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# **CurlyWhirly Documentation**

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**Information**

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For more information on CurlyWhirly, or to download the application, please visit the [CurlyWhirly web site](#).



The CurlyWhirly data format is a tab delimited text format with a header which specifies the category groups which categories are found in, as well as the axis names for the data set. The category column header should start with the prefix *categories:* and the header line for the column which contains your data point names should be *label*.

## 1.1 Optional header lines

CurlyWhirly supports a number of optional header lines which extend the functionality and interoperability of CurlyWhirly on a dataset specific basis. These header lines are prefixed by a “#” and allow the dataset to define additional URLs relating to data points which can be visited for more information about the data points, or to create groups in database systems of data points, among other things.

### 1.1.1 Database search

This is a URL which should give more information about an individual data point when visited. CurlyWhirly will look for the string `$LINE` in the URL and replace it with the data point name, when attempting to visit the URL. Users can make use of this functionality by right clicking on a data point and selecting `Database search` from the `Visit URL` menu.

```
#cwDatabaseLineSearch=http://mylookup.address/name=$LINE
```

### 1.1.2 Database group upload

CurlyWhirly supports the definition of URLs for uploading a group of points to an information system (such as [Germinate](#)) allowing users to make decisions about groupings of points within CurlyWhirly and further explore these groupings in information systems with different kinds of data about the points. When in multi-selection mode you can click the *DBLink* hyperlink, which will call out to the group upload URL of the database system specified in the input file and allow the user to check the group before making the decision to create the group in the database. At this point you can also pick a name for the group, which is returned to CurlyWhirly and then used to open the full group web page. To make use of this functionality the input file has to define two headers, the group upload URL and the

group preview URL. The group upload URL is used to send a data file with a point name on each line, from the group of points to be uploaded. The expectation is that if the upload is successful, the information system returns a group name, which can then be used as part of the group preview URL to allow users to preview the group they are about to create in the information system, before committing to creating that grouping of data points.

```
#cwDatabaseGroupUpload=http://mylookup.address/group-upload
#cwDatabaseGroupPreview=http://mylookup.address/group=$GROUP
```

### 1.1.3 Colour headers

#### Category colours

Users can optionally specify custom colours for categories in CurlyWhirly as part of the input format. These take the form of key value pairs in header lines where the key is the name of the category group separated from the category by a `.` character and the value is a textual representation of the colour to be used for that category in the form of an RGB string e.g. `rgb(0,0,0)` for the colour black, and `rgb(255,255,255)` for the colour white. You can customise the colours associated with a category from within CurlyWhirly by double clicking on the colour swatch for that category in the selection tab and selecting your preferred colour for that category. Any colour customisation can then be exported back out to share with other users as part of the `Export data` function. Assuming we have a category group called `size`, with the categories `large`, `medium`, and `small`, you may expect to see the following colour headers:

```
# color=size.large::CW::rgb(255,0,0)
# color=size.medium::CW::rgb(0,255,0)
# color=size.small::CW::rgb(0,0,255)
```

This would result in points categorised as being large would be coloured red, medium points would be green, and small points would be blue.

#### User interface colours

It is also possible to customise the colour of a number of CurlyWhirly's user interface components. These are saved out on export much like custom category colours, however users could also specify these in advance by specifying colours to go along with the following colour keys / UI components. All of these colours can be customised from CurlyWhirly's settings dialog. The colours below represent the default colours for each user interface component.

#### Background / canvas colour

```
# color=User.OpenGLPanel.background::CW::rgb(0,0,0)
```

This defines the background colour of the view in CurlyWhirly and defaults to black.

#### Close button colour

```
# color=User.OpenGLPanel.closeButtonColor::CW::rgb(64,64,64)
```

This defines the colour of the close button (the small X in the top right of the display), which can be used to close the dataset that is currently open. It defaults to a dark grey.



## Colour key text

```
# color=User.OpenGLPanel.colorKeyText::CW::rgb(255,255,255)
```

Defines the colour of the text in the colour key which can optionally be included in screenshots and movies that are exported from CurlyWhirly. This defaults to black, but users should pick a colour which stands out from the background colour.

## Axis colours

```
# color=User.OpenGLPanel.xAxisColor::CW::rgb(0,255,0)
# color=User.OpenGLPanel.yAxisColor::CW::rgb(0,255,0)
# color=User.OpenGLPanel.zAxisColor::CW::rgb(0,255,0)
# color=User.OpenGLPanel.axisLabels::CW::rgb(255,255,255)
```

Defines the colours of the axes, and of the axis labels. The axes default to being coloured green and their labels default to being white.

## Multi-selection colours

```
# color=User.OpenGLPanel.multiSelectAxesColor::CW::rgb(0,0,255)
# color=User.OpenGLPanel.multiSelectSphereColor::CW::rgb(128,128,255)
# color=User.OpenGLPanel.multiSelectColor::CW::rgb(255,255,255)
# color=User.OpenGLPanel.multiSelectLineColor::CW::rgb(255,0,0)
```

The colours of the multi-selection sphere, multi-selected points, lines connecting multi-selected points to the central point, and the mini-axes which can be shown within the multi-selection sphere.

