \fi
3493 \fi
3494 \providecolor{chronos main colour}{named}{chronos@prifliw}%
3495 \providecolor{chronos main background colour}{named}%
3496     {chronos@prifliw@cefndir}%
3497 \providecolor{chronos main color}{named}{chronos@prifliw}%
3498 \providecolor{chronos main background color}{named}%
3499     {chronos@prifliw@cefndir}%
3500 \providecolor{chronos prifliw}{named}{chronos@prifliw}%
3501 \providecolor{chronos prifliw cefndir}{named}%
3502     {chronos@prifliw@cefndir}%
3503 \providecolor{chronos timeline foreground colour}{named}%
3504     {chronos@lliw@llinell}%
3505 \providecolor{chronos timeline background colour}{named}%
3506     {chronos@lliw@cefndir@llinell}%
3507 \providecolor{chronos timeline foreground color}{named}%
3508     {chronos@lliw@llinell}%
3509 \providecolor{chronos timeline background color}{named}%
3510     {chronos@lliw@cefndir@llinell}%
3511 \providecolor{chronos lliw llinell amser blaendir}{named}%
3512     {chronos@lliw@llinell}%
3513 \providecolor{chronos lliw llinell amser cefndir}{named}%
3514     {chronos@lliw@cefndir@llinell}%
3515 \providecolor{chronos timeline border inner colour}{named}%
3516     {chronos@borderinner}%
3517 \providecolor{chronos timeline border outer colour}{named}%
3518     {chronos@borderouter}%
3519 \providecolor{chronos timeline border middle colour}{named}%
3520     {chronos@bordermiddle}%
3521 \providecolor{chronos timeline border inner color}{named}
3522     {chronos@borderinner}%
3523 \providecolor{chronos timeline border outer color}{named}
3524     {chronos@borderouter}%
3525 \providecolor{chronos timeline border middle color}{named}
3526     {chronos@bordermiddle}%
3527 \providecolor{chronos lliw llinell amser border mewnol}{named}
3528     {chronos@borderinner}%
3529 \providecolor{chronos lliw llinell amser border allanol}{named}
3530     {chronos@borderouter}%
3531 \providecolor{chronos lliw llinell amser border canol}{named}
3532     {chronos@bordermiddle}%
3533 \colorlet{chronos current tag colour}{chronos@prifliw}%
3534 \colorlet{chronos current tag color}{chronos@prifliw}%
3535 \ifdim\chronos@height=\pi pt %^A BEGIN
3536     \PackageInfo{chronos}{Timeline height unset.
3537         Guessing an appropriate value.}%

```



```

3538     \ifchronos@yearsonline
3539         \chronos@height=10mm
3540     \ifdim\chronos@borderheight=\pi pt
3541         \PackageInfo{chronos}{%
3542             Timeline border height unset. Guessing an appropriate value.}%
3543         \chronos@borderheight=2.5mm
3544     \fi
3545 \else % off line
3546     \ifdim\chronos@borderheight=\pi pt
3547         \PackageInfo{chronos}{%
3548             Timeline border height unset. Guessing an appropriate value.}%
3549         \chronos@height=1pt
3550         \chronos@borderheight=0pt
3551     \else
3552         \pgfmathsetlength \chronos@height {4*\chronos@borderheight}%
3553     \fi
3554 \fi
3555 \fi % END \ifdim\chronos@height=\pi pt
3556 \ifdim\chronos@borderheight=\pi pt %^^A angen height am hwn ; angen hwn am llinell
yshift
3557     \PackageInfo{chronos}{%
3558         Timeline border height unset. Guessing an appropriate value.}%
3559     \ifchronos@yearsonline
3560         \pgfmathsetlength \chronos@borderheight {\chronos@height/4}
3561     \else
3562         \chronos@borderheight=0pt
3563     \fi
3564 \fi
3565 \ifchronos@yearsonline %^^A BEGIN \ifchronos@yearsonline
3566 \else
3567     \pgfqkeys{/chronos/timeline}{do timeline arrow}%
3568     \ifdim\chronos@llinell@yshift=\pi pt %^^A BEGIN
3569         \ifdim\chronos@height<5pt %^^A BEGIN
3570             \ifdim\chronos@borderheight<.5pt %^^A BEGIN
3571                 \ifchronos@blynyddoeddisod%^^A BEGIN
3572                     \chronos@llinell@yshift=5pt
3573                 \else
3574                     \ifchronos@blynyddoedduchod%^^A BEGIN
3575                         \chronos@llinell@yshift=-5pt
3576                     \fi %^^A END \ifchronos@blynyddoedduchod
3577                     \fi %^^A END \ifchronos@blynyddoeddisod
3578                 \else
3579                     \ifchronos@blynyddoeddisod %^^A BEGIN
3580                         \chronos@llinell@yshift=\chronos@borderheight
3581                     \else
3582                         \ifchronos@blynyddoedduchod %^^A BEGIN
3583                             \chronos@llinell@yshift=-\chronos@borderheight
3584                         \fi %^^A END \ifchronos@blynyddoedduchod
3585                     \fi %^^A END % \ifchronos@blynyddoeddisod
3586                 \fi %^^A END \ifdim\chronos@borderheight<.5pt
3587             \else
3588                 \ifchronos@blynyddoeddisod %^^A BEGIN
3589                     \chronos@llinell@yshift=2pt
3590                 \else
3591                     \ifchronos@blynyddoedduchod %^^A BEGIN
3592                         \chronos@llinell@yshift=-2pt
3593                     \fi %^^A END \ifchronos@blynyddoedduchod
3594                 \fi %^^A END \ifchronos@blynyddoeddisod
3595             \fi %^^A END \ifdim\chronos@height<5pt
3596         \fi %^^A END \ifdim\chronos@llinell@yshift=\pi pt
3597     \fi %^^A END \ifchronos@yearsonline

```

```

3598 \ifx\chronos@templpl\chronos@templplc \PackageWarning{chronos}{%
3599   You've set the main colour and the main background colour to the same.}\fi
3600 \ifnum\chronos@startyear=0\relax
3601   \chronos@yearzerotrue
3602 \else
3603   \ifnum\chronos@endyear=0\relax
3604     \chronos@yearzerotrue
3605   \fi
3606 \fi
3607 \IfExistT \chronos@camrhaniadau {\chronos@if@gosodF{@bare}}{%
3608   \ifnum\chronos@camrhaniadau>1
3609     \chronos@marks@baretrue
3610   \fi
3611   }%
3612 }%
3613 \setlength\chronos@diwedd@diwedd{0pt}%
3614 \setlength\chronos@dechrau@dechrau{0pt}%
3615 \chronos@if@gosodF{markeras}{%
3616   \ifnum\chronos@startyear<0
3617     \ifnum\chronos@endyear>0
3618       \chronos@markerastrue
3619     \fi
3620   \fi
3621 }% \chronos@if@gosodF{markeras}
3622 \ifchronos@markeras % BEGIN

```

angen cōd Martin Scharrer uchod - needs the above code by Martin Scharrer

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

```

3623   \ifnum\chronos@endyear>0
3624     \settowidth\chronos@diwedd@diwedd{\chronos@ffont@cyfnodau\chronos@ce}%
3625     \addtolength{\chronos@diwedd@diwedd}{\chronos@eramargin}%
3626   \else
3627     \let\chronos@ce\relax
3628   \fi

```

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

```

3629   \ifnum\chronos@startyear<0
3630     \settowidth\chronos@dechrau@dechrau{\chronos@ffont@cyfnodau\chronos@bce}%
3631     \addtolength{\chronos@dechrau@dechrau}{\chronos@eramargin}%
3632   \else
3633     \let\chronos@bce\relax
3634   \fi
3635 \fi % END \ifchronos@markeras

```

cofia!! \chronos@set@date a ffrindiau'n awto-cywiro am flwyddyn sero!!

remember!! \chronos@set@date and friends auto-correct for year zero!!

cofia! ti'n defnyddio ****pgfcalendar**** yn lle blynyddoedd nawr!!

remember! you use pgfcalendar in place of years now!! (but I have no idea what I meant by this ...)

```

3636 \pgfmathsetmacro\chronos@unit{%
3637   (\chronos@width-2*\chronos@timelinemargin-\chronos@dechrau@dechrau-%
3638   \chronos@diwedd@diwedd)/(\thechronos@enddate-\thechronos@startdate)%
3639 }%
3640 \pgfmathsetmacro{\chronos@amser@diwedd}{%
3641   (\thechronos@enddate-\thechronos@startdate)*\chronos@unit}%
3642 \addtolength{\chronos@dechrau@dechrau}{\chronos@timelinemargin}%
3643 \addtolength{\chronos@diwedd@diwedd}{\chronos@timelinemargin}%

```

```

3644     \path (Opt,Opt) ++(-\chronos@dechrau@dechrau,Opt) coordinate (chronos pre);%^^A
oedd chronos@dechrau
3645     \path (\chronos@amser@diwedd pt,Opt) ++(\chronos@diwedd@diwedd,Opt)
3646         coordinate (chronos post);%^^A oedd chronos@diwedd
3647     \chronos@inner@halfheight \dimexpr0.5\dimexpr\chronos@height\relax%
3648     \chronos@outer@halfheight \dimexpr\chronos@inner@halfheight+\dimexpr\chronos@borderhei
3649     \coordinate (chronos top) at (Opt,\chronos@inner@halfheight);%^^A oedd chronos@height
3650     \coordinate (chronos base) at (Opt,-\chronos@inner@halfheight);%^^A oedd chronos@depth
3651     \coordinate (chronos foot) at (Opt,-\chronos@outer@halfheight);
3652     \coordinate (chronos head) at (Opt,\chronos@outer@halfheight);

```

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

```

3653     \foreach \i/\j in {%
3654         pre/top,post/top,pre/base,post/base,pre/head,post/head,pre/foot,post/foot%
3655     } \coordinate (chronos \i-\j) at (chronos \i | - chronos \j);
3656     \coordinate (chronos start) at (Opt,Opt);% dal yn gywir?
3657     \coordinate (chronos origin) at (chronos start);% newid isod efaillai
3658     \coordinate (chronos end) at (\chronos@amser@diwedd pt,Opt);
3659     \coordinate (chronos mid) at ($(chronos pre)!.5!(chronos post)$);
3660     \coordinate (chronos mid-time) at ($(chronos start)!.5!(chronos end)$);

```

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

```

3661     \let\timelineht\chronos@height
3662     \begin{scope}[/chronos/chronos@border@haenen]
3663         \ifdim\chronos@borderheight>Opt
3664             \path [%
3665                 top color=chronos@borderouter,%
3666                 bottom color=chronos@borderinner,%
3667                 middle color=chronos@bordermiddle,%
3668                 /chronos/lilinell amser/timeline@border%
3669             ] (chronos pre-top) rectangle (chronos post-head);
3670             \path [%
3671                 bottom color=chronos@borderouter,%
3672                 top color=chronos@borderinner,%
3673                 middle color=chronos@bordermiddle,%
3674                 /chronos/lilinell amser/timeline@border%
3675             ] (chronos post-base) rectangle (chronos pre-foot);
3676         \fi
3677     \end{scope}% [/chronos/chronos@border@haenen]
3678     \begin{scope}[/chronos/chronos@llinell amser@haenen]
3679         \ifchronos@yearsonline

```

fill the timeline if putting the years etc. onto it

```

3680         \fill [%
3681             chronos@lliw@cefndir@llinell,%
3682             /chronos/lilinell amser/timeline@line%
3683         ] (chronos pre-top) rectangle (chronos post-base);
3684     \else

```

fel arall, draw

```

3685         \draw [%
3686             chronos@lliw@llinell,%
3687             line width=\chronos@height,%
3688             /chronos/lilinell amser/timeline@line%
3689         ] (chronos pre) -- (chronos post);

```

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

```

3690     \coordinate (tmpa) at (current bounding box.north);
3691     \coordinate (tmpb) at (current bounding box.south);
3692     \pgfresetboundingbox
3693     \path (chronos pre) -- (chronos post) -- (tmpa) -- (tmpb);
3694     \fi % \ifchronos@yearsonline

prif label - main label lau cyfnodau - eras

3695     \ifchronos@markeras % BEGIN
3696     \ifchronos@yearsonline
3697         \node (chronos bce) [%
3698             text=chronos@lliw@llinell,%
3699             font=\chronos@ffont@cyfnodau,%
3700             inner xsep=0pt,%
3701             xshift=-\chronos@eramargin,%
3702             anchor=east%
3703         ] at (chronos start) {\chronos@bce};
3704     \node (chronos ce) [%
3705         text=chronos@lliw@llinell,%
3706         font=\chronos@ffont@cyfnodau,%
3707         inner xsep=0pt,%
3708         xshift=\chronos@eramargin,%
3709         anchor=west%
3710     ] at (chronos end) {\chronos@ce};
3711     \else
3712     \settowidth \chronos@templgthc {\chronos@ffont@cyfnodau\chronos@bce}%
3713     \node (chronos bce) [%
3714         /chronos/llinell amser/timeline@years,%
3715         /chronos/llinell amser/timeline@year@off@line,%
3716         text=chronos@lliw@llinell,%
3717         font=\chronos@ffont@cyfnodau,%
3718         inner xsep=0pt,%
3719         xshift=-\chronos@eramargin-.5\chronos@templgthc%
3720     ] at (chronos start) {\chronos@bce};
3721     \settowidth \chronos@templgthc {\chronos@ffont@cyfnodau\chronos@ce}%
3722     \node (chronos ce) [%
3723         /chronos/llinell amser/timeline@years,%
3724         /chronos/llinell amser/timeline@year@off@line,%
3725         text=chronos@lliw@llinell,%
3726         font=\chronos@ffont@cyfnodau,%
3727         inner xsep=0pt,%
3728         xshift=\chronos@eramargin+.5\chronos@templgthc%
3729     ] at (chronos end) {\chronos@ce};
3730     \fi
3731     \fi % END \ifchronos@markeras
3732     \ifchronos@timeline@showyears % BEGIN
3733     \pgfmathsetcounter{chronos@startyear}{\chronos@startyear}%
3734     \pgfmathsetcounter{chronos@startmarkyear}{\chronos@startyear}%
3735     \pgfmathsetcounter{chronos@endyear}{\chronos@endyear}%
3736     \def\tempa{none}%
3737     \setcounter{chronos@tempcnta}{\value{chronos@endyear}}%
3738     \stepcounter{chronos@tempcnta}%
3739     \addtocounter{chronos@tempcnta}{-\value{chronos@startyear}}%
3740     \IfExistTF \chronos@cam@blwyddyn@fawr {%
3741         \IfExistTF \chronos@cam@blwyddyn@fach {%
3742             \ifnum\chronos@cam@blwyddyn@fach>\chronos@cam@blwyddyn@fawr
3743                 \def\chronos@cam@blwyddyn@fach{0}%
3744                 \PackageWarning{chronos}{Setting minor step year to zero}%
3745             \else
3746                 \IfBooleanExprT {%
3747                     (\IntCompareBoolean {\chronos@cam@blwyddyn@fach} > {0}) &&
3748                     ! (\LegacyBoolean {chronos@minoryears}) &&

```

```

3749         ! (\LegacyBoolean {chronos@marks@minor}) &&
3750         (\LegacyBoolean {chronos@marks@bare})
3751     }{%
3752         \PackageWarning{chronos}{%
3753             Setting minor step year to zero so your marks are evenly spaced%
3754         }%
3755         \def\chronos@cam@blwyddyn@fach{0}%
3756     }%
3757     \fi
3758 }{\def\chronos@cam@blwyddyn@fach{0}}%
3759 }{%
3760 \IfExistTF \chronos@cam@blwyddyn@fach {%
3761     \let\chronos@cam@blwyddyn@fawr\chronos@cam@blwyddyn@fach
3762     \def\chronos@cam@blwyddyn@fach{0}%
3763     \PackageWarning{chronos}{%
3764         Using minor step year as step year and setting minor step %
3765         year to zero%
3766     }%
3767 }{%
3768     \PackageWarning{chronos}{%
3769         You have not specified how frequently years should be marked %
3770         on the timeline.
3771         Guessing appropriate values.
3772         Set step major year and/or step minor year to specify%
3773     }%
3774     \ifnum\value{chronos@tempcnta}>1500
3775         \def\chronos@cam@blwyddyn@fawr{500}%
3776         \def\chronos@cam@blwyddyn@fach{100}%
3777     \else\ifnum\value{chronos@tempcnta}>1000
3778         \def\chronos@cam@blwyddyn@fawr{250}%
3779         \def\chronos@cam@blwyddyn@fach{50}%
3780     \else\ifnum\value{chronos@tempcnta}>300
3781         \def\chronos@cam@blwyddyn@fawr{100}%
3782         \def\chronos@cam@blwyddyn@fach{50}%
3783     \else\ifnum\value{chronos@tempcnta}>150
3784         \def\chronos@cam@blwyddyn@fawr{100}%
3785         \def\chronos@cam@blwyddyn@fach{25}%
3786     \else\ifnum\value{chronos@tempcnta}>100
3787         \def\chronos@cam@blwyddyn@fawr{50}%
3788         \def\chronos@cam@blwyddyn@fach{10}%
3789     \else\ifnum\value{chronos@tempcnta}>50
3790         \def\chronos@cam@blwyddyn@fawr{20}%
3791         \def\chronos@cam@blwyddyn@fach{10}%
3792     \else\ifnum\value{chronos@tempcnta}>20
3793         \def\chronos@cam@blwyddyn@fawr{10}%
3794         \def\chronos@cam@blwyddyn@fach{2}%
3795     \else\ifnum\value{chronos@tempcnta}>10
3796         \def\chronos@cam@blwyddyn@fawr{5}%
3797         \def\chronos@cam@blwyddyn@fach{1}%
3798     \else\def\chronos@cam@blwyddyn@fawr{1}%
3799         \def\chronos@cam@blwyddyn@fach{0}%
3800     \fi % >10
3801     \fi % >20
3802     \fi % >50
3803     \fi % > 100
3804     \fi % > 150
3805     \fi % >300
3806     \fi % >1000
3807     \fi % >1500
3808 }%
3809 }% \IfExistTF \chronos@cam@blwyddyn@fawr

```

```

3810 \chronos@if@gosodF{markateraswitch}{%
3811 \ifnum\chronos@cam@blwyddyn@fach=1
3812 \chronos@markateraswitchfalse
3813 \else
3814 \ifnum\chronos@cam@blwyddyn@fawr=1
3815 \chronos@markateraswitchfalse
3816 \else
3817 \chronos@markateraswitchtrue
3818 \fi
3819 \fi
3820 }%
3821 \ifnum\chronos@cam@blwyddyn@fach=0
3822 \let\chronos@tempv\chronos@cam@blwyddyn@fawr
3823 \else
3824 \let\chronos@tempv\chronos@cam@blwyddyn@fach
3825 \fi
3826 \IfExistF \chronos@camrhaniadau {%^A rhaid \chronos@marks@baretrue o achos
y cõd uchod
3827 \ifnum\value{chronos@tempcnta}<5
3828 \chronos@marks@baretrue
3829 \PackageInfo{chronos}{%
3830 I'm guessing you want bare marks on your timeline.
3831 If I'm wrong, specify step divisions=0 to override my decision}%
3832 \ifnum\value{chronos@tempcnta}>2
3833 \def\chronos@camrhaniadau{4}%
3834 \else
3835 \ifnum\value{chronos@tempcnta}>1
3836 \def\chronos@camrhaniadau{6}%
3837 \else
3838 \def\chronos@camrhaniadau{12}%
3839 \fi % >1
3840 \fi % >2
3841 \else
3842 \ifchronos@marks@bare\relax
3843 \else
3844 \chronos@marks@barefalse
3845 \PackageInfo{chronos}{%
3846 I'm guessing you don't want bare marks on your timeline.
3847 If I'm wrong, specify step divisions to override my decision}%
3848 \fi
3849 \fi % <5
3850 }% \chronos@camrhaniadau
3851 \ifchronos@marks@bare
3852 \IfExistF \chronos@camrhaniadau {%
3853 \PackageInfo{chronos}{%
3854 You have requested bare marks but not specified how many.
3855 Guessing 4 per minor step. Set step divisions to specify}%
3856 \def\chronos@camrhaniadau{4}%
3857 }% \IfExistT \chronos@camrhaniadau
3858 \fi % \ifchronos@marks@bare
3859 \IfFreeTF \chronos@stepfrom {%
3860 \ifnum\thechronos@startyear=\thechronos@endyear
3861 \else
3862 \def\tempa{01}%
3863 \ifx\chronos@startmonth\tempa
3864 \ifx\chronos@startday\tempa
3865 \else
3866 \stepcounter{chronos@startmarkyear}%
3867 \fi % \ifx\chronos@startday\tempa
3868 \else
3869 \stepcounter{chronos@startmarkyear}%

```

```

3870         \fi % \ifx\chronos@startmonth\tempa
3871     \fi % \ifnum\thechronos@startyear=\thechronos@endyear
3872     \pgfmathsetmacro\chronos@tempremainder{%
3873         int(mod(\thechronos@startmarkyear,\chronos@tempv))}%
3874     \ifnum\chronos@tempremainder=0\relax
3875     \else
3876         \IfBooleanExprTF {%
3877             ! (\LegacyBoolean{\chronos@yearzero}) &&
3878             (\IntCompareBoolean{\thechronos@startmarkyear}{=}{1}) %
3879         }{%
3880             \setcounter{\chronos@startmarkyear}{0}% => 1 fel \chronos@startmarkyear
3881         }{%
3882             \ifnum\chronos@tempremainder<0
3883                 \pgfmathsetcounter{\chronos@startmarkyear}{%
3884                     int(\thechronos@startmarkyear-\chronos@tempremainder)}%
3885             \else
3886                 \pgfmathparse{%
3887                     int(\thechronos@startmarkyear-\chronos@tempremainder+\chronos@tempv)}%
3888                 }%
3889                 \ifnum\pgfmathresult>\thechronos@endyear
3890                     \PackageWarning{\chronos}{Ignoring steps}%
3891                 \else
3892                     \setcounter{\chronos@startmarkyear}{\pgfmathresult}%
3893                 \fi
3894             \fi
3895         }%
3896     \fi
3897 }{%
3898     \pgfmathsetcounter{\chronos@startmarkyear}{\chronos@stepfrom}%
3899     \pgfmathparse{int(mod(\thechronos@startmarkyear,\chronos@tempv))}%
3900     \ifnum\pgfmathresult=0\relax
3901     \else
3902         \PackageWarning{\chronos}{%
3903             You have explicitly requested years marked on your timeline %
3904             which are not modulo the steps you have specified.
3905             I'm setting the year format to show full years, which should %
3906             make the result a bit more intelligible.%
3907         }%
3908         \chronos@setminoryearformat{!Y}%
3909     \fi
3910 }% \IfFreeTF \chronos@stepfrom
3911 \ifnum\chronos@cam@blwyddyn@fach=0
3912     \pgfmathsetmacro\chronos@nextstep{%
3913         int(((\thechronos@startmarkyear+\chronos@cam@blwyddyn@fawr)>\thechronos@endyear
3914             ? \thechronos@endyear :
3915             (\thechronos@startmarkyear+\chronos@cam@blwyddyn@fawr))}%
3916     }%
3917 \else
3918     \pgfmathsetmacro\chronos@nextstep{%
3919         int(((\thechronos@startmarkyear+\chronos@cam@blwyddyn@fach)>\thechronos@endyear
3920             ? \thechronos@endyear :
3921             (\thechronos@startmarkyear+\chronos@cam@blwyddyn@fach))}%
3922     }%
3923 \fi
3924 \chronos@global@clear@to@clist{tmpa}{}%
3925 \IfExistT \chronos@camrhaniadau
3926     {\pgfmathsetmacro \chronos@tempml{int(\chronos@camrhaniadau-1)}}%
3927 \ifchronos@yearzero
3928     \setcounter{\chronos@tempcnta}{1}
3929 \else
3930     \setcounter{\chronos@tempcnta}{0}%

```

```

3931 \fi
3932 \IfBooleanExprTF {%
3933 (\IntCompareBoolean{\chronos@nextstep}={}\{thechronos@startmarkyear})
3934 || ! (\IntCompareBoolean{\chronos@nextstep}<}\{thechronos@endyear})
3935 || ( ( (\IntCompareBoolean{\chronos@nextstep}={}\{0}) ||
3936 (\IntCompareBoolean{\thechronos@startmarkyear}={}\{0}) ) &&
3937 (\IntCompareBoolean{\thechronos@startmarkyear}<}\{-\thechronos@endyear})
3938 && ! \LegacyBoolean {chronos@yearzero} )
3939 }{%^^A osgoi infinite loop yn pgf \foreach isod
3940 \setcounter{chronos@tempcntb}{\thechronos@endyear}%
3941 \addtocounter{chronos@tempcntb}{-\thechronos@startyear}%
3942 \IfBooleanExprT {%
3943 ! \LegacyBoolean {chronos@yearzero} &&
3944 (\IntCompareBoolean{\thechronos@startmarkyear}>}\{-\thechronos@endyear})
3945 && ( (\IntCompareBoolean{\chronos@nextstep}={}\{0}) ||
3946 (\IntCompareBoolean{\thechronos@startmarkyear}={}\{0}) )
3947 } {\addtocounter{chronos@tempcntb}{-1}}%
3948 \ifnum\thechronos@tempcntb<2
3949 \IfExistTF \chronos@camrhaniadau
3950 {%
3951 \pgfmathparse{int(mod(12,\chronos@camrhaniadau))}%
3952 \ifnum\pgfmathresult=0\relax
3953 \else
3954 \PackageWarning{%
3955 Since your timeline spans fewer than two years, %
3956 step divisions must be a factor of 12.
3957 I will use 4 if you requested 5 and 6 otherwise}%
3958 \ifnum\pgfmathresult=5
3959 \def\chronos@camrhaniadau{4}%
3960 \else
3961 \ifnum\pgfmathresult>6
3962 \def\chronos@camrhaniadau{6}%
3963 \fi % \ifnum\pgfmathresult>6 hynny yw 7,8,9,10,11
3964 \fi % \ifnum\pgfmathresult=5
3965 \fi % \ifnum\pgfmathresult=0
3966 \setcounter{chronos@tempcntb}{\chronos@startmonth}%
3967 \ifnum\chronos@startday>1 \stepcounter{chronos@tempcntb}\fi
3968 \edef\chronos@tmpstartmonth{\thechronos@tempcntb}%
3969 \IfBooleanExprF {%
3970 (\IntCompareBoolean{\chronos@tmpstartmonth}={}\{\chronos@endmonth})
3971 &&
3972 (\IntCompareBoolean{\thechronos@startyear}={}\{\thechronos@endyear})
3973 }
3974 {%
3975 \pgfmathsetcounter{chronos@tempcntc}{int{12/\chronos@camrhaniadau}}%
3976 \addtocounter{chronos@tempcntb}{\thechronos@tempcntc}%
3977 \ifnum\thechronos@tempcntb>11
3978 \edef\chronos@tempu{\chronos@tmpstartmonth,12}%
3979 \else
3980 \edef\chronos@tempu{%
3981 \chronos@tmpstartmonth,\thechronos@tempcntb,...,12}%
3982 \fi
3983 \foreach \m [expand list] in {\chronos@tempu}%
3984 {%
3985 \chronos@set@date {\thechronos@startyear}{\m}{01}{tempa}%
3986 \ifnum\thechronos@tempadate>\thechronos@enddate
3987 \breakforeach
3988 \else
3989 \ifnum\m=1
3990 \chronos@global@to@clist*+{tempa}{%
3991 \thechronos@tempadate/\thechronos@startyear/\thechronos@startyear%

```



```

3992         }%
3993     \else
3994         \chronos@global@to@clist**{tmpa}{%
3995             \thechronos@tempdate/-5000/\thechronos@startyear%
3996         }%
3997     \fi % \m=1
3998     \fi % \thechronos@tempdate>\thechronos@enddate
3999 }% \foreach \m in {\chronos@tmpstartmonth,...,12}
4000 \ifnum\thechronos@startyear<\thechronos@endyear
4001 \stepcounter{chronos@tempcntc}%
4002 \ifnum\thechronos@tempcntc<\chronos@endmonth
4003 \edef\chronos@tempu{1,\thechronos@tempcntc,...,\chronos@endmonth}%
4004 \else
4005 \edef\chronos@tempu{1,\thechronos@tempcntc}%
4006 \fi
4007 \foreach \m [expand list] in {\chronos@tempu} %^A {1,...,\chronos@endmo
4008 }%
4009 \chronos@set@date {\thechronos@endyear}{\m}{01}{tmpa}%^A awto-cywiro
    am flwyddyn sero
4010     \ifnum\thechronos@tempdate>\thechronos@enddate
4011     \breakforeach
4012     \else
4013         \ifnum\m=1
4014             \chronos@global@to@clist**{tmpa}{%
4015                 \thechronos@tempdate/\thechronos@endyear/\thechronos@endyear%
4016             }%
4017         \else
4018             \chronos@global@to@clist**{tmpa}{%
4019                 \thechronos@tempdate/-5000/\thechronos@endyear%
4020             }%
4021         \fi %^A \m=1
4022         \fi %^A \thechronos@tempdate>\thechronos@enddate
4023         }%^A \foreach \m in {1,...,\chronos@endmonth}
4024         \fi % \thechronos@startyear<\thechronos@endyear
4025         }%^A \ifboolexpr { test {\ifnum\thechronos@tmpstartmonth=\thechronos@endm
    and test {\ifnum\thechronos@startyear=\thechronos@endyear} }
4026         }%^A \IfExistTF \chronos@camrhaniadau F
4027         \chronos@global@to@clist**{tmpa}{%
4028             \thechronos@startdate/\thechronos@startmarkyear/\thechronos@startmarkyear,
4029             \thechronos@enddate/\thechronos@endyear/\thechronos@endyear%
4030         }%
4031         }%^A \IfExistTF \chronos@camrhaniadau
4032         \chronos@marks@barefalse
4033     \else
4034         \foreach \b [%
4035             evaluate=\b as \i using {%
4036                 ((\b==0)&&(\thechronos@tempcnta==0)) ? 1 : int(\b)}%
4037         ] in {\thechronos@startmarkyear,\thechronos@endyear} {%
4038             \chronos@set@date{\i}{01}{01}{year}%^A awto-cywiro am flwyddyn sero
4039             \chronos@global@to@clist**{tmpa}{\thechronos@yeardate/\b/\i}%
4040         }%
4041     \fi % \ifnum\thechronos@tempcntb<2
4042 }{%
4043     \foreach \b [%
4044         evaluate=\b as \i using {%
4045             ((\b==0)&&(\thechronos@tempcnta==0)) ? 1 : int(\b)}%
4046     ] in {%
4047         \thechronos@startmarkyear,\chronos@nextstep,...,\thechronos@endyear%
4048     } {%
4049         \chronos@set@date{\i}{01}{01}{year}% awto-cywiro am flwyddyn sero
4050         \chronos@global@to@clist**{tmpa}{\thechronos@yeardate/\b/\i}%

```

```

4051         }%
4052         }%^A \ifboolexpr { test {\ifnumcomp{\chronos@nextstep}={}\thechronos@startyear}}
         or test {\ifnumcomp{\chronos@nextstep}={}\thechronos@endyear}} }
4053         \foreach \d/\b/\chronosyeari [%
4054             expand list,%
4055             remember=\chronosyeari as \ilast (initially \pi),%
4056             remember=\d as \dlast (initially \pi)%
4057         ] in {\chronos@global@from@clist{tmpa}}
4058         {% BEGIN \foreach \b ...
4059             \ifnum\d=\dlast\relax % BEGIN
4060             \else
4061                 \pgfmathsetmacro\chronos@tempa{(\d-\thechronos@startdate)*\chronos@unit}%
4062                 \coordinate (chronos date \d) at (\chronos@tempa pt,Opt);
4063                 \pgfqkeys{/chronos}{% defnyddio am nodau noeth beth bynnag ac am marciau
cyffredinol os y llinell amser yn fyr
4064                     temp@on/.style={/chronos/llinell amser/timeline@minor@mark@on@line},
4065                     temp@off/.style={/chronos/llinell amser/timeline@minor@mark@off@line},
4066                 }%
4067                 \ifnum\dlast=\pi
4068                     \let\chronos@tempff\chronos@ffont@camaubach
4069                     \ifchronos@yearsonline
4070                         \node (chronos phantom year) [%
4071                             rotate around/.style={},%
4072                             rotate/.style={},%
4073                             /chronos/llinell amser/timeline@years,%
4074                             /chronos/llinell amser/timeline@year@on@line,%
4075                             font=\chronos@tempff%
4076                         ] at (chronos start) {\phantom{1}};
4077                     \else
4078                         \node (chronos phantom year) [%
4079                             rotate around/.style={},%
4080                             rotate/.style={},%
4081                             /chronos/llinell amser/timeline@years,%
4082                             /chronos/llinell amser/timeline@year@off@line,%
4083                             font=\chronos@tempff,%
4084                             fill=none%
4085                         ] at (chronos start)
4086                         {\phantom{\chronos@showyear[\chronos@minoryearformat]{1}}};
4087                     \fi
4088                 \fi % \ifnum\dlast=\pi
4089                 \ifnum\b=-5000
4090                     \ifchronos@yearsonline
4091                         \path [/chronos/temp@on]
4092                         (chronos phantom year.south -| chronos date \d) --
4093                         (chronos phantom year.north -| chronos date \d);
4094                     \else
4095                         \path [/chronos/temp@off] (chronos date \d) --
4096                         (chronos date \d |- chronos phantom year.\chronos@timelinyearsanchor)
4097                         ;
4098                     \fi
4099                 \else % \ifnum\b=-5000
4100                     \coordinate (chronos year \chronosyeari) at (\chronos@tempa pt,Opt);
4101                     \ifnum\b=\thechronos@startmarkyear
4102                         \xdef\chronos@firstmarkedyeardate{\d}%
4103                     \coordinate (chronos first marked year) at (chronos year \chronosyeari);
4104                     \ifnum\chronosyeari=0
4105                         \coordinate (chronos origin) at (\chronos@tempa pt,Opt);
4106                     \fi
4107                 \else
4108                     \ifnum\chronosyeari=1

```