## 1.2 Header

Input files should have a header (following on from any of the optional header lines which start with a #). The minimum requirement for a CurlyWhirly file header is the it should start with `label` and be followed by at least one (but preferably 3 or more) coordinate column.

```
label PC01 PC02 PC03
```

The real power of CurlyWhirly comes from the hierarchial filtering of data points, using a multiple categorisation scheme in which each `DataPoint` can be associated with myriad categories, from a variety of different category groups. In this case the input file needs to specify columns for each of the category groups with which data points can be categorised. Categories must be specified before the `label` column, so the same header line above, with categories for `size` and `age` should look like this:

```
categories:size categories:age label PC01 PC02 PC03
```

It is also possible to specify additional URLs to relating to data points as pseudo-categories. These must be specified after the categories columns and before the label column. Once loaded, the URLs are available to visit from the `Visit URL` sub-menu of the right-click context menu. All URLs specified this way should present a `$LINE` section of the URL which will be replaced by the individual data point name when attempting to visit the URL.

```
categories:size          categories:age  categories:cwURL:Genesys      label  PC01  ↵  
↪ PC02    PC03  
large young  https://ics.hutton.ac.uk/germinate-demo/?accessionName=$LINE#passport ↵  
↪ point1  -0.3552 -0.1541 -0.0363
```

## 1.3 Sample

A full sample of the start of a file may look something like the following:

```
#cwDatabaseLineSearch=http://mylookup.address/name=$LINE  
#cwDatabaseGroupUpload=http://mylookup.address/group-upload  
#cwcwDatabaseGroupPreview=http://mylookup.address/group=$GROUP  
categories:size          categories:age  label  PC01    PC02    PC03  
large young  point1  -0.3552 -0.1541 -0.0363  
medium old   point2  -0.344  -0.0556 -0.1038  
small young  point3  -0.3411 -0.0542 -0.066
```

## CHAPTER 2

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### Importing Data

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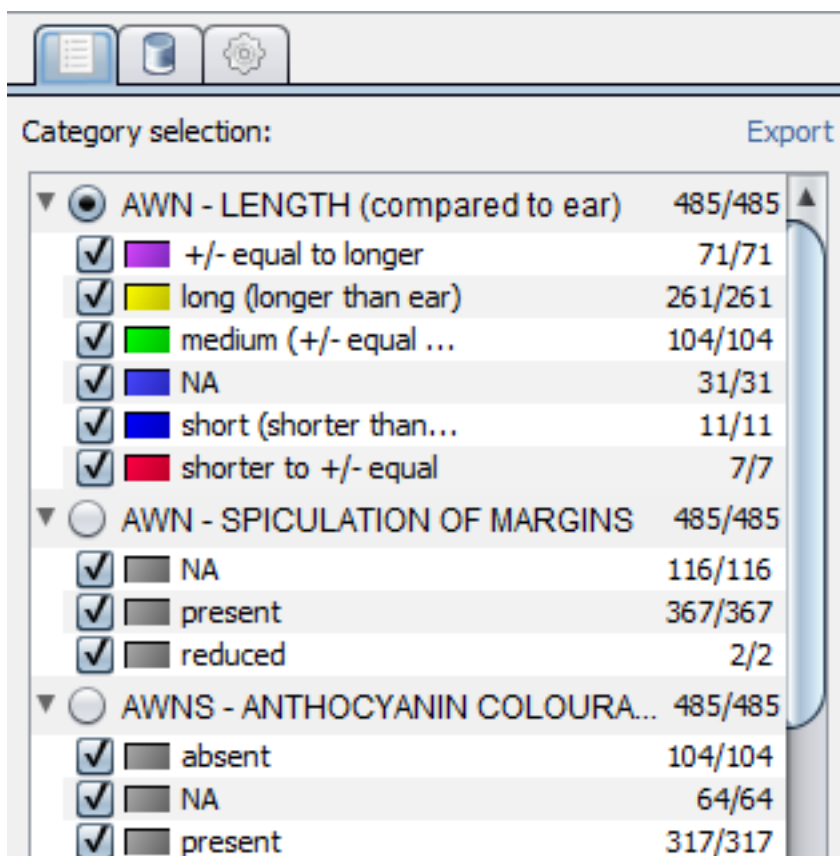
Import data into CurlyWhirly by either selecting Import a file into CurlyWhirly from CurlyWhirly's welcome screen, the Open data button from the toolbar, or by dragging and dropping a CurlyWhirly formatted data file onto the CurlyWhirly window.

CurlyWhirly will now import your data and display it on the main canvas, replacing the welcome screen. You should see a basic 3D plot of the data points in your data set, with X, Y and Z axes displayed as well. The left hand panel will now display the categories (and values associated with those categories) that were found in your data set.















## CHAPTER 3

### Category Selection



Category selection: [Export](#)

<input checked="" type="radio"/>	AWN - LENGTH (compared to ear)	485/485
<input checked="" type="checkbox"/>	 +/- equal to longer	71/71
<input checked="" type="checkbox"/>	 long (longer than ear)	261/261
<input checked="" type="checkbox"/>	 medium (+/- equal ...	104/104
<input checked="" type="checkbox"/>	 NA	31/31
<input checked="" type="checkbox"/>	 short (shorter than...	11/11
<input checked="" type="checkbox"/>	 shorter to +/- equal	7/7
<input type="radio"/>	AWN - SPICULATION OF MARGINS	485/485
<input checked="" type="checkbox"/>	 NA	116/116
<input checked="" type="checkbox"/>	 present	367/367
<input checked="" type="checkbox"/>	 reduced	2/2
<input type="radio"/>	AWNS - ANTHOCYANIN COLOURA...	485/485
<input checked="" type="checkbox"/>	 absent	104/104
<input checked="" type="checkbox"/>	 NA	64/64
<input checked="" type="checkbox"/>	 present	317/317

## 3.1 Basics

You can select categories for your data set from selection tab within CurlyWhirly. To select a category click the radio button beside that category name. You should now see that the scene is using the colours specified by the values of your selected category. You can select category values which you do not wish to be coloured by clicking the check box next to a category value. Data points which have the category value which you don't want to colour by will appear as grey spheres.