```

4109         \ifchronos@yearzero\relax
4110         \else
4111         \coordinate (chronos origin) at (\chronos@tempa pt,0pt);

```

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

```

4112         \coordinate (chronos year 0) at (chronos year 1);
4113         \fi % \ifchronos@yearzero
4114         \fi % \ifnum\chronosyeari=1
4115         \fi % \ifnum\b=\thechronos@startmarkyear
4116         \ifnum\b=\chronos@nextstep
4117         \ifchronos@marks@bare
4118         \pgfmathsetmacro\chronos@tempg{%
4119         ((\d-\chronos@firstmarkedyeardate)*\chronos@unit)/\chronos@camrhaniada
4120         }%
4121         \global\let\chronos@tempg\chronos@tempg
4122         \fi
4123         \fi % \ifnum\b=\chronos@nextstep
4124         \ifnum\chronos@cam@blwyddyn@fach=0
4125         \chronos@cam@modtrue
4126         \else
4127         \pgfmathparse{int(mod(\chronosyeari,\chronos@cam@blwyddyn@fawr))}%
4128         \ifnum\pgfmathresult=0\relax
4129         \chronos@cam@modtrue
4130         \else
4131         \IfBooleanExprT {%
4132         ! \LegacyBoolean {chronos@yearzero} &&
4133         \IntCompareBoolean {\chronosyeari}={1}
4134         }{%
4135         \pgfmathparse{int(mod((\chronosyeari-1),\chronos@cam@blwyddyn@fawr))}%
4136         \ifnum\pgfmathresult=0\relax
4137         \chronos@cam@modtrue
4138         \fi
4139         }%
4140         \fi % \ifnum\pgfmathresult=0
4141         \fi % \ifnum\chronos@cam@blwyddyn@fach=0
4142         \ifchronos@cam@mod
4143         \pgfqkeys{/chronos}{%
4144         temp@on/.style={%
4145         /chronos/l1line11 amser/timeline@mark@on@line},
4146         temp@off/.style={%
4147         /chronos/l1line11 amser/timeline@mark@off@line},
4148         }%
4149         \let\chronos@tempff\chronos@ffont@camaumawr
4150         \def\chronos@temph{%
4151         \else
4152         \pgfqkeys{/chronos}{%
4153         temp@on/.style={%
4154         /chronos/l1line11 amser/timeline@minor@mark@on@line},
4155         temp@off/.style={%
4156         /chronos/l1line11 amser/timeline@minor@mark@off@line},
4157         }%
4158         \let\chronos@tempff\chronos@ffont@camaubach
4159         \xdef\chronos@temph{\chronos@minoryearformat}%
4160         \ifchronos@marks@minor
4161         \chronos@markstrue
4162         \else
4163         \chronos@marksfalse
4164         \fi
4165         \fi % ^A \ifchronos@cam@mod

```

```

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

4166         \ifchronos@markateraswitch %
4167         \ifnum\b=0
4168         \chronos@tempfalse
4169         \else
4170         \chronos@temptrue
4171         \fi
4172         \ifchronos@minoryears \else \ifchronos@cam@mod \else \chronos@tempfalse
\fi\fi
4173         \else
4174         \chronos@temptrue
4175         \fi

BEGIN \ifchronos@yearsonline ...

4176         \ifchronos@yearsonline

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

4177         \ifchronos@temp
4178         \node (chronos year \chronosyeari) [%
4179         /chronos/l1inell amser/timeline@years,%
4180         /chronos/l1inell amser/timeline@year@on@line,%
4181         font=\chronos@tempff%
4182         ] at (chronos year \chronosyeari)
4183         {\chronos@showyear[\chronos@temp]{\chronosyeari}};
4184         \fi %^^A END \ifchronos@temp
4185         \ifchronos@marks %^^A BEGIN
4186         \path [/chronos/temp@on] (chronos year \chronosyeari.south) --
4187         (chronos year \chronosyeari |- chronos base);%^^A rhag ofn rotate
(pwy sy'n gwybod?)
4188         \path [/chronos/temp@on] (chronos year \chronosyeari.north) --
4189         (chronos year \chronosyeari |- chronos top);%^^A rhag ofn rotate
(pwy sy'n gwybod?)
4190         \ifchronos@marks@bare % BEGIN
4191         \ifnum\dlast=\pi\relax % BEGIN
4192         \else
4193         \ifnum\chronos@camrhaniadau>1 % BEGIN
4194         \foreach \m [evaluate=\m as \n using {int(\m-1)}]
4195         in {2,...,\chronos@camrhaniadau}
4196         {%
4197         \path [%
4198         /chronos/l1inell amser/timeline@bare@mark@on@line%
4199         ] ([xshift=-\n*\chronos@tempg pt]chronos year
4200         \chronosyeari |- chronos phantom year.south)
4201         -- ([xshift=-\n*\chronos@tempg pt]chronos year
4202         \chronosyeari |- chronos phantom year.north);
4203         }%
4204         \ifnum\b=\chronos@nextstep % BEGIN
4205         \path (chronos year \ilast);
4206         \pgfgetlastxy{\chronos@tempgx}{\chronos@tempgy};%
4207         \setlength \chronos@templgtha{%
4208         \chronos@tempgx-\chronos@tempg pt};%
4209         \ifdim\chronos@templgtha<0pt\relax % BEGIN
4210         \else
4211         \foreach \n in {1,...,\chronos@tempml}
4212         {%
4213         \coordinate (a) at (\chronos@templgtha,0pt);
4214         \path [%
4215         /chronos/l1inell amser/timeline@bare@mark@on@line%
4216         ] (a |- chronos phantom year.south) --
4217         (a |- chronos phantom year.north);

```

```

4218             \addtolength \chronos@templgtha{-\chronos@tempg pt}%
4219             \ifdim\chronos@templgtha<0pt
4220                 \breakforeach
4221             \fi
4222             \global\chronos@templgtha\chronos@templgtha
4223         }%
4224         \fi % END \ifdim\chronos@templgtha<0pt
4225     \fi % END \ifnum\b=\chronos@nextstep
4226     \edef\chronos@tempy{\thechronos@endyear}%
4227     \pgfmathsetmacro\chronos@tempny{int(\b+\chronos@tempv)}%
4228     \ifnum\chronos@tempny>\thechronos@endyear % BEGIN
4229         \path (chronos year \chronosyeari);
4230         \pgfgetlastxy{\chronos@tempgx}{\chronos@tempgy}%
4231         \setlength \chronos@templgtha{%
4232             \chronos@tempgx+\chronos@tempg pt}%
4233         \path (chronos end);
4234         \pgfgetlastxy{\chronos@tempgx}{\chronos@tempgy}%
4235         \ifdim\chronos@templgtha>\chronos@tempgx\relax % BEGIN
4236     \else
4237         \foreach \n in {1,...,\chronos@tempml}
4238         {%
4239             \coordinate (a) at (\chronos@templgtha,0pt);
4240             \path [%
4241                 /chronos/llynell amser/timeline@bare@mark@on@line%
4242             ]
4243             (a |- chronos phantom year.south) --
4244             (a |- chronos phantom year.north);
4245             \addtolength \chronos@templgtha{\chronos@tempg pt}%
4246             \ifdim\chronos@templgtha>\chronos@tempgx
4247                 \breakforeach
4248             \fi
4249             \global\chronos@templgtha\chronos@templgtha
4250         }%
4251         \fi % END \ifdim\chronos@templgtha<0pt
4252     \fi % END \ifnum\chronos@tempny>\thechronos@endyear
4253     \fi % END \ifnum\chronos@camrhaniadau>1
4254     \fi % END \ifnum\dlast=\pi
4255     \fi % END \ifchronos@marks@bare
4256     \fi % END \ifchronos@marks
4257 \else % chronos@yearsonline yw F

```

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

```

4258     \ifchronos@temp
4259         \node (chronos node year \chronosyeari) [%
4260             /chronos/llynell amser/timeline@years,%
4261             /chronos/llynell amser/timeline@year@off@line,%
4262             font=\chronos@tempff%
4263         ] at (chronos year \chronosyeari)
4264         {\chronos@showyear[\chronos@temp]{\chronosyeari}};
4265     \else
4266         \node (chronos node year \chronosyeari) [%
4267             /chronos/llynell amser/timeline@years,%
4268             /chronos/llynell amser/timeline@year@off@line,%
4269             font=\chronos@ffont@camaumawr,%
4270             draw=none,%
4271             fill=none%
4272         ] at (chronos year \chronosyeari)
4273         {\phantom{\chronos@showyear[\chronos@temp]{\chronosyeari}}};
4274     \fi %^^A END % \ifchronos@temp
4275     \ifchronos@marks %^^A BEGIN
4276     \ifchronos@temp

```

```

4277         \else
4278         \ifnum\b=0
4279         \path [%
4280             shorten <=.5*\chronos@height,
4281             /chronos/temp@off,
4282             /chronos/llinell amser/era switch off line%
4283         ] (\chronos@tempa pt,0pt) --
4284             (chronos node year \chronosyeari.center -| chronos year \chronosyeari
4285             ;%^^A rhag ofn rotate
4286         \chronos@temptrue
4287         \fi
4288         \fi
4289         \path [shorten <=.5*\chronos@height, /chronos/temp@off]
4290             (\chronos@tempa pt,0pt) --
4291             (chronos node year \chronosyeari.\chronos@timelineyearsanchor
-| chronos year \chronosyeari) ;
4292         \ifnum\dlast=\pi\relax
4293         \else
4294         \ifchronos@marks@bare % BEGIN
4295         \ifnum\chronos@camrhaniadau>1
4296         \foreach \m [evaluate=\m as \n using {int(\m-1)}] in
4297             {2,...,\chronos@camrhaniadau}
4298         \path [%
4299             shorten <=.5*\chronos@height,
4300             /chronos/llinell amser/timeline@bare@mark@off@line%
4301         ] ([xshift={-\n*\chronos@tempg pt}]\chronos@tempa pt,0pt)
4302             coordinate (\chronosyeari-\n) --
4303             (\chronosyeari-\n |- chronos node year \chronosyeari.\chronos@
4304         \ifnum\b=\chronos@nextstep % BEGIN
4305         \path (chronos year \ilast);
4306         \pgfgetlastxy{\chronos@tempgx}{\chronos@tempgy}%
4307         \setlength \chronos@templgtha{%
4308             \chronos@tempgx-\chronos@tempg pt}%
4309         \ifdim\chronos@templgtha<Opt\relax % BEGIN
4310         \else
4311         \foreach \n in {1,...,\chronos@tempml}
4312         {%
4313         \path [%
4314             shorten <=.5*\chronos@height,
4315             /chronos/llinell amser/timeline@bare@mark@off@line%
4316         ] (\chronos@templgtha,0pt) coordinate (a) --
4317             (a |- chronos node year \chronosyeari.\chronos@timelineyears
4318             \addtolength \chronos@templgtha{-\chronos@tempg pt}%
4319             \ifdim\chronos@templgtha<Opt \breakforeach\fi
4320             \global\chronos@templgtha\chronos@templgtha
4321         ]%
4322         \fi % \ifdim\chronos@templgtha<Opt
4323         \fi % \ifnum\b=\chronos@nextstep
4324         \edef\chronos@tempy{\thechronos@endyear}%
4325         \pgfmathsetmacro\chronos@tempny{int(\b+\chronos@tempv)}%
4326         \ifnum\chronos@tempny>\thechronos@endyear % BEGIN
4327         \path (chronos year \chronosyeari);
4328         \pgfgetlastxy{\chronos@tempgx}{\chronos@tempgy}%
4329         \setlength \chronos@templgtha{%
4330             \chronos@tempgx+\chronos@tempg pt}%
4331         \path (chronos end);
4332         \pgfgetlastxy{\chronos@tempgx}{\chronos@tempgy}%
4333         \ifdim\chronos@templgtha>\chronos@tempgx\relax % BEGIN
4334         \else
4335         \foreach \n in {1,...,\chronos@tempml}
4336         {%

```

```

4337         \path [%
4338             shorten <=.5*\chronos@height,%
4339             /chronos/l1line1l amser/timeline@bare@mark@off@line,%
4340             magenta%
4341         ] (\chronos@templgtha,0pt) coordinate (a) --
4342         (a |- chronos node year \chronosyeari.\chronos@timelinyea
4343         \addtolength \chronos@templgtha{\chronos@tempg pt}%
4344         \ifdim\chronos@templgtha>\chronos@tempgx
4345             \breakforeach
4346         \fi
4347         \global\chronos@templgtha\chronos@templgtha
4348         }%
4349         \fi % END \ifdim\chronos@templgtha<Opt
4350         \fi % END \ifnum\b=\thechronos@endyear
4351         \fi % END \ifnum\chronos@camrhaniadau>1below
4352         \fi % END \ifchronos@marks@bare
4353         \fi % END \ifnum\dlast=\pi
4354         \fi % END \ifchronos@marks
4355         \fi % END years on line
4356         \fi % \ifnum\b=-5000
4357         \fi % \ifnum\d=\dlast % END
4358     }% END \foreach \b ...
4359 \fi % END showing years
4360 \chronos@from@clist{dyddiadau_coords}{\chronos@coords}%
4361 \ifx\chronos@coords@empty\relax % BEGIN
4362 \else
4363     \foreach \i in \chronos@coords {%
4364         \chronos@set@date{\i}{01}{01}{tempa}% awto-cywiro am flwyddyn sero
4365         \pgfmathsetmacro\chronos@tempf{%
4366             (\thechronos@tempdate-\thechronos@startdate)*\chronos@unit%
4367         }%
4368         \edef\chronos@tempa{\chronos@tempyear}\edef\chronos@tempb{\i}%
4369         \ifx\chronos@tempa\chronos@tempb
4370             \coordinate (chronos year \i) at (\chronos@temp pt,0pt);
4371         \else
4372             \coordinate (chronos date \i) at (\chronos@temp pt,0pt);
4373         \fi
4374     }%
4375 \fi% END
4376 \ifchronos@eventyearsonline
4377     \pgfqkeys{/chronos}{%
4378         timeline years=on line,
4379     }%
4380 \fi
4381 \end{scope}% [/chronos/chronos@l1line1l amser@haenen] ?

```

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

```

4382 \begin{scope}[%^A <<< byw,every node etc.
4383     byw,every node/.append style={%
4384         /chronos/@testun=chronos@prifliw,/chronos/placeholder%
4385     }%
4386 ]%
4387 \ifnum\chronos@uchod>0
4388     \node (u1) [%
4389         anchor=south west, yshift=\chronos@borderheight+2pt, alias=level 1%
4390     ] at (chronos top -| \chronos@lefelau@at)
4391     {\phantom{Enw}u1 \textbar{} level 1\\phantom{1234}};
4392 \ifnum\chronos@uchod>1
4393     \foreach \i [count=\ino] in {2,...,\chronos@uchod}
4394         \node (u\i) [anchor=south west, alias=level \i] at
4395         (u\ino.north west) {%

```

```

4396         \phantom{Enw}u{i} \textbar{} level \i\\phantom{1234}%
4397     };
4398     \fi
4399 \fi
4400 \ifnum\chronos@isod>0
4401     \node (i1) [%
4402         anchor=north west, yshift=-\chronos@borderheight-2pt, alias=level -1%
4403     ] at (chronos base -| \chronos@lefelau@at)
4404     {\phantom{Enw}i1 \textbar{} level -1\\phantom{1234}};
4405 \ifnum\chronos@isod>1
4406     \foreach \i [count=\ino] in {2,...,\chronos@isod}
4407     \node (i\i) [anchor=north west, alias=level -\i] at
4408     (i\ino.south west)
4409     {\phantom{Enw}i\i} \textbar{} level -\i\\phantom{1234}};
4410 \fi
4411 \fi
4412 \ifchronos@showcoords
4413 \begin{scope}[on chronos overlay layer]
4414     \ifnum\chronos@uchod>0
4415     \foreach \i in {1,...,\chronos@uchod}
4416     \draw [help lines, draw=chronos@lliw@node] (u\i.north east)
4417     -| (u\i.south west) -| cycle;
4418 \fi
4419 \ifnum\chronos@isod>0
4420     \foreach \i in {1,...,\chronos@isod}
4421     \draw [help lines, draw=chronos@lliw@node]
4422     (i\i.north east) -| (i\i.south west) -| cycle;
4423 \fi
4424 \end{scope}%[on chronos overlay layer]
4425 \fi
4426 \end{scope}%^^A >>> byw, every node etc.
4427 \let\ceyearlabel\chronos@yearce
4428 \let\bceyearlabel\chronos@yearbce
4429 \let\celabel\chronos@ce
4430 \let\bcelabel\chronos@bce
4431 \let\timelineborderht\chronos@borderheight
4432 \let\timelinewd\chronos@width
4433 \let\lineyshift\chronos@llinell@yshift

```

At the end of chronos ...