## 3.2 Hierarchical filtering

While you only select one category for colouring by, you can filter which spheres are coloured by deselecting category values in any category. For example you could colour by AWN - LENGTH and filter the selection so that only the long (longer than ear) value was selected from that category, as well as only having the present value selected from the AWN - SPICULATION OF MARGINS category. Any data points which didn't shared that combination of selected category values would appear as grey spheres. You can either progressively filter down from the full set of points by removing categories you're not interested in, or you can use the Select none button at the bottom of the selection tab and progressively add categories to the set that you're interested in seeing.

## 3.3 Category colours

You can change the colour of a category value by double clicking on the coloured rectangle which represents that value's colour. You should see a colour selection dialog from which you can select a new colour for the value. This colour is remembered for this category value within this dataset going forward. Additionally if you export this data set using the Export option from the toolbar these colours are exported along with the data.

The Data Tab allows you to view a table of the data points in the 3D plot. This table is automatically sorted so that selected points are higher up in the table. Furthermore within the selected points they are sorted by colour as well. For each datapoint its colour, name and the value for each axis are shown.

### 4.1 Right click options

**Save table data to file** Allows you to export the contents of the table to a file.

**Save table data to file (highlighted points only)** Allows you to export only the highlighted (coloured) points from the table to a file.

**Copy table data to clipboard** Allows you to take a copy of the data found in the table to the clipboard, from where you can paste it into other applications.

### 4.2 Filtering

You can also filter the table so that only points meeting a certain criteria are visible within it. You do so by selecting a variable you wish to filter on from Name, Min X, Max X, Min Y, Max Y, Min Z and Max Z from the Filter drop-down menu, then entering a value in the text box below. In the case of Name filtering this can be the full, or partial, name of the data point. In the case of Min X this would be the minimum value of each data point's X coordinate.





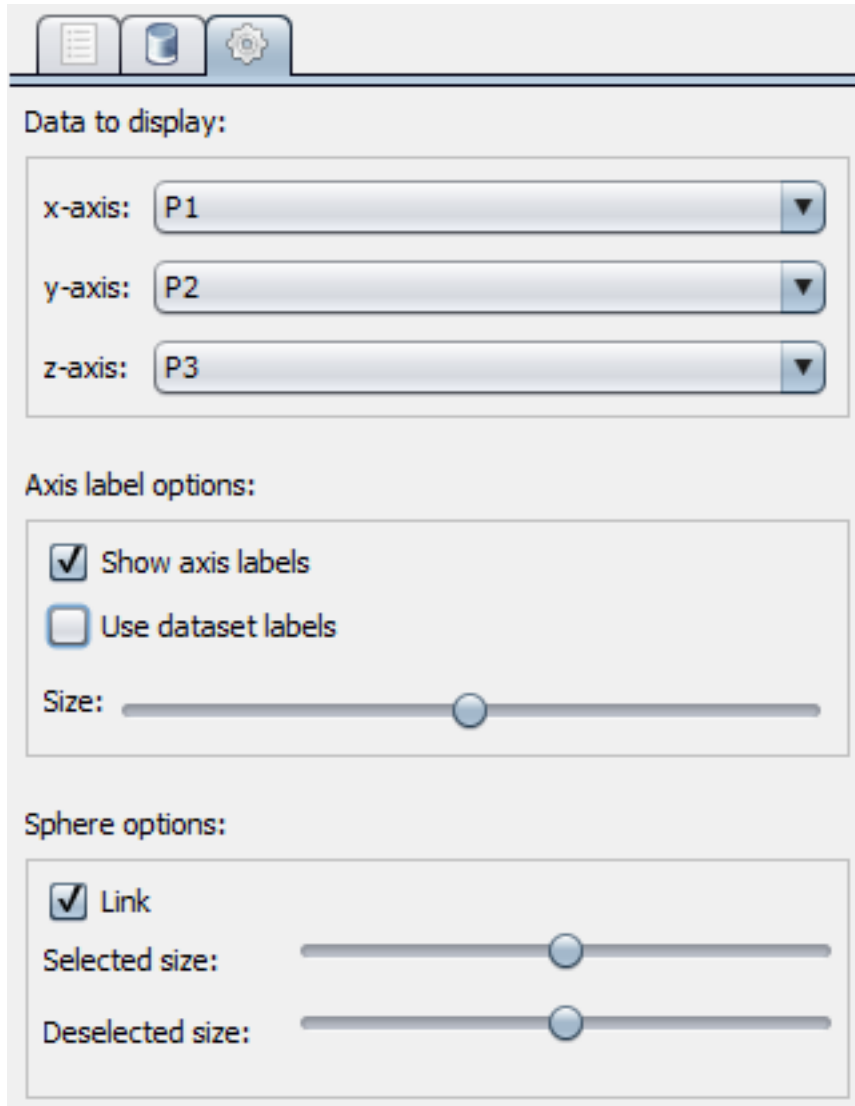
## CHAPTER 5

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### Controls Tab

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The `Controls Tab` allows you to control several aspects of the way data is displayed within CurlyWhirly.