```

4434 }{%^^A oedd yn execute at end picture={...}
4435 \ifchronos@frame
4436 \ifchronos@headings\relax
4437 \else
4438 \ifchronos@framedefnyddiobb\relax
4439 \else
4440 \pgfqkeys{/chronos}{subheadings drops'=0pt:0pt}%
4441 \chronos@headingstrue
4442 \fi % \ifchronos@framedefnyddiobb
4443 \fi % \ifchronos@headings
4444 \fi % \ifchronos@frame
4445 \ifchronos@headings
4446 \ifdim\chronos@heading@drop=0pt
4447 \chronos@heading@drop=15pt
4448 \PackageWarning{chronos}{Setting headings drop to 15pt}%
4449 \fi
4450 \ifdim\chronos@subheading@drop@uchod=0pt
4451 \chronos@subheading@drop@uchod=12pt
4452 \PackageWarning{chronos}{Setting upper subheading drop to 12pt}%
4453 \fi
4454 \ifdim\chronos@subheading@drop@isod=0pt

```



```

4455     \chronos@subheading@drop@isod=10pt
4456     \PackageWarning{chronos}{Setting lower subheading drop to 10pt}%
4457     \fi
4458     \ifnum\chronos@uchod=0
4459         \coordinate (u0) at (current bounding box.north);
4460         \PackageWarning{chronos}{%
4461             Placing (u0) at (current bounding box.north) for headings placement.%
4462         }%
4463     \fi
4464     \ifdim\chronos@border@penawdau=\pi pt
4465         \IfIntCompareTF {\chronos@uchod > 0}
4466         {%
4467             \chronos@border@penawdau=15pt
4468             \PackageWarning{chronos}{%
4469                 Allowing 15pt plus headings and subheadings drops for headings.%
4470             }%
4471         }{%
4472             \chronos@border@penawdau=5pt
4473             \PackageWarning{chronos}{%
4474                 Allowing 5pt plus headings and subheadings drops for headings.%
4475             }%
4476         }%
4477         \advance \chronos@border@penawdau by \chronos@heading@drop
4478         \advance \chronos@border@penawdau by \chronos@subheading@drop@uchod
4479         \advance \chronos@border@penawdau by \chronos@subheading@drop@isod
4480     \fi
4481     \ifnum\chronos@isod=0
4482         \coordinate (i0) at (current bounding box.south);
4483         \PackageWarning{chronos}{%
4484             Placing (i0) at (current bounding box.south) for structural purposes.%
4485         }%
4486     \fi
4487     \chronos@templgtha=\chronos@border@penawdau
4488     \advance\chronos@templgtha by \chronos@border@pen
4489     \coordinate (chronos margin top) at
4490         ($(\u\chronos@uchod.north -| chronos post) + (0pt,\chronos@templgtha)$);
4491     \chronos@templgtha=\chronos@border@pen
4492     \advance\chronos@templgtha by \chronos@heading@drop
4493     \coordinate (chronos main headings) at
4494         ($(\chronos margin top) - (0pt,\chronos@templgtha)$);% oedd pen & gwahanol
4495     \coordinate (chronos bottom) at
4496         ($(\i\chronos@isod.south) + (0pt,-\chronos@border@gwaelod)$);% oedd gwaelod
4497     \coordinate (chronos upper subheadings) at
4498         ($(\chronos main headings) - (0pt,\chronos@subheading@drop@uchod)$);% oedd pwy1
4499     \coordinate (chronos lower subheadings) at
4500         ($(\chronos upper subheadings) - (0pt,\chronos@subheading@drop@isod)$);% oedd
pwy2
4501     \coordinate (chronos@de) at ($(\chronos post) + (\chronos@border@de,0pt)$);% oedd
de
4502     \coordinate (chronos@chwith) at
4503         ($(\chronos pre) + (-\chronos@border@chwith,0pt)$);% oedd chwith

4504     \fi % \ifchronos@headings
4505     \pgfqkeys{/chronos}{@before@headings}%
4506     \chronos@at@end
4507     \pgfqkeys{/chronos}{@before@frame}%
4508     \ifchronos@frame
4509         \scoped[on chronos background layer]{%
4510             \ifchronos@framedefnyddiobb % if frame uses bb
4511                 \node (chronos frame) [%
4512                     fit=(current bounding box), /chronos/prif/@frame%

```

```

4513     ] {};
4514     \else
4515         \node (chronos frame) [fit=(chronos margin top -| chronos@de)
4516             (chronos bottom -| chronos@chwith), /chronos/prif/@frame] {};
4517     \fi % \ifchronos@framedefnyddiobb
4518     \path (chronos frame.south west)
4519         ++(-\chronos@border@allanol,-\chronos@border@allanol) |-
4520         (chronos frame.north east) --
4521         ++(\chronos@border@allanol,\chronos@border@allanol);
4522     }%
4523     \fi % \ifchronos@frame
4524     \pgfqkeys{/chronos}{@tikz}%
4525     \end{scope}% [/chronos/@style]
4526     \pgf@relevantforpicturesizefalse
4527     \pgfqkeys{/chronos}{@tikz}%
4528     \ifchronos@showcoords
4529     \begin{scope}[on chronos overlay layer]
4530         \foreach \i/\j in {%
4531             chronos foot/-55,%
4532             chronos head/north,%
4533             chronos base/-25,%
4534             chronos top/120,%
4535             chronos start/85,%
4536             chronos end/85,%
4537             chronos pre/west,%
4538             chronos post/east,%
4539             chronos pre-top/175,%
4540             chronos post-top/15,%
4541             chronos pre-base/south west,%
4542             chronos post-base/south east,%
4543             chronos pre-head/155,%
4544             chronos post-head/north east,%
4545             chronos pre-foot/south,%
4546             chronos post-foot/south,%
4547             chronos origin/-85,%
4548             chronos mid/90,%
4549             chronos mid-time/-90%
4550         }
4551         \node [/chronos/show coord={\j}{\i}] at (\i) {};
4552         \ifchronos@timeline@showyears
4553             \node [/chronos/show coord={45}{chronos first marked year}] at
4554                 (chronos first marked year) {};
4555         \fi
4556         \ifchronos@headings
4557             \foreach \i/\j in {%
4558                 chronos main headings/east,%
4559                 chronos bottom/north,%
4560                 chronos upper subheadings/east,%
4561                 chronos lower subheadings/east,%
4562                 chronos margin top/north%
4563             }
4564             \node [/chronos/show coord={\j}{\i}] at (\i) {};
4565         \fi
4566         \node (chronos@gwybodaeth@coords) [%
4567             below=2.5pt of current bounding box.south west,%
4568             anchor=north west,%
4569             every pin,%
4570             text=chronos@lliw@coord%
4571         ] {\textbullet{} coordinates};
4572     \end{scope}%
4573     \fi % \ifchronos@showcoords

```

```

4574 \ifchronos@shownodes
4575 \begin{scope}[on chronos overlay layer]
4576 \ifchronos@markeras
4577 \foreach \i/\j in {chronos bce/south, chronos ce/-95}
4578 {%
4579 \draw [help lines, draw=chronos@lliw@node] (\i.north west) -|
4580 (\i.south east) -| cycle;
4581 \node [/chronos/show node coord={\j}{\i}] at (\i) {};
4582 }%
4583 \fi % \ifchronos@markeras
4584 \ifchronos@frame
4585 \draw [help lines, draw=chronos@lliw@node] (chronos frame.north west)
4586 -| (chronos frame.south east) -| cycle;
4587 \node [/chronos/show node coord={north}{chronos frame}] at
4588 (chronos frame.north) {};
4589 \fi % \ifchronos@frame
4590 \ifchronos@showcoords
4591 \node (chronos@gwybodaeth@nodes) [%
4592 right=of chronos@gwybodaeth@coords.base east,%
4593 anchor=base west,%
4594 every pin,%
4595 text=chronos@lliw@node%
4596 ] {\textbullet{} nodes};
4597 \else
4598 \node (chronos@gwybodaeth@nodes) [%
4599 below=2.5pt of current bounding box.south west,%
4600 anchor=north west,%
4601 every pin,%
4602 text=chronos@lliw@node%
4603 ] {\textbullet{} nodes};
4604 \fi % \ifchronos@showcoords
4605 \end{scope}%
4606 \fi % \ifchronos@shownodes
4607 \ifchronos@showbb
4608 \begin{scope}[on chronos overlay layer]
4609 \draw [help lines,draw=chronos@lliw@bb]
4610 (current bounding box.north east) -| (current bounding box.south west)
4611 -| cycle;
4612 \node [%
4613 /chronos/show coordinate={chronos@lliw@bb}{90}{bounding box}{15pt}{}%
4614 ] at (current bounding box.120) {};
4615 \ifchronos@shownodes
4616 \node (chronos@gwybodaeth@bb) [%
4617 right=of chronos@gwybodaeth@nodes.base east,%
4618 anchor=base west,%
4619 every pin,%
4620 text=chronos@lliw@bb%
4621 ] {\textbullet{} bounding box};
4622 \else
4623 \ifchronos@showcoords
4624 \node (chronos@gwybodaeth@bb) [%
4625 right=of chronos@gwybodaeth@coords.base east,%
4626 anchor=base west,%
4627 every pin,%
4628 text=chronos@lliw@bb%
4629 ] {\textbullet{} bounding box};
4630 \else
4631 \node (chronos@gwybodaeth@bb) [%
4632 below=2.5pt of current bounding box.south west,%
4633 anchor=north west,%
4634 every pin,%

```

```

4635         text=chronos@lliw@bb%
4636     ] {\textbullet{ } bounding box};
4637     \fi % \ifchronos@showcoords
4638     \fi % \ifchronos@shownodes
4639     \end{scope}%
4640     \fi % \ifchronos@showbb
4641 \end{tikzpicture}%

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

4642 \chronos@global@clear@to@clist{century_subheadings}%
4643 \chronos@lliwiau@clear
4644 \ifchronos@byw@isod@rhag
4645     \global\chronos@byw@isodtrue
4646 \else
4647     \global\chronos@byw@isodfalse
4648 \fi
4649 \ifchronos@digwyddiad@isod@rhag
4650     \global\chronos@digwyddiad@isodtrue
4651 \else
4652     \global\chronos@digwyddiad@isodfalse
4653 \fi
4654 \ifchronos@parhad@isod@rhag
4655     \global\chronos@parhad@isodtrue
4656 \else
4657     \global\chronos@parhad@isodfalse
4658 \fi
4659 \let\chronosset\@chronosset
4660 }

\chronosset This can't be the right way to do this, can it?
\@chronosset
\@@chronosset
4661 \NewDocumentCommand \@chronosset { s m } {%
4662     \pgfqkeys{/chronos}{#2}%
4663     \IfBooleanF{#1}{%
4664         \ifchronos@byw@isod
4665             \chronos@byw@isod@rhagtrue
4666         \else
4667             \chronos@byw@isod@rhagfalse
4668         \fi
4669         \ifchronos@digwyddiad@isod
4670             \chronos@digwyddiad@isod@rhagtrue
4671         \else
4672             \chronos@digwyddiad@isod@rhagfalse
4673         \fi
4674         \ifchronos@parhad@isod
4675             \chronos@parhad@isod@rhagtrue
4676         \else
4677             \chronos@parhad@isod@rhagfalse
4678         \fi
4679         \chronos@lliwiau@cadw@rhag}}
4680 \NewDocumentCommand \@@chronosset { s m }
4681 {%
4682     \PackageWarning{chronos}{%
4683         \bs chronosset has no effect inside a chronos environment.
4684         Usage ignored %
4685     }%
4686 }
4687 \let\chronosset\@chronosset

```

\byw That is, \chronoslife.

```

4688 \NewDocumentCommand\byw { m }{%
4689   \beginngroup
4690     \Undefine\chronos@byw@labelgeni
4691     \Undefine\chronos@byw@labelmarw
4692     \Undefine\chronos@byw@angor
4693     \Undefine\chronos@byw@at
4694     \Undefine\chronos@byw@inanchor
4695     \Undefine\chronos@cynnwys@testun
4696     \Undefine\chronos@cynnwys@dyddiadau
4697     \Undefine\chronos@cynnwys@enw
4698     \Undefine\chronos@cysylltwyr
4699     \chronos@byw@cysylltiadtheorifalse %^^A rhag ofn
4700     \tikzset{byw={enw={??},marw={\year-\month-\day},bu farw=false,#1}}%
4701     \ifchronos@eventdatessplit
4702       \PackageInfo{chronos}{Setting split false for non-event.}%
4703       \chronos@eventdatessplitfalse
4704     \fi
4705     \pgfmathsetmacro\chronos@temph{%
4706       (\thechronos@genidate-\thechronos@startdate)*\chronos@unit
4707     }%
4708     \pgfmathsetmacro\chronos@tempk{%
4709       (\thechronos@marwdate-\thechronos@startdate)*\chronos@unit
4710     }%
4711     \pgfmathsetmacro\chronos@templ{%
4712       (\chronos@temph+\chronos@tempk)*\chronos@unit/2%
4713     }%

temporary coordinate accurate only for x

4714     \coordinate (\chronos@byw@tikzname) at (\chronos@templ pt,0pt);
4715     \chronos@troilliuiaw@tag{byw}%
4716     \chronos@gosodangor@tag{byw}%
4717     \chronos@gosodborder@tag{byw}%
4718     \IfExistTF \chronos@cynnwys@testun{%
4719       \let\chronos@cynnwys@dyddiadau\relax
4720       \let\chronos@cynnwys@enw\relax
4721     }{%
4722       \IfExistF \chronos@cynnwys@enw {%
4723         \def \chronos@cynnwys@enw {\chronos@enw@priflythrennu{\chronos@byw@enw}}%
4724       }%
4725       \IfExistTF \chronos@cynnwys@dyddiadau {%
4726         \pretocmd \chronos@cynnwys@dyddiadau {\chronos@byw@ffontdyddiad}{-}{-}%
4727       }{%
4728         \ifchronos@onlytext\let\chronos@cynnwys@dyddiadau\relax
4729         \else
4730           \ifchronos@bufarw\relax\else\def\chronos@byw@labelmarw{\fi
4731             \chronos@dyddiadau@tag{byw}{geni}{geni}{marw}{marw}%
4732           \ifchronos@temp
4733             \def \chronos@cynnwys@dyddiadau {%
4734               \chronos@byw@ffontdyddiad\chronos@byw@labelmarw
4735             }%
4736           \else
4737             \def \chronos@cynnwys@dyddiadau {%
4738               \chronos@byw@ffontdyddiad\chronos@byw@labelgeni
4739             --\chronos@byw@labelmarw
4740             }%
4741           \fi
4742         \fi
4743       }%
4744       \def \chronos@cynnwys@testun {%
4745         {\chronos@byw@ffonttestun\chronos@cynnwys@enw}\chronos@cynnwys@dyddiadau
4746       }%

```

```

4747 }%
4748 \chronos@creu@llinell {byw}{\chronos@temph pt}{\chronos@tempk pt}{geni}{marw}%

final coordinate accurate for x and y

4749 \coordinate (\chronos@byw@tikzname) at
4750 ($(\chronos@byw@tikzname{} geni)!1/2!(\chronos@byw@tikzname{} marw)$);

creu cylcu ar y lein ; testun - prif node ; testun cylch ; prif gysylltiad

4751 \chronos@creu@testun@tag{byw}{\chronos@cynnwys@testun}%
4752 \ifchronos@byw@cysylltiadtheori
4753 \chronos@angorau@theori{testun \chronos@byw@tikzname}%
4754 {cysylltwr \chronos@byw@tikzname}[connector \chronos@byw@tikzname]%
4755 {/chronos/@cysylltwr@testun=\chronos@byw@lliw}%

4756 \fi
4757 \ifchronos@every@byw@isod
4758 \global\chronos@byw@isodtrue
4759 \else\ifchronos@every@byw@uchod
4760 \global\chronos@byw@isodfalse
4761 \else
4762 \ifchronos@byw@isod
4763 \global\chronos@byw@isodfalse
4764 \else
4765 \global\chronos@byw@isodtrue
4766 \fi
4767 \fi
4768 \fi
4769 \chronos@ailosod@nodweddion
4770 \endgroup
4771 }

```

`\digwyddiad` That is, `\chronosevent`.

```

4772 \NewDocumentCommand\digwyddiad { m }{%
4773 \begingroup
4774 \Undefine\chronos@digwyddiad@angor
4775 \Undefine\chronos@digwyddiad@invanchor
4776 \Undefine\chronos@digwyddiad@at
4777 \Undefine\chronos@cynnwys@testun
4778 \Undefine\chronos@cynnwys@dyddiadau
4779 \Undefine\chronos@cynnwys@enw
4780 \Undefine\chronos@cysylltwyr
4781 \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

4782 \tikzset{digwyddiad={enw={??},#1}}%
4783 \pgfmathsetmacro\chronos@temph{%
4784 (\thechronos@digdate-\thechronos@startdate)*\chronos@unit
4785 }%

temporary coordinate accurate only for x

4786 \coordinate (\chronos@digwyddiad@tikzname) at (\chronos@temph pt,0pt);
4787 \chronos@troilliwiiau@tag{digwyddiad}%
4788 \chronos@gosodangor@tag{digwyddiad}%
4789 \chronos@gosodborder@tag{digwyddiad}%
4790 \ifchronos@eventdatessplit
4791 \ifchronos@onlytext\relax
4792 \IfExistF \chronos@cynnwys@testun {%

```

```

4793     \IfExistTF \chronos@cynnwys@enw {%
4794         \def\chronos@cynnwys@testun {%
4795             \chronos@digwyddiad@ffonttestun
4796             \chronos@cynnwys@enw
4797         }
4798     }{%
4799         \def \chronos@cynnwys@testun {%
4800             \chronos@digwyddiad@ffonttestun
4801             \chronos@enw@priflythrennu{\chronos@digwyddiad@enw}%
4802         }%
4803     }%
4804 }%
4805 \else
4806 \IfExistF \chronos@cynnwys@testun {%
4807     \IfExistF \chronos@cynnwys@dyddiadau {%
4808         \def \chronos@cynnwys@dyddiadau {%
4809             \chronos@showdate@cs[chronos@digwyddiad@fformatdyddiad]{dig}%
4810         }%
4811     }%
4812     \IfExistTF \chronos@cynnwys@enw {%
4813         \def\chronos@cynnwys@testun {%
4814             \chronos@digwyddiad@ffonttestun
4815             \chronos@cynnwys@enw
4816         }
4817     }{%
4818         \def \chronos@cynnwys@testun {%
4819             \chronos@digwyddiad@ffonttestun
4820             \chronos@enw@priflythrennu{\chronos@digwyddiad@enw}%
4821         }%
4822     }%
4823 }%
4824 \fi
4825 \else % not event date split
4826 \IfExistTF \chronos@cynnwys@testun {%
4827     \let\chronos@cynnwys@dyddiadau\relax
4828     \let\chronos@cynnwys@enw\relax
4829 }{%
4830     \IfExistF {\chronos@cynnwys@enw}{%
4831         \def \chronos@cynnwys@enw {%
4832             \chronos@enw@priflythrennu{\chronos@digwyddiad@enw}%
4833         }%
4834     }%
4835     \IfExistTF \chronos@cynnwys@dyddiadau {%
4836         \apptocmd \chronos@cynnwys@dyddiadau {\}\{\}%
4837         \pretocmd \chronos@cynnwys@dyddiadau
4838             {\chronos@digwyddiad@ffontdyddiad}\{\}%
4839     }{%
4840         \ifchronos@onlytext\let\chronos@cynnwys@dyddiadau\relax
4841         \else
4842             \def \chronos@cynnwys@dyddiadau {%
4843                 \chronos@digwyddiad@ffontdyddiad
4844                 \chronos@showdate@cs[chronos@digwyddiad@fformatdyddiad]{dig}\%
4845             }%
4846         \fi
4847     }%
4848     \def \chronos@cynnwys@testun {%
4849         \chronos@cynnwys@dyddiadau
4850         \chronos@digwyddiad@ffonttestun
4851         \chronos@cynnwys@enw
4852     }%
4853 }%

```

```

4854     \fi

marcio digwyddiad ar y lein | mark event on line

4855     \begin{scope}[/chronos/chronos@llynell@haenen]% finalise coordinate placement
4856         \path [/chronos/@llynell=\chronos@digwyddiad@lliw] ({\chronos@temph pt,0}
4857             |- \chronos@border@coord) -- +(Opt,\chronos@digwyddiad@border)
4858             coordinate (\chronos@digwyddiad@tikzname);
4859         \ifchronos@eventdatessplit
4860             \path [/chronos/@llynell=\chronos@digwyddiad@lliw]
4861                 ({\chronos@temph pt,0} |- \chronos@border@coord@inv) --
4862                 +(Opt,\chronos@digwyddiad@border@inv) coordinate
4863                 (\chronos@digwyddiad@tikzname-inv);
4864         \fi
4865     \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

4866     \ifchronos@eventdatessplit
4867         \chronos@creu@testun@tag*{digwyddiad}{\chronos@cynnwys@dyddiadau}%^^A angen defnyddio
/chronos/event date split
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@llynell 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 coordinate accurate only for x

```

4932   \coordinate (\chronos@parhad@tikzname) at (\chronos@templ pt,Opt);
4933   \chronos@troilliwiaw@tag{parhad}%
4934   \chronos@gosodangor@tag{parhad}%
4935   \chronos@gosodborder@tag{parhad}%
4936   \IfExistTF \chronos@cynnwys@testun{%
4937     \let\chronos@cynnwys@dyddiadau\relax
4938     \let\chronos@cynnwys@enw\relax
4939   }{%
4940     \IfExistF \chronos@cynnwys@enw {%
4941       \def \chronos@cynnwys@enw {\chronos@enw@priflythrennu{\chronos@parhad@enw}}%
4942     }%
4943     \IfExistTF \chronos@cynnwys@dyddiadau {%
4944       \apptocmd \chronos@cynnwys@dyddiadau {\}\{\}%
4945     }{%
4946       \ifchronos@onlytext\let\chronos@cynnwys@dyddiadau\relax
4947       \else
4948         \ifchronos@gorffenedig\relax\else\def\chronos@parhad@labeldiwedd{\fi
4949           \chronos@dyddiadau@tag{parhad}{thing}{dechrau}{otherthing}{diwedd}%
4950           \ifchronos@temp
4951             \def \chronos@cynnwys@dyddiadau {\chronos@parhad@labeldechrau\}%
4952           \else
4953             \def \chronos@cynnwys@dyddiadau {%
4954               \chronos@parhad@labeldechrau--\chronos@parhad@labeldiwedd\}%
4955           \fi
4956         \fi
4957       }%
4958     \def \chronos@cynnwys@testun {%
4959       \chronos@parhad@ffontdyddiad
4960       \chronos@cynnwys@dyddiadau

```

```

4961     \chronos@parhad@ffonttestun
4962     \chronos@cynnwys@enw
4963     }%
4964     }%
4965     \chronos@creu@llinell {parhad}{\chronos@temph pt}{\chronos@tempk pt}{dechrau}{diwedd}%

```

final coordinate placement

```

4966     \coordinate (\chronos@parhad@tikzname) at
4967     ($(\chronos@parhad@tikzname} dechrau)!1/2!(\chronos@parhad@tikzname} diwedd)$);

```

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

```

4968     \chronos@creu@testun>tag{parhad}{\chronos@cynnwys@testun}%
4969     \ifchronos@parhad@cysylltiadtheori
4970         \chronos@angorau@theori{testun \chronos@parhad@tikzname}%
4971         {cysylltwr \chronos@parhad@tikzname}[connector \chronos@parhad@tikzname]%
4972         {/chronos/@cysylltwr@testun=\chronos@parhad@lliw}%
4973     \fi
4974     \ifchronos@every@parhad@isod
4975         \global\chronos@parhad@isodtrue
4976     \else\ifchronos@every@parhad@uchod
4977         \global\chronos@parhad@isodfalse
4978     \else
4979         \ifchronos@parhad@isod
4980             \global\chronos@parhad@isodfalse
4981         \else
4982             \global\chronos@parhad@isodtrue
4983         \fi
4984     \fi
4985     \fi
4986     \chronos@ailosod@nodweddion
4987 \endgroup
4988 }

```

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

```

4989 \NewDocumentCommand\theori { m }{%
4990     \begingroup
4991     \Undefine\chronos@theori@angor
4992     \Undefine\chronos@theori@at
4993     \Undefine\chronos@theori@invanchor
4994     \Undefine\chronos@cynnwys@testun
4995     \Undefine\chronos@cynnwys@enw
4996     \Undefine\chronos@cynnwys@dyddiadau
4997     \Undefine\chronos@cysylltwyr
4998     \chronos@theori@cysylltiadtheorifalse %^^A rhag ofn
4999     \tikzset{theori={enw={??},#1}}%
5000     \chronos@troilliwiaw@tag{theori}%
5001     \IfExistTF \chronos@theori@angor{%
5002         \IfExistTF \chronos@cysylltwyr{%
5003             \pretocmd\chronos@cysylltwyr{\chronos@theori@angor,}{-}{-}%
5004         }{%
5005             \def\chronos@cysylltwyr{\chronos@theori@angor}%
5006         }%
5007     }{%
5008         \ifchronos@theori@isod
5009             \def\chronos@theori@angor{north}%
5010         \else
5011             \def\chronos@theori@angor{south}%
5012         \fi

```

```

5013 }%
5014 \IfExistTF \chronos@cynnwys@testun {%
5015 \let\chronos@cynnwys@enw\relax
5016 }{%
5017 \IfExistF \chronos@cynnwys@enw {%
5018 \def \chronos@cynnwys@enw {\chronos@enw@priflythrennu{\chronos@theori@enw}}%
5019 }%
5020 \def \chronos@cynnwys@testun {\chronos@cynnwys@enw}%
5021 }%

creu testun | text tag

5022 \chronos@creu@testun@tag[alias=\chronos@theori@tikzname]{theori}{%
5023 \chronos@theori@ffonttestun\chronos@cynnwys@testun}%
5024 \IfExistT \chronos@cysylltwyr{%
5025 \chronos@angorau@theori{\chronos@theori@enw}{%
5026 cysylltwr \chronos@theori@enw
5027 }[connector \chronos@theori@enw]{%
5028 /chronos/@cysylltwr@testun=\chronos@theori@lliw
5029 }%
5030 }%
5031 \chronos@ailosod@nodweddion
5032 \endgroup
5033 }

```

`\chronos@angorau@theori` That is, anchors for `\chronostheory`. Should this be done this way?!

```

5034 \NewDocumentCommand \chronos@angorau@theori{mmO{connector }m}{%
5035 % #1 enw y prif node ;
5036 % #2 enw yr angor cyntaf ;
5037 % #4 style
5038 \ifchronos@phantom
5039 \PackageWarning{chronos}{Phantom tags cannot have connectors }%
5040 \else

```

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

```

5041 \begin{scope}[/chronos/middle anchorborder]
5042 \setcounter{chronos@theori@countanchors}{0}%
5043 \@for \xx:=\chronos@cysylltwyr \do {%
5044 \stepcounter{chronos@theori@countanchors}%
5045 \ifnum\value{chronos@theori@countanchors}=1%
5046 \node (#2) [%
5047 #4,%
5048 alias=#2\thechronos@theori@countanchors,%
5049 alias=#3,%
5050 alias=#3\thechronos@theori@countanchors
5051 ] at (#1.middle \xx) {};}
5052 \else
5053 \node (#2\thechronos@theori@countanchors) [%
5054 #4, alias=#3\thechronos@theori@countanchors
5055 ] at (#1.middle \xx) {};}
5056 \fi
5057 }%
5058 \end{scope}%
5059 \fi
5060 }

```

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

```

5061 \NewDocumentCommand \cylchtheori { m } {%
5062 \begingroup
5063 \Undefine\chronos@cylchtheori@at

```

```

5064 \Undefine\chronos@cynnwys@testun
5065 \Undefine\chronos@cynnwys@enw
5066 \Undefine\chronos@cynnwys@dyddiadau
5067 \tikzset{cylch theori={enw={??},#1}}%

5068 \coordinate [%
5069 /chronos/every@cylch cylch theori,%
5070 /utils/exec=\pgfkeysalsofrom{\chronos@cadw}%
5071 ] (\chronos@cylchtheori@tikzname1) at (\chronos@cylchtheori@at);
5072 \path [/chronos/every@cylch cylch theori] (\chronos@cylchtheori@tikzname1)
5073 circle (\chronos@cylchtheori@bach) circle (\chronos@cylchtheori@mawr);
5074 \pgfmathsetlength\chronos@templgtha{\chronos@cylchtheori@bach+0.5pt}%
5075 \pgfmathsetlength\chronos@templgthc{\chronos@cylchtheori@mawr-0.5pt}%
5076 \pgfmathsetlength\chronos@templgthb{\chronos@cylchtheori@mawr+2pt}%
5077 \coordinate (\chronos@cylchtheori@tikzname2) at
5078 ($(\chronos@cylchtheori@tikzname1) - (\chronos@templgtha,0)$);
5079 \coordinate (\chronos@cylchtheori@tikzname3) at
5080 ($(\chronos@cylchtheori@tikzname1) - (\chronos@templgthc,0)$);
5081 \coordinate (\chronos@cylchtheori@tikzname4) at
5082 ($(\chronos@cylchtheori@tikzname1) + (0,\chronos@templgthb)$);
5083 \coordinate (\chronos@cylchtheori@tikzname5) at
5084 ($(\chronos@cylchtheori@tikzname1) - (0,\chronos@templgthb)$);
5085 \path [%
5086 /chronos/every@testun cylch theori/.expanded={%
5087 \ \chronos@cylchtheori@circletext@uchod\ %
5088 }%
5089 ] (\chronos@cylchtheori@tikzname2) arc (180:0:\chronos@templgtha);
5090 \path [%
5091 /chronos/every@testun cylch theori/.expanded={%
5092 \chronos@cylchtheori@circletext@isod
5093 }%
5094 ] (\chronos@cylchtheori@tikzname3) arc (180:360:\chronos@templgthc);
5095 \node (label above \chronos@cylchtheori@tikzname) [%
5096 anchor=south, /chronos/theori/cylchau/@label
5097 ] at (\chronos@cylchtheori@tikzname4) {\chronos@cylchtheori@label@uchod};
5098 \node (label below \chronos@cylchtheori@tikzname) [%
5099 anchor=north, /chronos/theori/cylchau/@label
5100 ] at (\chronos@cylchtheori@tikzname5) {\chronos@cylchtheori@label@isod};
5101 \node (\chronos@cylchtheori@tikzname) [%
5102 fit=(label below \chronos@cylchtheori@tikzname)
5103 (label above \chronos@cylchtheori@tikzname)
5104 (\chronos@cylchtheori@tikzname4)
5105 (\chronos@cylchtheori@tikzname5)%
5106 ] {};
5107 \chronos@ailosod@nodweddion
5108 \endgroup
5109 }

```

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

```

5110 \NewDocumentCommand \prideitl { m }
5111 {%
5112 \begingroup
5113 \Undefine\chronos@prifdeitl@at
5114 \Undefine\chronos@prifdeitl@angor
5115 \tikzset{prif=#1}}%
5116 \IfExistF\chronos@prifdeitl@angor{\def\chronos@prifdeitl@angor{center}}%
5117 \IfExistTF\chronos@prifdeitl@tikzname{%
5118 \pgfqkeys{/chronos}{@tempd/.style={alias=prif deitl,alias=main title}}%
5119 }{%
5120 \def\chronos@prifdeitl@tikzname{prif deitl}%
5121 \pgfqkeys{/chronos}{@tempd/.style={alias=main title}}%

```

```

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

```

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

```

5149 \NewDocumentCommand \gwybodaeth { s m }{%
5150   \begingroup
5151     \Undefine\chronos@gwybodaeth@angor
5152     \Undefine\chronos@gwybodaeth@at
5153     \let\chronos@cynnwys@testun\empty
5154     \Undefine\chronos@cynnwys@enw
5155     \Undefine\chronos@gwybodaeth@capsiw
5156     \tikzset{gwybodaeth={enw={??},#2}}%
5157     \IfExistF \chronos@gwybodaeth@angor{\def\chronos@gwybodaeth@angor{west}}%
5158     \IfExistF \chronos@gwybodaeth@capsiw {%
5159       \def \chronos@gwybodaeth@capsiw {%
5160         \chronos@enw@priflythrennu{\chronos@gwybodaeth@enw}%
5161       }%
5162     }%
5163     \IfExistF \chronos@gwybodaeth@lliw {%
5164       \let\chronos@gwybodaeth@lliw\chronos@gwybodaeth@lliw@rhagosodedig
5165     }%
5166     \node (testun \chronos@gwybodaeth@tikzname) [%
5167       /chronos/@testun=\chronos@gwybodaeth@lliw,%
5168       anchor=\chronos@gwybodaeth@angor,%
5169       /chronos/.cd,%
5170       /utils/exec=\pgfkeysalsofrom{\chronos@cadw},%
5171       alias=tag \chronos@gwybodaeth@tikzname,%
5172       alias=text tag \chronos@gwybodaeth@tikzname,%
5173       alias=\chronos@gwybodaeth@tikzname
5174 ] at (\chronos@gwybodaeth@at) {\chronos@cynnwys@testun};
5175     \IfBooleanF {#1}{%
5176       \node (capsiw \chronos@gwybodaeth@tikzname) [%
5177         /chronos/gwybodaeth/@label,%
5178         alias=enw \chronos@gwybodaeth@tikzname,%
5179         alias=name \chronos@gwybodaeth@tikzname,%