The screenshot shows a software interface with three main control panels. At the top, there is a toolbar with three icons: a document, a cylinder, and a gear. Below the toolbar, the first panel is titled "Data to display:" and contains three vertical drop-down menus. The first menu is labeled "x-axis:" and has "P1" selected. The second menu is labeled "y-axis:" and has "P2" selected. The third menu is labeled "z-axis:" and has "P3" selected. The second panel is titled "Axis label options:" and contains two checkboxes: "Show axis labels" (checked) and "Use dataset labels" (unchecked). Below these checkboxes is a horizontal slider labeled "Size:" with a blue knob in the center. The third panel is titled "Sphere options:" and contains a checked checkbox labeled "Link". Below this are two horizontal sliders: "Selected size:" and "Deselected size:", both with blue knobs in the center.

## 5.1 Data to display

You can select the coordinate from your data set which is displayed on each axis of the display. To select which coordinate is on - for example - the x-axis simply select a coordinate from the drop-down menu and that coordinate's value for each point will be used for the x-axis in the display.

Data to display:

x-axis: P1 ▼

y-axis: P2 ▼

z-axis: P3 ▼

## 5.2 Axis label options

**Show axis labels** Ticking this makes axis labels appear at the end of the positive extent of each axis.

**Use dataset labels** Ticking this changes the axis labels so that they use the names given to the coordinate bound to each axis found in the data file, rather than X, Y and Z.

**Size** Allows you to alter the size of the axis labels.

Axis label options:

Show axis labels

Use dataset labels

Size:

## 5.3 Sphere options

**Link** When you move either the Selected size or Deselected size sliders, the other slider will move by the same amount. This keeps the size of selected and deselected points the same as each other.

**Selected size** Allows you to change the size of data points which are selected (coloured) within the display.

**Deselected size** Allows you to change the size of data points which are deselected (not coloured) within the display.

Sphere options:

Link

Selected size:

Deselected size:



### 6.1 Rotation

You can rotate the 3D plot by dragging the mouse with the left mouse button held down. CurlyWhirly interprets the movement of the mouse and translates this into an appropriate rotation of the 3D plot. In addition, you can automatically rotate the 3D plot around the current y-axis by clicking the `Spin` button on the toolbar.

### 6.2 Zooming

To zoom in to the 3D plot scroll up using the scroll wheel of your mouse, or by pressing `CTRL` and `+` together. You can zoom out of the plot by scrolling down with your mouse wheel, or by pressing `CTRL` and `-` together.

### 6.3 Mouse

If you hover the mouse over a data point, the name of that data point will appear in a tooltip. If you right click a data point a menu appears. The menu contains the following options:

**Visit URL** If the dataset you are viewing is linked to a database / website (via a database URL in the input file) clicking this option allows will take you to a page on that database / website with more information about the data point.

**Details...** Selecting the `Details...` menu option brings up a dialog which displays all of the information that CurlyWhirly has on the data point under the mouse. This includes its name, the values for each coordinate it has and its values for each category it has. The `More information...` option will take you to a database / website page for the data point you are currently viewing the details of in the same manner as the `Visit URL` menu option above.

**Multi select** Allows you to switch CurlyWhirly into multiple selection mode. In multiple selection mode a selection sphere appears around the data point under the mouse and the multiple selection panel appears at the bottom of the display. You can adjust the size of the selection sphere using the `Selection size` slider and you

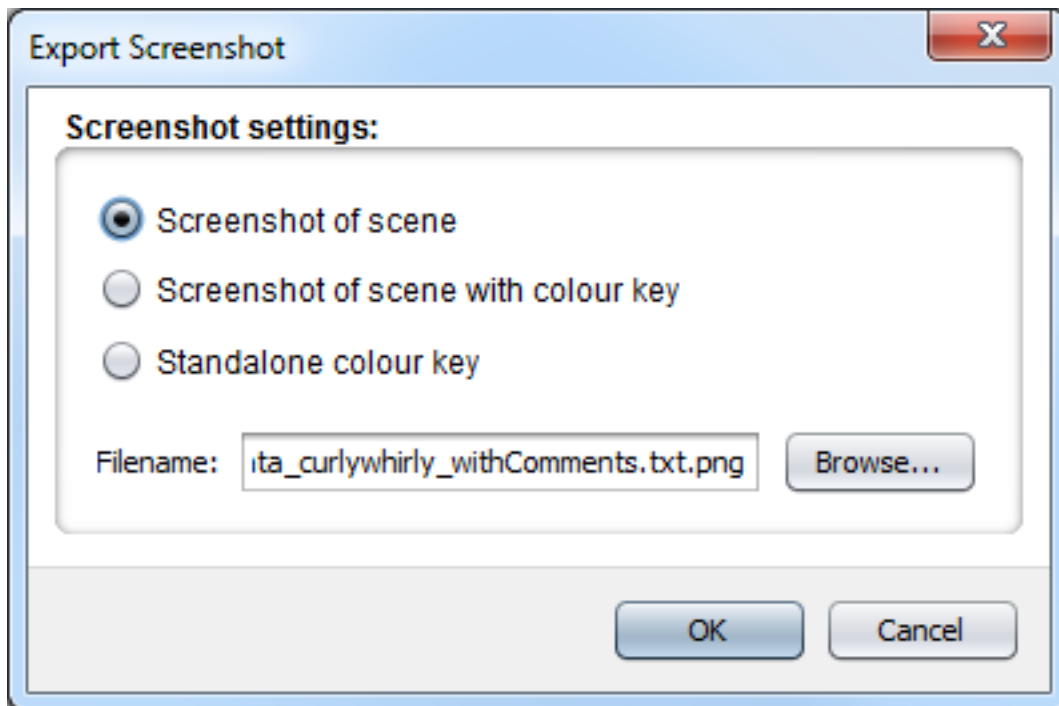
can select the action you want applied to the points within the selection sphere using the `Action` combo-box. Available actions are `Select`, `Deselect` and `Toggle`. The first two do exactly what you would expect and `Toggle` switches selected points to be deselected and deselected points to be selected. To apply the selection click `Ok`, otherwise click `Cancel` to leave the scene as it was prior to entering multiple selection mode. Finally you can choose how selection mode works by opening the `Options` dialog by clicking `Options . . .`