```

```

5180     alias=label \chronos@gwybodaeth@tikzname,%
5181     alias=caption \chronos@gwybodaeth@tikzname
5182   ] at (\chronos@gwybodaeth@tikzname.south) {\chronos@gwybodaeth@capsiw};
5183 }%
5184 \edef\chronos@tempa{lliw \chronos@gwybodaeth@tikzname}%
5185 \edef\chronos@tempe{colour \chronos@gwybodaeth@tikzname}%
5186 \edef\chronos@tempf{color \chronos@gwybodaeth@tikzname}%
5187 \edef\chronos@tempb{\chronos@gwybodaeth@lliw}%
5188 \xglobal\colorlet{\chronos@tempa}{\chronos@tempb}%
5189 \xglobal\colorlet{\chronos@tempe}{\chronos@tempb}%
5190 \xglobal\colorlet{\chronos@tempf}{\chronos@tempb}%
5191 \colorlet{chronos current tag colour}{\chronos@tempb}%
5192 \colorlet{chronos current tag color}{\chronos@tempb}%
5193 \chronos@ailosod@nodweddion
5194 \endgroup
5195 }

```

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

```

5196 \NewDocumentCommand \hawlfraint { m }
5197 {%
5198   \begingroup
5199     \Undefine\chronos@hawlfraint@at
5200     \Undefine\chronos@hawlfraint@enw
5201     \def\chronos@hawlfraint@angor{north west}%
5202     \def\chronos@hawlfraint@cylchdroi{90}%
5203     \tikzset{hawlfraint=#1}%
5204     \IfExistF{\chronos@hawlfraint@notis}{%
5205       \ifchronos@copyleft
5206         \def\chronos@hawlfraint@notis##1##2{Copyleft \textcopyright{} ##1 ##2}%
5207       \else
5208         \def\chronos@hawlfraint@notis##1##2{Copyright \textcopyright{} ##1 ##2}%
5209       \fi
5210     }%
5211     \IfExistF{\chronos@hawlfraint@at}{%
5212       \def\chronos@hawlfraint@at{current bounding box.south west}%
5213       \PackageWarning{chronos}{Placing copyright notice at bottom left }%
5214     }%
5215     \IfExistF {\chronos@hawlfraint@cynnwys}{%
5216       \IfBooleanExprTF {
5217         \CSFreeBoolean \chronos@hawlfraint@enw
5218         || ! (\CSFreeBoolean \chronos@hawlfraint@awdur)
5219         || ! (\CSFreeBoolean \chronos@hawlfraint@blwyddyn)
5220       }{%
5221         \IfExistF {\chronos@hawlfraint@awdur}{%
5222           \IfExistTF {\svnauthor} {%
5223             \IfExistTF {\svnFullAuthor} {%
5224               \def\chronos@hawlfraint@awdur{\svnFullAuthor{\svnauthor}}%
5225             }{%
5226               \let\chronos@hawlfraint@awdur\svnauthor
5227             }%
5228           }{%
5229             \def\chronos@hawlfraint@awdur{Author}%
5230           }%
5231         }%
5232       \IfExistF {\chronos@hawlfraint@blwyddyn}{%
5233         \IfExistTF {\svnyear} {%
5234           \let\chronos@hawlfraint@blwyddyn\svnyear
5235         }{%
5236           \let\chronos@hawlfraint@blwyddyn\today
5237         }%

```

```

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

5264 \draw node (\chronos@hawlfraint@tikzname) [%
5265     draw=none,%
5266     /chronos/@tempd,%
5267     /chronos/@hawlfraint,%
5268     anchor=\chronos@hawlfraint@angor,%
5269     rotate=\chronos@hawlfraint@cylchdroi,%
5270     /utils/exec=\pgfkeysalsofrom{\chronos@cadw}%
5271 ] at (\chronos@hawlfraint@at) {\chronos@hawlfraint@cynnwys};
5272 \ifchronos@showcoords
5273 \begin{scope}[on chronos overlay layer]
5274     \draw [help lines, draw=chronos@lliw@node]
5275         (\chronos@hawlfraint@tikzname.north east) -|
5276         (\chronos@hawlfraint@tikzname.south west) -| cycle;
5277     \node [%
5278         /chronos/show coordinate={chronos show node colour}{0}{%
5279             \chronos@hawlfraint@tikzname
5280         }{10pt}{align=center}%
5281     ] at (\chronos@hawlfraint@tikzname.east) {};
5282 \end{scope}%
5283 \fi
5284 \endgroup
5285 }

```

`\chronoscopyleft` Variant of `\chronoscopyright`.

```

5286 \NewDocumentCommand \chronoscopyleft { m }{%
5287     \begingroup
5288         \chronos@copylefttrue
5289         \hawlfraint {#1}%
5290     \endgroup
5291 }

```

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

```

5292 \NewDocumentCommand \chronos@dyddiadau@tag{mmmm}{%

```

```

5293 %^^A #1 : tag e.g. byw / parhad ;
5294 %^^A #2 first date counter e.g. geni / thing ;
5295 %^^A #3 first label e.g. geni / dechrau ;
5296 %^^A #4 second date counter e.g. marw / otherthing ;
5297 %^^A #5 second label e.g. marw / diwedd
5298 \IfCSEExistTF{chronos@#1@label#3}{%
5299 \IfCSEExistF{chronos@#1@label#5}{%
5300 \expandafter\def\csname chronos@#1@label#5\endcsname{%
5301 \chronos@showdate@cs[chronos@#1@fformat#5]{#4}%
5302 }%
5303 }%
5304 }{%
5305 \IfCSEExistF{chronos@#1@label#5}{% creu label yr ail ddyddiad
5306 \expandafter\def\csname chronos@#1@label#5\endcsname{%
5307 \chronos@showdate@cs[chronos@#1@fformat#5]{#4}%
5308 }%
5309 }%
5310 \edef\tempa{}\edef\tempb{\csname chronos@#1@label#5\endcsname}%
5311 \ifx\tempa\tempb
5312 \expandafter\def\csname chronos@#1@label#3\endcsname{%
5313 \chronos@showdate@cs[chronos@#1@fformat#3@cyfnodau]{#2}%
5314 }%
5315 \else
5316 \expandafter\ifnum\csname chronos@#2year\endcsname<0
5317 \expandafter\ifnum\csname chronos@#4year\endcsname<0
5318 \expandafter\def\csname chronos@#1@label#3\endcsname{%
5319 \chronos@showdate@cs[chronos@#1@fformat#3@cyfnod]{#2}%
5320 }%
5321 \else
5322 \expandafter\def\csname chronos@#1@label#3\endcsname{%
5323 \chronos@showdate@cs[chronos@#1@fformat#3@cyfnodau]{#2}%
5324 }%
5325 \fi
5326 \else
5327 \expandafter\def\csname chronos@#1@label#3\endcsname{%
5328 \chronos@showdate@cs[chronos@#1@fformat#3@cyfnod]{#2}%
5329 }%
5330 \fi
5331 \fi
5332 }%
5333 \ifchronos@dimondblynnyddoedd
5334 \edef\chronos@tempf{\csname chronos@#2year\endcsname}%
5335 \edef\chronos@tempq{\csname chronos@#4year\endcsname}%
5336 \ifnum\chronos@tempf=\chronos@tempq\relax
5337 \chronos@temptrue
5338 \else
5339 \chronos@tempfalse
5340 \fi
5341 \else
5342 \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
5343 \chronos@temptrue
5344 \else
5345 \chronos@tempfalse
5346 \fi
5347 \fi
5348 }

```

`\chronos@gosodborder@tag` Internal macro to install connection point on timeline border.

```
5349 \NewDocumentCommand \chronos@gosodborder@tag{m}{%
```



```

5350 \csname ifchronos@#1@isod\endcsname
5351   \ifchronos@yearsonline
5352     \def\chronos@border@coord{chronos base}%
5353     \def\chronos@border@coord@inv{chronos top}%
5354     \expandafter\setlength\csname chronos@#1@border\endcsname{%
5355       -\chronos@borderheight}%
5356     \expandafter\setlength\csname chronos@#1@border@inv\endcsname{%
5357       \chronos@borderheight}%
5358   \else
5359     \def\chronos@border@coord{chronos top}%
5360     \def\chronos@border@coord@inv{chronos base}%
5361     \expandafter\setlength\csname chronos@#1@border\endcsname{%
5362       -\chronos@height}%
5363     \expandafter\setlength\csname chronos@#1@border@inv\endcsname{%
5364       \chronos@height}%
5365   \fi
5366 \else
5367   \ifchronos@yearsonline
5368     \def\chronos@border@coord{chronos top}%
5369     \def\chronos@border@coord@inv{chronos base}%
5370     \expandafter\setlength\csname chronos@#1@border\endcsname{%
5371       \chronos@borderheight}%
5372     \expandafter\setlength\csname chronos@#1@border@inv\endcsname{%
5373       -\chronos@borderheight}%
5374   \else
5375     \def\chronos@border@coord{chronos base}%
5376     \def\chronos@border@coord@inv{chronos top}%
5377     \expandafter\setlength\csname chronos@#1@border\endcsname{%
5378       \chronos@height}%
5379     \expandafter\setlength\csname chronos@#1@border@inv\endcsname{%
5380       -\chronos@height}%
5381   \fi
5382 \fi
5383 }

```

`\chronos@troilliwiau@tag` Internal macro to rotate colours and configure below/above split, as applicable.

```

5384 \NewDocumentCommand \chronos@troilliwiau@tag{m}{%^^A <<<
5385   \IfCSExistTF {chronos@#1@at}{%
5386     \edef\chronos@tempj{\csname chronos@#1@at\endcsname}%
5387     \path (\chronos@tempj) ++(Opt,\chronos@yshift);
5388     \pgfgetlastxy{\chronos@templgtha}{\chronos@templgthb}%
5389     \ifdim\chronos@templgthb>Opt\relax
5390       \expandafter\global\csname chronos@#1@isodfalse\endcsname
5391     \else
5392       \ifdim\chronos@templgthb<Opt\relax
5393         \expandafter\global\csname chronos@#1@isodtrue\endcsname
5394       \fi
5395     \fi
5396     \def\chronos@yshift@inv{-\chronos@yshift}%
5397   }{%
5398     \ifchronos@tag@cysylltu
5399       \CSletCS {chronos@#1@at}{chronos@#1@tikzname}%^^A uses temporary coordinate at this
point but will be aligned horizontally
5400     \else
5401       \expandafter\def\csname chronos@#1@at\endcsname{chronos origin}%
5402       \PackageWarning{chronos}{Aligning #1 text tag with (chronos origin).
Set at to avoid this}%
5403     \fi
5404   \fi
5405   \ifdim\chronos@yshift>Opt\relax
5406     \expandafter\global\csname chronos@#1@isodfalse\endcsname

```

```

5407     \def\chronos@yshift@inv{-\chronos@yshift}%
5408     \else
5409     \ifdim\chronos@yshift<Opt\relax
5410     \expandafter\global\csname chronos@#1@isodtrue\endcsname
5411     \def\chronos@yshift@inv{-\chronos@yshift}%
5412     \else
5413     \ifdim\chronos@testun@yshift=Opt\relax
5414     \PackageWarning{chronos}{%
5415     Tag will be placed at the timeline's vertical centre.
5416     Set non-zero yshift or text tag yshift or set at to avoid this%
5417     }%
5418     \fi
5419     \chronos@legacy@if{chronos@#1@isod}{% cheat!
5420     \pretocmd\chronos@cadw{yshift=-\chronos@testun@yshift,}{-}{-}%
5421     \def\chronos@yshift@inv{\chronos@testun@yshift}%
5422     }{%
5423     \pretocmd\chronos@cadw{yshift=\chronos@testun@yshift,}{-}{-}%
5424     \def\chronos@yshift@inv{-\chronos@testun@yshift}%
5425     }% if chronos@#1isod
5426     \fi % if yshift<Opt
5427     \fi % if yshift>Opt
5428     }%
5429     \IfCSFreeT{chronos@#1@lliw}{%^^A \ifcsundef is T even if cs is \relax (unlike \ifcsdef
which is also T if cs is \relax)
5430     \expandafter\ifchronos@troilliwiaw
5431     \csname ifchronos@#1@isod\endcsname
5432     \chronos@troilliwiaw@isod[#1]
5433     \else
5434     \chronos@troilliwiaw@uchod[#1]%
5435     \fi
5436     \else
5437     \CSletCS{chronos@#1@lliw}{chronos@#1@lliw@rhagosodedig}%
5438     \fi
5439     }%
5440     \edef\chronos@tempa{lliw \csname chronos@#1@tikzname\endcsname}%
5441     \edef\chronos@tempb{\csname chronos@#1@lliw\endcsname}%
5442     \edef\chronos@tempe{colour \csname chronos@#1@tikzname\endcsname}%
5443     \edef\chronos@tempf{color \csname chronos@#1@tikzname\endcsname}%
5444     \xglobal\colorlet{\chronos@tempa}{\chronos@tempb}%
5445     \xglobal\colorlet{\chronos@tempe}{\chronos@tempb}%
5446     \xglobal\colorlet{\chronos@tempf}{\chronos@tempb}%
5447     \colorlet{chronos current tag colour}{\chronos@tempb}%
5448     \colorlet{chronos current tag color}{\chronos@tempb}%
5449     \ifchronos@enwaulliwysml
5450     \edef\chronos@tempg{\csname chronos@#1@tikzname\endcsname}%
5451     \xglobal\colorlet{\chronos@tempg}{\chronos@tempb}%
5452     \fi
5453     }%^^A >>>

```

`\chronos@gosod@angor@tag` Internal macro to add connector to tag anchors.

```

5454 \NewDocumentCommand\chronos@gosodangor@tag{m}{%i^^A <<<
5455 \IfCSExistTF{chronos@#1@angor}{%
5456 \expandafter\edef\expandafter\chronos@tempa\expandafter{%
5457 \csname chronos@#1@angor\endcsname
5458 }%
5459 \foreach \i/\j in {%
5460 north/south,%
5461 south/north,%
5462 east/west,%
5463 west/east,%

```

```

5464     north west/south east,%
5465     south east/north west,%
5466     north east/south west,%
5467     south west/north east%
5468 }{%
5469   \edef\chronos@tempb{\i}%
5470   \ifx\chronos@tempa\chronos@tempb
5471     \global\CSlet{chronos@#1@invanchor}\j\breakforeach
5472   \fi
5473 }%
5474 }{%
5475   \csname ifchronos@#1@isod\endcsname
5476   \expandafter\def\csname chronos@#1@angor\endcsname {north}%
5477   \expandafter\def\csname chronos@#1@invanchor\endcsname {south}%
5478   \else
5479   \expandafter\def\csname chronos@#1@angor\endcsname {south}%
5480   \expandafter\def\csname chronos@#1@invanchor\endcsname {north}%
5481   \fi
5482 }%
5483 }%^A >>>

```

`\chronos@creu@llinell` Internal macro to put new life or period on timeline.

```

5484 \NewDocumentCommand \chronos@creu@llinell {mmmmm}{%^A <<< fill (fallai draw)} llinell
      ar y llinell amser am dymor estynedig

5485 \expandafter\let\expandafter\chronos@tempa\csname chronos@#1@tikzname\endcsname
5486 \edef\chronos@tempd{\csname chronos@#1@tikzname\endcsname-inv}%
5487 \expandafter\let\expandafter\chronos@tempb\csname chronos@#1@border\endcsname
5488 \expandafter\let\expandafter\chronos@tempc\csname chronos@#1@border@inv\endcsname
5489 \begin{scope} [/chronos/chronos@llinell@haenen]
5490   \ifchronos@yearsonline

5491     \path [/chronos/@llinell/.expand once=\csname chronos@#1@lliw\endcsname] %
5492       ({#2,0} |- \chronos@border@coord) -- +(0pt,\chronos@tempb) coordinate %
5493       (\chronos@tempa{ } #4) -| ({#3,0} |- \chronos@border@coord) coordinate %
5494       [midway] (\chronos@tempa{ } #5) -- cycle;
5495   \else
5496     \path [/chronos/@llinell/.expand once=\csname chronos@#1@lliw\endcsname] %
5497       ({#2,0} |- \chronos@border@coord) ++(0pt,\chronos@tempb) %
5498       ++(0pt,\chronos@llinell@yshift) coordinate (\chronos@tempa{ } #4) -- %
5499       ({#3,0} |- \chronos@tempa{ } #4) coordinate (\chronos@tempa{ } #5);
5500   \fi
5501   \ifchronos@eventdatessplit
5502     \ifchronos@yearsonline
5503       \path [/chronos/@llinell/.expand once=\csname chronos@#1@lliw\endcsname] %
5504         ({#2,0} |- \chronos@border@coord@inv) -- +(0pt,\chronos@tempc) %
5505         coordinate (\chronos@tempd{ } #4) -| ({#3,0} |- \chronos@border@coord@inv) %
5506         coordinate [midway] (\chronos@tempd{ } #5) %
5507         -- cycle;
5508     \else
5509       \path [/chronos/@llinell/.expand once=\csname chronos@#1@lliw\endcsname] %
5510         ({#2,0} |- \chronos@border@coord@inv) ++(0pt,\chronos@tempc) %
5511         ++(0pt,-\chronos@llinell@yshift) coordinate (\chronos@tempd{ } #4) -- %
5512         ({#3,0} |- \chronos@tempd{ } #4) coordinate [midway] %
5513         (\chronos@tempd{ } #5);
5514     \fi
5515   \fi
5516 \end{scope}%
5517 }%^A >>>