---

## Capture Screenshot

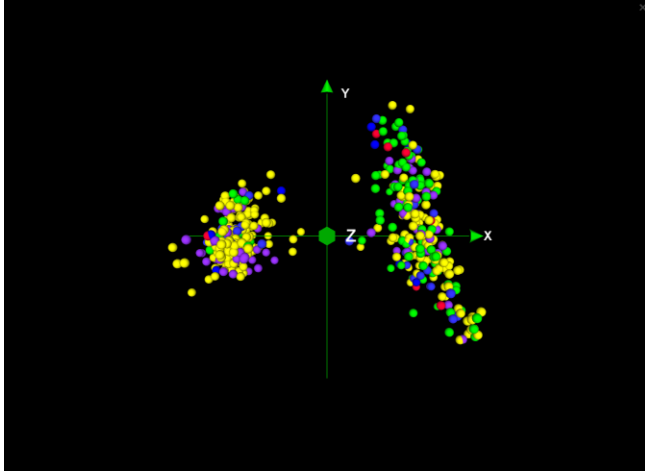
---

To take a screenshot of the scene in CurlyWhirly, click the Screenshot button which is found in the toolbar at the top of the screen. This should open the dialog seen below:

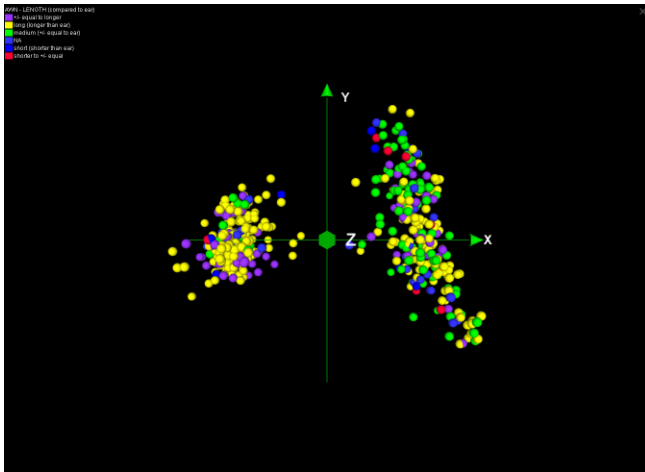


The dialog presents three different screenshot options:

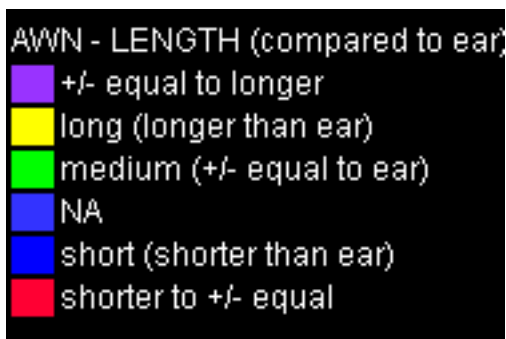
**Screenshot of the scene** Selecting this allows you to output a screenshot of the 3D plot exactly as you currently see it within CurlyWhirly.



**Screenshot of the scene with colour key** Selecting this allows you to output a screenshot of the 3D plot as above but with the addition of a colour key which is superimposed in the top left-hand corner of the screenshot. The colour key shows which Category is currently having its colours displayed, as well as specifying which colour represents which value for the category.



**Standalone colour key** Allows you to output the same colour key as above but this time on its own without the screenshot of the plot. This can be handy if your view is zoomed in particularly close to the points and in the situation above the colour key may obscure some of the points. It may also be useful for displaying alongside movies of the 3D plot.



CurlyWhirly automatically looks to save the file alongside the input file originally used to load the current data set and uses that file's name as the basis for its default name for screenshots. You can however either enter a filename directly into the text box, or browse for a new location and add a new name using the `Browse...` button. Finally to save the



screenshot to disk click OK, otherwise to cancel the operation click Cancel.