```

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

```

5518 \NewDocumentCommand \chronos@creu@testun@tag{s 0 {} m +m}{%^^A <<< make text tag
5519 % #1 : seren | star
5520 % #2 : allweddu ychwanegol | additional keys
5521 % #3 : tag e.g. byw
5522 % #4 : testun | text
5523 \ifchronos@phantom
5524 \relax
5525 \else
5526 \expandafter\let\expandafter\chronos@tempa\csname chronos@#3@tikzname\endcsname
5527 \expandafter\let\expandafter\chronos@tempb\csname chronos@#3@at\endcsname
5528 \IfBooleanTF{#1}{%
5529 \edef\chronos@tempa{\csname chronos@#3@tikzname\endcsname-inv}%
5530 \expandafter\let\expandafter\chronos@tempc\csname chronos@#3@invanchor\endcsname
5531 \pgfkeys{/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>0pt
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 }{%
5542 \expandafter\let\expandafter\chronos@tempc\csname chronos@#3@angor\endcsname
5543 \pgfkeys{/chronos}{%
5544 chronos@tempa@style/.style={#2},
5545 chronos@tempb@style/.style={#2}}%
5546 \coordinate (chronos@temp@coord) at (\chronos@tempb);
5547 }%

```

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@#3@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) {#4};}%
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@#3@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@#3@lliw\endcsname,%
5570 /chronos/@cysylltwr@testun@prif/.expand once=\csname chronos@#3@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@#3@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@#3@lliw\endcsname
5592 ] (cysylltwr chronos \chronos@tempa) \chronos@tempe
5593 (cysylltwr testun \chronos@tempa) ;%
5594 }%% oedd .\chronos@tempc
5595 }{}% \ifchronos@#3@cysylltiad
5596 \fi % \ifchronos@tag@cysylltu
5597 \fi
5598 }%^A >>>
```

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

```
\chronoslife
\chronosperiod 5599 \AtEndPreamble{%
\chronosinfo 5600 \ifpackageloaded{memoize}{%
\chronostheory 5601 \mmzset{%
\chronostheorycircle 5602 auto={chronos}{memoize},
5603 }%
\chronosmaintitle 5604 }{% nid yw hyn yn memoizable byth bynnag
\chronoscopyright 5605 \pgfkeys{/handlers/.meaning to context/.code={}}%
\chronosshowpreset 5606 }%
\chronosshowcolour 5607 \ifchronos@byw@isod
\chronosshowcolor 5608 \chronos@byw@isod@rhagtrue
\chronosshowfeatures 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 \chronosshowcolour{\let\chronosshowcolour\chronos@dangos@lliw}%
5633 \IfExistF \chronosshowcolor{\let\chronosshowcolor\chronos@dangos@lliw}%

```

`\chronosshowfeatures` Debugging.

```

5634 \ProvideDocumentCommand \chronosshowfeatures { o }{%
5635 \IfValueTF {#1} {%
5636 \chronos@dangos@nodweddion{#1}
5637 }{%
5638 \chronos@dangos@nodweddion@rhag
5639 }%
5640 }%

```

Required colours for `\chronosshowfeatures`.

```

5641 \providecolor{chronos show coordinate colour}{named}{chronos@lliw@coord}%
5642 \providecolor{chronos show node colour}{named}{chronos@lliw@node}%
5643 \providecolor{chronos show coordinate color}{named}{chronos@lliw@coord}%
5644 \providecolor{chronos show node color}{named}{chronos@lliw@node}%

```

`\ceyearlabel` Globalised defaults.

```

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

5656 \chronos@presetfalse

```

17 *chronos-lib-styles*

Styles.

```

5657 \RequirePackage{chronos}
5658 \ProvidesPackageSVN[\MyFileName-lib-styles.sty]{$Id: chronos-code.dtx 10925 2025-03-07
5659 15:07:59Z cfrees $}[v0.9.1 \revinfo]
5659 \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 5660 modern/.style={% <<<
rainbow serif 5661 /chronos/.cd,
sober judge 5662 modern/.meaning to context,
5663 colour scheme=modern,
5664 no colour rotation,
5665 timeline={%
5666 dates=1500:1900,
5667 timeline years=on line,
5668 timeline line={chronos timeline background colour, opacity=1},
5669 timeline height'=5mm,
5670 timeline marks,
5671 timeline border height'=5pt,
5672 major step font=\sffamily\bfseries\small,
5673 minor step font=\sffamily\bfseries\footnotesize,
5674 eras font=\sffamily\bfseries,
5675 timeline mark={line width=.4pt, shorten <=-2pt, shorten >=0pt},
5676 timeline minor mark={line width=.2pt, shorten <=-2pt, shorten >=0pt},
5677 },
5678 every chronos connectors'=coordinate,
5679 every text tag connectors+={circle, anchor=center, draw=none,%
5680 fill=none, minimum size=\pgflinewidth},
5681 connections={draw=##1, {Triangle[width=0pt 3,reversed,length=0pt 1.5]}-%
5682 {Triangle[width=0pt 5,reversed,length=0pt 2.5]}}},
5683 period/line={fill=chronos timeline foreground colour, blend mode=overlay},
5684 life/line={fill=chronos timeline foreground colour, blend mode=overlay},
5685 event/line={draw=chronos timeline foreground colour, thick, blend mode=overlay},
5686 every text tags={fill=chronos main background colour, text=####1,%
5687 fill opacity=.75, text opacity=1, draw=none, rounded corners,%
5688 align=center, font=\sffamily\footnotesize},
5689 only years,
5690 without eras,
5691 connections on=background,
5692 subheadings style={align=center, anchor=base, inner sep=0pt, outer sep=0pt,%
5693 text=chronos main colour!75!chronos main background colour, opacity=.8,%
5694 font=\sffamily\footnotesize},
5695 headings style={align=center, anchor=base, inner sep=0pt, outer sep=0pt,%
5696 text=chronos main colour!75!chronos main background colour, opacity=.8,%
5697 font=\sffamily\bfseries\small},
5698 main/frame={inner sep=5pt, ultra thick, draw=chronos main colour,%
5699 fill=none,},% oedd chronos@prifliw@cefindir
5700 main/title={/chronos/main/@frame, font=\sffamily\huge\bfseries, %
5701 text=chronos main colour, anchor=center, align=center,%
5702 draw=chronos main colour,ultra thick,drop shadow,%
5703 fill=chronos main background colour,fill opacity=1},
5704 headings drops'=10pt:10pt:7.5pt,
5705 bce year label=BCE,
5706 ce year label=CE,
5707 levels=3:3,
5708 },% >>>
5709 lavender menace/.style={% <<<
5710 /chronos/.cd,
5711 lavender menace/.meaning to context,
5712 modern,
5713 colour scheme=lavender,
5714 rotate all colours,
5715 every text tags+={draw=####1,sharp corners,text opacity=1,%
5716 fill opacity=1,draw opacity=1,drop shadow},
5717 period/line+={top color=chronosSilver,%

```

```

5718     bottom color=chronos timeline border outer colour,fill opacity=1},
5719     life/line+={top color=chronosSilver,%
5720     bottom color=chronos timeline border outer colour,fill opacity=1},
5721     main/title+={text=chronos main colour!75!chronosDarkGray},
5722 },% >>>
5723 serif on line/.style={% <<<
5724     /chronos/.cd,
5725     serif on line/.meaning to context,
5726     no colour rotation,
5727     colour scheme=default,
5728     text tag connectors'={fill=##1, opacity=1, circle, minimum size=2.5pt,%
5729     anchor=center, inner sep=0pt, outer sep=0pt},
5730     chronos connectors'={fill=##1, opacity=.75, circle, minimum size=2.5pt,%
5731     anchor=center, inner sep=0pt, outer sep=0pt},
5732     timeline ce label={CE},
5733     timeline bce label={BCE},
5734     special date=none,
5735     timeline={%
5736     start date={1800-01-01},
5737     end date={1900-01-01},
5738     timeline years=on line,
5739     timeline marks,
5740     timeline year={text=chronos timeline foreground colour, align=center},
5741     timeline mark={draw=chronos timeline foreground colour, thick, shorten >=2.5pt},
5742     timeline minor mark={draw=chronos timeline foreground colour,%
5743     thick, shorten >=3.5pt},
5744     timeline bare mark={draw=chronos timeline foreground colour,%
5745     semithick, shorten >=2pt, shorten <=2pt},
5746     minor years,
5747     step divisions=2,
5748     timeline line={chronos timeline background colour},
5749     major step font=\normalfont\bfseries,
5750     minor step font=\normalfont\bfseries\small,
5751     eras font=\normalfont\bfseries,
5752     },
5753     headings style={text=chronos main colour!75!chronos main background colour,%
5754     font=\footnotesize\uishape},
5755     subheadings style={font=\scriptsize\uishape,%
5756     text=chronos main colour!75!chronos main background colour},
5757     event/text tag+={font=\small\scshape},
5758     period/text tag+={font=\small\scshape},
5759     life/text tag+={font=\small\scshape},
5760     period/line+={fill=##1, fill opacity=.25},
5761     life/line+={fill=##1, fill opacity=.25},
5762     every text tags+={text=####1!75!black},%^A add global default o/w ignored (ond nid
    eisiau inner sep=0pt)
5763     levels=3:3,
5764     main/title={font=\Large\bfseries,text=chronos main colour,draw=none},
5765     frame,
5766     main/frame={draw=chronos timeline background colour, ultra thick},
5767 },% >>>
5768 rainbow serif/.style={% <<<
5769     /utils/exec={\selectcolormodel{rgb}},
5770     /chronos/.cd,
5771     rainbow serif/.meaning to context,
5772     serif on line,
5773     colour scheme=xcolseries,
5774     rotate all colours,
5775     timeline={%
5776     dates=1500:2100,
5777     timeline mark eras,

```



```

5778     timeline bare marks=false,
5779     },
5780     only years,
5781     without eras,
5782 },% >>>
5783 sober judge/.style={% <<<
5784     /chronos/.cd,
5785     sober judge/.meaning to context,
5786     colour scheme=sobriety,
5787     timeline={%
5788         start date=1001-10-01,
5789         end date=1003-06-14,
5790         step years=1,
5791         step divisions=6,
5792         timeline minor marks,
5793         timeline bare marks,
5794     },
5795     ce year label=CE,
5796     levels=3:3,
5797     no colour rotation,
5798     every connections'={draw=###1,%
5799         -{Triangle[width=1.5pt, reversed, length=.75pt, fill=###1]}},
5800     every text tags'={fill opacity=.75,%
5801         fill=###1!25, draw=###1, rounded corners,%
5802         font=\footnotesize\sffamily, text=chronos timeline foreground colour},
5803     main/title={font=\sffamily\bfseries\LARGE, text=chronos main colour},
5804     main/frame={draw=chronos main colour, line width=1pt, rounded corners},
5805     headings style={font=\rmfamily\small\itshape,%
5806         text=chronos main colour!75!chronos main background colour},
5807     subheadings style={/chronos/@amseraumawr,font=\scriptsize\rmfamily\itshape},
5808     every lines+={fill=none,draw=none},
5809 },% >>>

```

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
5810 somewhat plain/.style={%^^A <<<
5811     /chronos/.cd,
5812     somewhat plain/.meaning to context,
5813     no colour rotation,
5814     colour scheme=default,
5815     timeline={%
5816         major step font=\normalfont\sffamily\small\bfseries,
5817         minor step font=\normalfont\sffamily\footnotesize,
5818         eras font=\normalfont\normalsize\sffamily,
5819         timeline width'=100mm,
5820         timeline years=above,
5821         timeline ce label={CE},
5822         timeline bce label={BCE},
5823         timeline margin'=12.5pt,
5824         minor years=false,
5825         start=-500,
5826         end=2050,
5827         timeline year={inner xsep=0pt},
5828     },
5829     special date=none,
5830     ce year label={CE},
5831     bce year label={BCE},

```

```

5832 text tag yshift'=-10pt,
5833 every text tags+={fill=chronos main background colour,fill opacity=.25,%
5834 text opacity=1,font=\sffamily\small},
5835 every connections+={draw=###1,%
5836 {Triangle[width=Opt 3,reversed,length=Opt 1.5]}-%
5837 {Triangle[width=Opt 3,reversed,length=Opt 1.5]}}},
5838 every event below,
5839 every period below,
5840 every life below,
5841 levels=0:3,
5842 frame,
5843 headings style={font=\footnotesize\sffamily,%
5844 text=chronos main colour!75!chronos main background colour},
5845 subheadings style={/chronos/@amseraumawr,font=\scriptsize\sffamily},
5846 main/frame={draw=chronos main colour!75!chronos main background colour,semithick},
5847 main/title={/chronos/main/title lines={%
5848 draw=chronos main colour!50!chronos main background colour,%
5849 thick},%
5850 text=chronos main colour!75!chronos main background colour,%
5851 font=\Large\sffamily,},
5852 headings drops'=12pt:10pt:7.5pt,
5853 headings border'=30pt,
5854 },%^A >>>
5855 contemporary 90/.style={%^A <<<
5856 /chronos/.cd,
5857 contemporary 90/.meaning to context,
5858 colour scheme=contninety,
5859 every text tags+={text=###1,font=\sffamily},
5860 every lines+={line width=1pt},
5861 no colour rotation,
5862 timeline={%
5863 start date=2002-01-01,
5864 end date=2016-12-31,
5865 timeline arrow,
5866 conditional timeline arrow={%
5867 timeline/timeline width-=3pt+4.5\timelineht,
5868 timeline/timeline line+={shorten >={-3pt-4.5\timelineht}, -Stealth},
5869 before headings+={%
5870 \path (chronos post) -- +(3pt+4.5\timelineht,0pt);
5871 },
5872 }{)},
5873 timeline marks,
5874 timeline minor marks,
5875 timeline mark={ultra thick},
5876 timeline minor mark={thick},
5877 step divisions=4,
5878 step major years=2,
5879 timeline year={fill=none},
5880 timeline margin'=5mm,
5881 timeline width'=90mm,
5882 timeline year={rotate=90},
5883 major step font=\sffamily\upshape\tlstyle\bfseries,
5884 minor step font=\sffamily\upshape\tlstyle,
5885 eras font=\sffamily\upshape\tlstyle\bfseries,
5886 timeline years=above,
5887 timeline years anchor=west,
5888 },
5889 without eras,
5890 every event below,
5891 every life below,
5892 every period below,

```

```

5893     levels=0:3,
5894     frame,
5895     headings style={font=\small\sffamily\plstyle,%
5896       text=chronos main colour!80!chronos main background colour},
5897     subheadings style={font=\footnotesize\sffamily\plstyle,%
5898       text=chronos main colour!60!chronos main background colour},
5899     main/frame={%
5900       double=chronos timeline foreground colour!25!chronos timeline background colour,%
5901       draw=chronos timeline foreground colour!75!chronos timeline background colour,%
5902       thin},
5903     main/title={font=\sffamily\upshape\plstyle\bfseries\huge,text=chronos main colour},
5904   },%^A >>>
5905 blues below/.style={%^A <<<
5906   /utils/exec={\selectcolormodel{rgb}},
5907   /chronos/.cd,
5908   blues below/.meaning to context,
5909   colour scheme=blues,
5910   rotate all colours,
5911   timeline={%
5912     timeline years=above,
5913     timeline marks,
5914     timeline minor marks,
5915     step minor year=50,
5916     step divisions=10,
5917     step major year=100,
5918     dates=1550:2050,
5919     timeline height'=3pt,
5920     timeline line={chronos timeline foreground colour,%
5921       double=chronos timeline background colour,%
5922       line width=\timelineht/3,double distance=\timelineht/3},
5923     timeline arrow,
5924     conditional timeline arrow={%
5925       timeline/timeline line+={Bar-Latex,shorten <=-\timelineht/3,%
5926         shorten >=-3pt-2.1\timelineht},
5927       timeline/timeline width-={3pt+2.43\timelineht},
5928       before headings+={\path (chronos post) -- ++(3pt+2.1\timelineht,0pt) %
5929         coordinate (chronos arrow tip) (chronos pre) -- %
5930         ++(-\timelineht/3,0pt) coordinate (chronos arrow tail);},
5931     },
5932     timeline mark={chronos timeline foreground colour,line width=.6pt,shorten >=-4pt},
5933     timeline minor mark={chronos timeline foreground colour,%
5934       line width=.5pt,shorten >=-3.5pt},
5935     timeline bare mark={%
5936       chronos timeline foreground colour,line width=.3pt,shorten >=-2.5pt},
5937     timeline year={fill=none,text=chronos timeline foreground colour,%
5938       rotate around={45:(chronos year \chronosyeari |- chronos top)}},
5939     major step font=\sffamily\footnotesize\tlstyle,
5940     timeline years anchor=south west,
5941     minor step font=\sffamily\scriptsize\tlstyle,
5942     timeline margin'=17.5pt,
5943   },
5944   minor year format={!Y},
5945   every event below,
5946   every life below,
5947   every period below,
5948   levels=0:3,
5949   headings style+={%
5950     text=chronos main colour!75!chronos main background colour,%
5951     font=\small\itshape\bfseries,%
5952   },
5953   subheadings style+={%