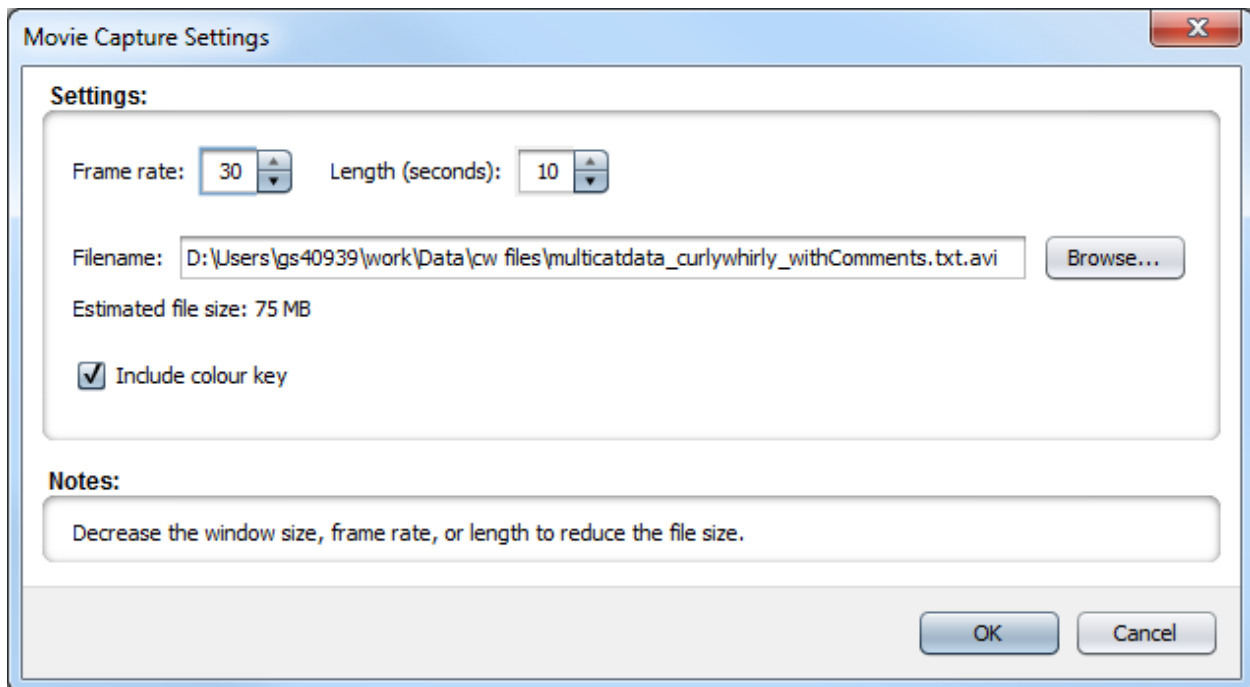


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## Capture Movie

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To take capture a movie of the 3D plot, click the Capture movie button on the toolbar at the top of CurlyWhirly's display. CurlyWhirly will fully rotate the scene once for the length of the movie specified within the dialog. This should open the dialog seen below:



### 8.1 Settings

**Frame rate** The number of frames per second the movie will run at. In general a higher number will result in a smoother movie. The maximum allowed value is 60 frames per second as there is little benefit going beyond

this number for typical PC monitors.

**Length (seconds)** The length in seconds of the movie to be captured. This is the length of time it will take CurlyWhirly to fully rotate the scene once.

**Filename** CurlyWhirly uses a default filename based on the name of the input file used to load the data set. You can use the Browse... button to specify a different location and name.

**Estimated file size** CurlyWhirly shows you an estimate of what the final file size of the movie will be once it is saved to disk. This is a function of the frame rate and the length, movies with higher frame rates that last longer will have a larger file size than those with lower frame rates which are shorter.

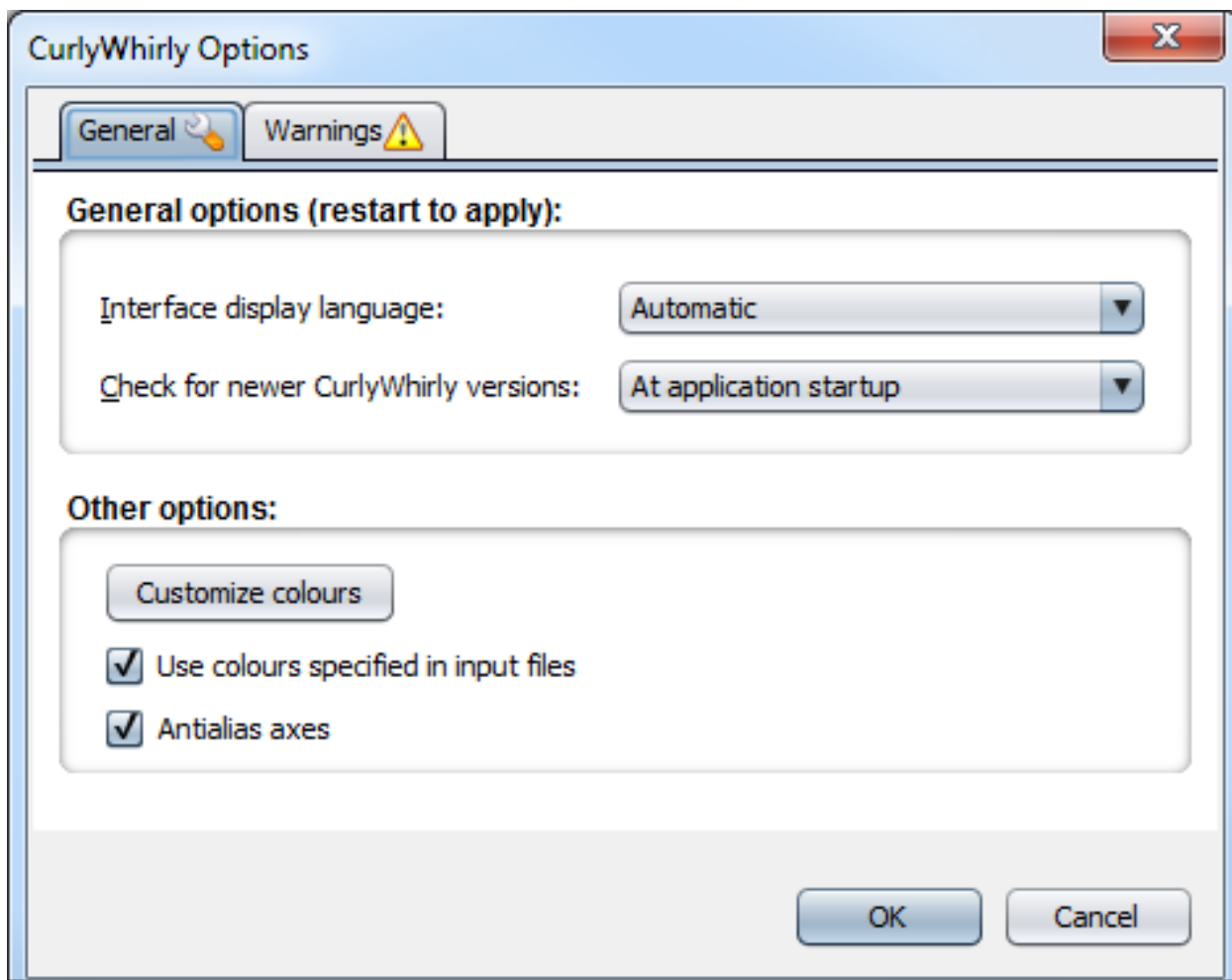
**Include colour key** You can include a colour key as part of the movie in much the same way as you can in a screenshot within CurlyWhirly. It appears superimposed on the top left-hand corner of the movie. If this will encroach on the data points in your display you can optionally output a standalone colour key from the Capture Screenshot dialog.

Either click OK to start the movie capture process, or Cancel to return to the 3D plot. If you click OK you should see a dialog indicating the progress of the movie capture process. Once the process is complete you will be offered an option to open the movie for viewing, or to return to the 3D plot.



CurlyWhirly Options

9.1 General



### 9.1.1 General options

**Interface display language** Allows you to choose the language of CurlyWhirly's user interface. Automatic uses you're operating system's language, other options allow you to pick specific languages (e.g. English (UK), English (US), German (DE) and Spanish (MX)).

**Check for newer CurlyWhirly versions** You can set when CurlyWhirly checks for updated version of itself. By default this option is set to At application startup, other values are Never, Once a day, Once a week and Once a month.