```

```

5954     text=chronos main colour!75!chronos main background colour,%
5955     font=\footnotesize\itshape,%
5956   },
5957   main/title+={%
5958     font=\LARGE,text=chronos timeline foreground colour,%
5959     draw=chronos timeline background colour,semithick,%
5960   },
5961   main/frame+={%
5962     thick,draw,chronos timeline foreground colour,%
5963     double=chronos timeline background colour,%
5964   },
5965   copyright={font=\footnotesize\sffamily, inner sep=0pt, outer sep=0pt,%
5966     text=chronos timeline foreground colour!50!chronos main background colour},
5967   copyright/rotate=90,
5968   copyright/tag anchor=north west,
5969 },%^A >>>
5970 timeline year rotate/.code={%
5971 },
5972 flipping blues/.style={%^A <<<
5973   /chronos/.cd,
5974   flipping blues/.meaning to context,
5975   blues below,
5976   timeline={%
5977     timeline years=below,
5978     timeline year={%
5979       fill=none,rotate around={-90:(chronos year \chronosyeari)},%
5980       text=chronos timeline foreground colour,%
5981     },
5982     timeline years anchor=north west,
5983   },
5984   every event above,
5985   every life above,
5986   every period above,
5987   levels=3:0,
5988 },%^A >>>
5989 rotated 45/.style={%^A <<<
5990   /chronos/.cd,
5991   rotated 45/.meaning to context,
5992   colour scheme=default,
5993   rotate all colours,
5994   timeline={%
5995     start date={{-25}-01-01},
5996     end date={20-01-01},
5997     step major years=5,
5998     timeline years=off line,
5999     timeline years=above,
6000     timeline marks,
6001     timeline font=\scriptsize,
6002     mark at era switch,
6003   },
6004   only text,
6005   year format={!Y !E},
6006   lines={draw=#1},
6007   every text tags+={rotate=-45},
6008   event/tag+={tag anchor=west},
6009   period/tag+={tag anchor=west},
6010   life/tag+={tag anchor=west},
6011   text tag yshift'=2.5pt,
6012   every event below,
6013   every period below,
6014   every life below,

```

```

6015     no connectors,
6016     no connections,
6017     lines on=foreground,
6018     frame,
6019     every text tags+={font=\sffamily},
6020     main/frame={draw=chronos main colour,rounded corners=10pt,thick},
6021     main/title={%
6022         draw=chronos main colour,rounded corners=3pt,%
6023         semithick,font=\sffamily\LARGE,%
6024     },
6025     headings style={%
6026         font=\itshape\small\bfseries,%
6027         text=chronos main colour!50!chronos main background colour,%
6028     },
6029     subheadings style={font=\itshape\small,%
6030         text=chronos timeline foreground colour!50!chronos timeline background colour},
6031 },%^A >>>
6032 off line colour/.style={%^A <<< ateb: https://tex.stackexchange.com/a/324106/
6033 /chronos/.cd,
6034 off line colour/.meaning to context,
6035 colour scheme=offlinebasic,
6036 rotate all colours,
6037 timeline={%
6038     timeline width'=120mm,
6039     timeline height'=3pt,
6040     start date={-3000}-01-01,
6041     end date={-2000}-01-01,
6042     timeline font=\sffamily\tiny,
6043     timeline year={text=chronos main colour},
6044     timeline arrow,
6045     conditional timeline arrow={%
6046         timeline/timeline width-=#1,
6047         timeline/timeline line+={%
6048             shorten >={-#1}, -{Triangle Cap[length=#1]},
6049         },
6050         before headings+={%
6051             \path (chronos post) -- +(#1,0pt);
6052         },
6053     }{},
6054     timeline border height'=0pt,
6055     step major years=100,
6056     step minor years=0,
6057     step divisions=0,
6058     timeline years=below,
6059     timeline marks,
6060     timeline minor marks=false,
6061     minor years=false,
6062     timeline bare marks=false,
6063 },
6064     every text tags+={%
6065         text=####1!75!black,font=\sffamily\scriptsize,%
6066         fill=chronos main background colour,fill opacity=.75,%
6067     },
6068     every connections+={%
6069         draw=####1,%
6070         {Triangle[width=0pt 3,reversed,length=0pt 1.5]}-%
6071         {Triangle[width=0pt 3,reversed,length=0pt 1.5]},%
6072     },
6073     event/line'={},
6074     year format={!q!Y},
6075     event/date format={!q!Y},

```

```

6076     main/title={font=\sffamily\Large,text=chronos timeline foreground colour},
6077     chronos tikz+={%
6078         \ifchronos@timeline@showyears
6079         \scoped[on chronos middle ground layer]{%
6080             \fill [chronos main background colour, fill opacity=.75]
6081                 (chronos pre) -| (chronos post |- chronos phantom year.south) -| cycle ;
6082         }
6083     \fi
6084 },
6085 },%^A >>>
6086 off line colour/.default=20mm,
6087 off line color/.forward to=/chronos/off line colour,
6088 off line colour alt/.style={%^A <<<
6089     /chronos/.cd,
6090     off line colour alt/.meaning to context,
6091     off line colour=#1,

use cronoleg colours

6092     colour scheme=offlinealt,
6093     rotate all colours,
6094     event/colours below from clist={lliwiiau_byw_isod},
6095     event/colours above from clist={lliwiiau_byw_uchod},
6096 },%^A >>>
6097 off line colour alt/.default=20mm,
6098 off line color alt/.forward to=/chronos/off line colour alt,
6099 off line simple/.style={%^A <<< https://tex.stackexchange.com/a/324106/
6100     /chronos/.cd,
6101     off line simple/.meaning to context,
6102     off line colour=#1,
6103     rotate no colours,
6104 },%^A >>>
6105 off line simple/.default=20mm,
6106 simple arrow/.style={%^A <<< https://tex.stackexchange.com/a/342699/
6107     /chronos/.cd,
6108     simple arrow/.meaning to context,
6109     timeline={%
6110         start date={1-01-01},
6111         end date={2000-01-01},
6112         step major years=250,
6113         timeline height'=2.5mm,
6114         timeline years=off line,
6115         timeline width'=200mm,
6116         timeline arrow,
6117         conditional timeline arrow={%
6118             timeline/timeline width-=#1,
6119             timeline/timeline line+={shorten >={-#1}, -{Triangle Cap[length=#1]}},
6120             before headings+={%
6121                 \path (chronos post) -- +(#1,0pt);
6122             },
6123         }{)},
6124     mark at era switch=false,
6125 },
6126 date format={!d/!m/!Y},
6127 every event below,
6128 every period below,
6129 every life below,
6130 no colour rotation,
6131 headings style={font=\footnotesize\itshape},
6132 subheadings style={font=\scriptsize\itshape},
6133 },%^A >>>
6134 simple arrow/.default=10mm,

```

```

6135 event splitter/.style={%^^A <<< https://tex.stackexchange.com/a/325890/
6136 /chronos/.cd,
6137 event splitter/.meaning to context,
6138 no colour rotation,
6139 timeline={%
6140   start date=2014-01-13,
6141   end date=2014-02-22,
6142   timeline width'=150mm,
6143   timeline margin'=0pt,
6144   timeline era margin'=0pt,
6145   timeline years=none,
6146   timeline years=off line,
6147 },
6148 event/date format={!b !d \thinspace !Y},
6149 event dates split,
6150 text tag yshift'=3pt,
6151 event text tag={font=\sffamily\small},
6152 no connectors,
6153 every event below,
6154 main/title={font=\sffamily\Large},
6155 frame,
6156 main/frame={draw},
6157 },%^^A >>>

```

17.0.3 No-year

Years are not marked.

date centric
lines on line
plain arrow

```

6158 date centric/.style={%^^A <<<
6159 /chronos/.cd,
6160 date centric/.meaning to context,
6161 timeline={%
6162   timeline width'=150mm,
6163   timeline height'=5mm,
6164   start date=1935-01-01,
6165   end date=2010-12-31,
6166   timeline font=\sffamily\small,
6167   timeline border height'=5pt,
6168 },
6169 event/text tag+={font=\sffamily\scriptsize, fill=none},
6170 no colour rotation,
6171 event/default colour=chronos main colour,
6172 event years on line,
6173 main/title+={%
6174   font=\sffamily\LARGE,text=chronos main colour,%
6175 /chronos/main/title lines={%
6176   draw=chronos timeline background colour,line width=1.5pt,%
6177   }%
6178 },
6179 },%^^A >>>
6180 lines on line/.style={%^^A <<< https://tex.stackexchange.com/a/324453/
6181 /chronos/.cd,
6182 lines on line/.meaning to context,
6183 rotate all colours,
6184 timeline={%
6185   timeline width'=120mm,
6186   timeline height'=#1,
6187   start date=01-01-01,
6188   end date=2016-12-31,

```

```

6189     timeline years=none,
6190     timeline years=above,
6191     timeline arrow,
6192     conditional timeline arrow={%
6193     timeline/timeline width'-=20mm,
6194     timeline/timeline line+={shorten >=-20mm, --{Triangle Cap[length=20mm]}},
6195     before headings+={%
6196     \path (chronos post) -- +(20mm,0pt);
6197     },
6198     }{},
6199   },
6200   only years,
6201   period/line+={line width=#1,draw=##1},
6202   life/line+={line width=#1,draw=##1},
6203   line yshift=.5*#1,
6204   event/line+={semithick},
6205   text tag yshift=2.5pt+.5*#1,
6206   every event above,
6207   every period below,
6208   every life below,
6209   headings style={font=\footnotesize\bfseries},
6210   subheadings style={font=\footnotesize},
6211 },%^A >>>
6212 lines on line/.default=5mm,
6213 plain arrow/.style={%^A <<< https://tex.stackexchange.com/a/324453/
6214 /chronos/.cd,
6215 plain arrow/.meaning to context,
6216 lines on line=#1,
6217 line yshift'=1pt,
6218 text tag yshift'=2.5pt,
6219 period/line+={line width=2pt,draw=##1},
6220 life/line+={line width=2pt,draw=##1},
6221 },%^A >>>
6222 plain arrow/.default=5mm,
6223 }%^A % END styles >>>

```

18 *chronos-lib-colschemes*

Colour schemes.

```

6224 \RequirePackage{chronos}
6225 \ProvidesPackageSVN[\MyFileName-lib-colschemes.sty]{%$Id: chronos-code.dtx 10925 2025-03-
    15:07:59Z cfrees $}[v0.9.1 \revinfo]

    blues cylluniau lliwiau | colour schemes
contninety
offlinealt 6226 \chronosnewcolourscheme[default]{blues}{%^A <<<
xcolseries 6227 timeline foreground=chronosDodgerBlue4,
lavender    6228 timeline background=chronosDodgerBlue2,
modern      6229 default below={%
offlinebasic 6230 chronosCerulean!50!chronosDodgerBlue4,chronosCerulean!50!chronosDodgerBlue3,%
sobriety    6231 chronosCerulean!50!chronosDodgerBlue2,chronosCerulean!50!chronosDodgerBlue1,%
6232 chronosCerulean},
6233 default above={chronosCerulean!50!chronosDodgerBlue4,%
6234 chronosCerulean!50!chronosDodgerBlue3,chronosCerulean!50!chronosDodgerBlue2,%
6235 chronosCerulean!50!chronosDodgerBlue1,chronosCerulean},
6236 foreground=chronosDodgerBlue4,
6237 background=white,
6238 }%^A >>>
6239 \chronosnewcolourscheme[default]{contninety}{%^A <<<

```



```

6240 foreground=chronosdarkgray,
6241 timeline foreground=chronosdarkgray,
6242 }%^A >>>
6243 \chronosnewcolourscheme[cronoleg]{offlinealt}{%^A <<<
6244 timeline foreground=blue!40,
6245 }%^A >>>

xcolor manual: 35

6246 \definecolorseries{xcolor g2}{hsb}{grad}{hsb}{.575,1,1}{.987,-.234,0}
6247 \definecolorseries{xcolor s2}{hsb}{step}{hsb}{.575,1,1}{.11,-.05,0}
6248 \resetcolorseries{xcolor g2}
6249 \resetcolorseries{xcolor s2}
6250 \chronosnewcolourscheme[default]{xcolseries}{%^A <<<
6251 default above={%
6252     xcolor s2!![0],xcolor s2!![1],xcolor s2!![2],xcolor s2!![3],%
6253     xcolor s2!![4],xcolor s2!![5],xcolor s2!![6],xcolor s2!![7],%
6254     xcolor s2!![8],xcolor s2!![9],xcolor s2!![10],xcolor s2!![11],%
6255     xcolor s2!![12],xcolor s2!![13],xcolor s2!![14],xcolor s2!![15]},
6256 default below={%
6257     xcolor g2!![0],xcolor g2!![1],xcolor g2!![2],xcolor g2!![3],%
6258     xcolor g2!![4],xcolor g2!![5],xcolor g2!![6],xcolor g2!![7],%
6259     xcolor g2!![8],xcolor g2!![9],xcolor g2!![10],xcolor g2!![11],%
6260     xcolor g2!![12],xcolor g2!![13],xcolor g2!![14],xcolor g2!![15]},
6261 background=white,
6262 foreground=black,
6263 timeline foreground=white,
6264 timeline background=black,
6265 timeline border inner=white,
6266 timeline border outer=white,
6267 timeline border middle=black!80,
6268 life/default=chronosdarkgray,
6269 event/default=chronosdarkgray,
6270 period/default=chronosdarkgray,
6271 theory/default=chronosdarkgray,
6272 info/default=chronosdarkgray,
6273 }%^A >>>
6274 \chronosnewcolourscheme[default]{lavender}{%^A <<<
6275 timeline foreground=chronosLavenderBlush4,
6276 timeline background=chronosLavender,
6277 timeline border inner=chronosLavenderBlush3,
6278 timeline border middle=chronosLavenderBlush1,
6279 timeline border outer=chronosLavenderBlush4,
6280 foreground=chronosLavenderBlush4,
6281 background=chronosLavender,
6282 default above={%
6283     chronosLavenderBlush4!90!chronosMediumPurple!50!chronosDarkSlateGrey,%
6284     chronosLavenderBlush3!90!chronosMediumPurple!50!chronosDarkSlateGrey,%
6285     chronosLavenderBlush2!90!chronosMediumPurple!50!chronosDarkSlateGrey},
6286 default below={%
6287     chronosLavenderBlush2!90!chronosMediumPurple!50!chronosDarkSlateGrey,%
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6289     chronosLavenderBlush4!90!chronosMediumPurple!50!chronosDarkSlateGrey},
6290 }%^A >>>
6291 \chronosnewcolourscheme[default]{modern}{%^A <<<
6292 timeline foreground=chronosSilver,
6293 }%^A >>>
6294 \chronosnewcolourscheme[default]{offlinebasic}{%^A <<<
6295 timeline foreground=blue!40,
6296 foreground=black,
6297 background=white,
6298 }%^A >>>

```

```
6299 \chronosnewcolourscheme[default]{sobriety}{%^^A <<<
6300 foreground=gray,
6301 background=white,
6302 timeline background=gray!50,
6303 timeline foreground=black,
6304 life/default=gray,
6305 event/default=gray,
6306 period/default=gray,
6307 theory/default=gray,
6308 info/default=gray,
6309 }%^^A >>>
```

Change History

v0.7?	General: First repo release. (Ish.) Earlier versions were published informally on TeX StackExchange	104	First CTAN release.	104
v0.9	General: First CTAN release.	104	v0.9.1 General: Minimal code documentation. docstrip implementation.	104

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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 code². † indicates an example of usage.

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²I 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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