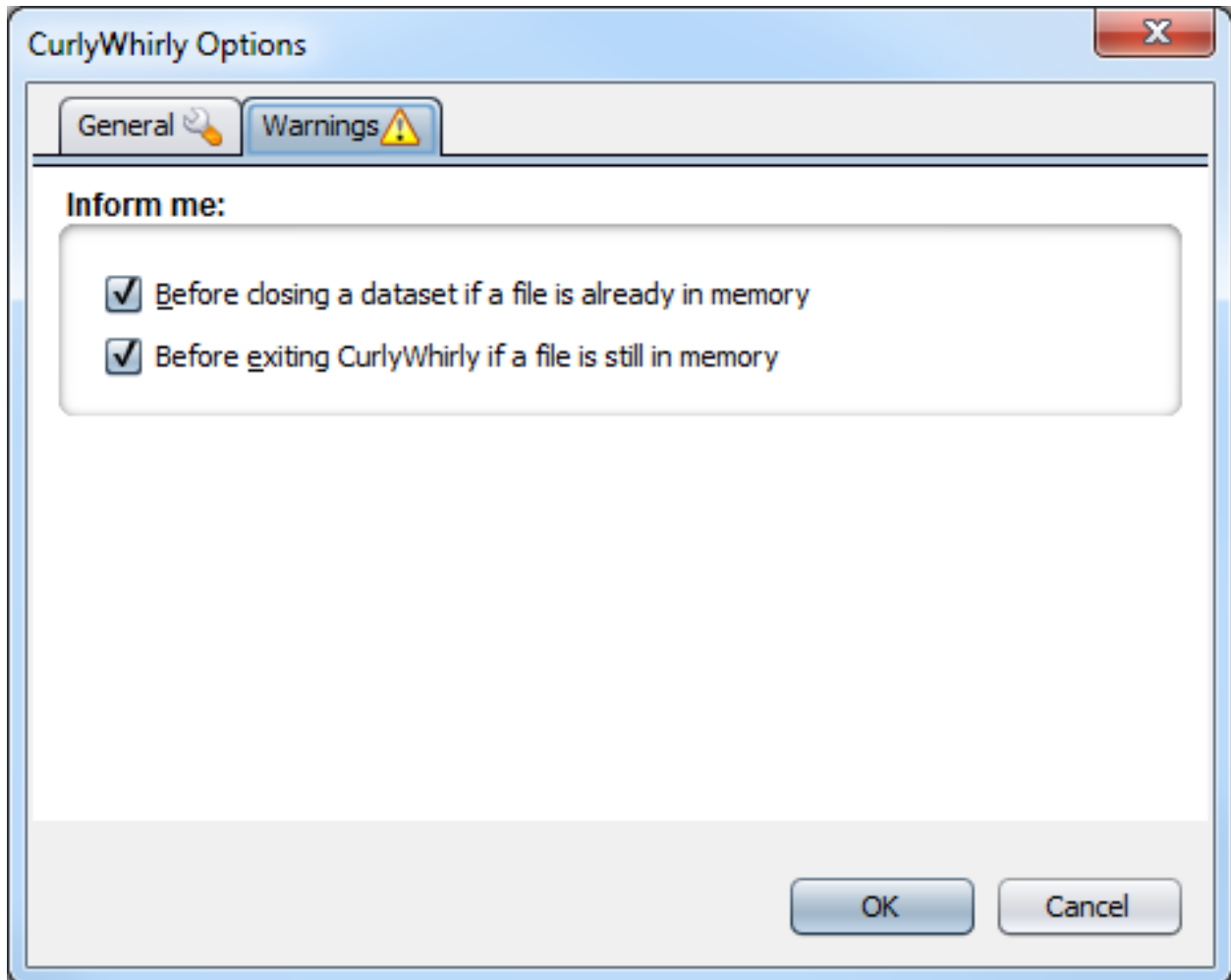
### 9.1.2 Other options

**Customize colours** Clicking this opens the Customize Colours dialog. This dialog is a listing of the default colours for each of the main components in CurlyWhirly (e.g. X-Axis). To change the colour for a component simply double click the colour, then pick a new colour from the colour picker dialog that is shown. This new colour will now be your new default for that component.

**Use colours specified in input files** When you export data from CurlyWhirly the exported data will include any colours associated with category values in that data set. Having this option ticked means any colours found in a file being imported will be used as the colours for category values in your CurlyWhirly.

**Antialias axes** Enabling this offers smoother axes at the cost of slightly reduced performance.

## 9.2 Warnings



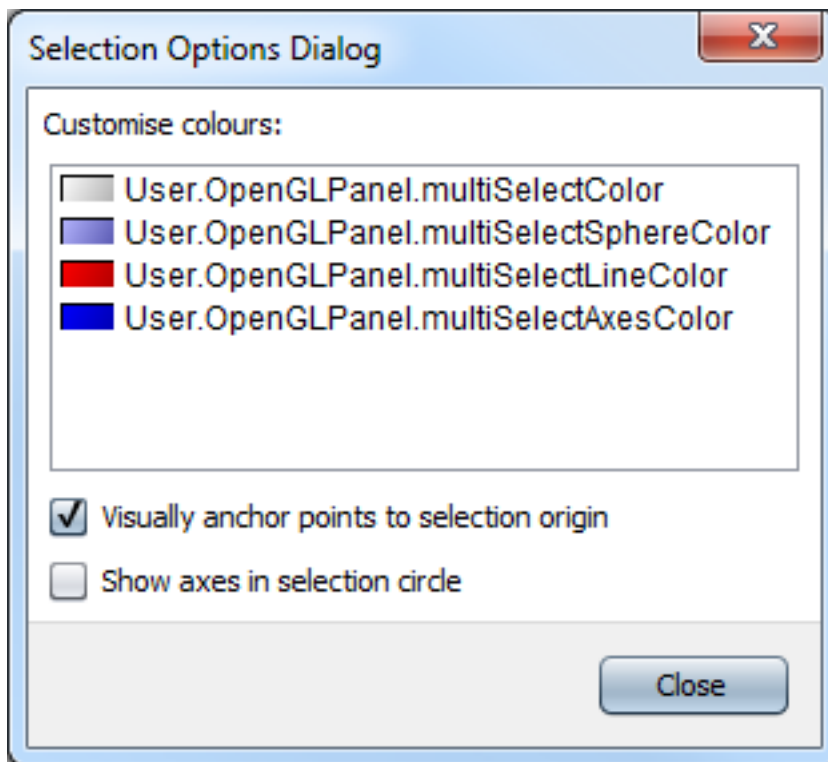
### 9.2.1 Inform me

**Before closing a dataset if a file is already in memory** With this checked CurlyWhirly will ask if you're sure you want to close the data set when you attempt to close it using the X in the top right hand corner of the 3D plot.

**Before exiting CurlyWhirly if a file is still in memory** With this checked CurlyWhirly will ask if you're sure you want to close the application while you are viewing a 3D plot.



## Selection Options Dialog



**Customise colours** You can use this to customise the colours of the various components of the multi-selection user interface. Simply double click one of the entries and select a new colour from the colour picker dialog that is displayed.

**Visually anchor points to selection origin** Having this checked draws a line from each data point that has been encompassed in the multi-select sphere back to the data point at the origin of the sphere.

**Show axes in the selection circle** Checking this option draws a miniature version of the axes within the selection sphere.