Introduction

The busgrap pre-processor is intended to add business type graphs, as opposed to statistical graphing, to groff. The first module just does pie charts, but further modules will do line and bar charts. So this manual currently only documents the way to add pie charts to your document.

Each graph is introduced by the code:-

```
.BGS
```

and the graphing parameters, explained below, are terminated with:-

```
.BGE
```

Within these two macro calls you may enter any of the graphing parameters, but you should not use a groff requests. You can use simple groff escapes if the parameter is going to be used as a label in the graph.

All the graph parameters have the form:-

```
name:value {[tab]value}
```

So parameters which accept multiple values have a single tab character between each value.

Graph Frame

Each graph needs a defined size on the page, this is the frame of the graph. The first parameter then will be:-

```
Frame:width height
```

Once you have a frame the only other required parameter is a set of series data parameters each holding a name and a value. So this is our first pie.
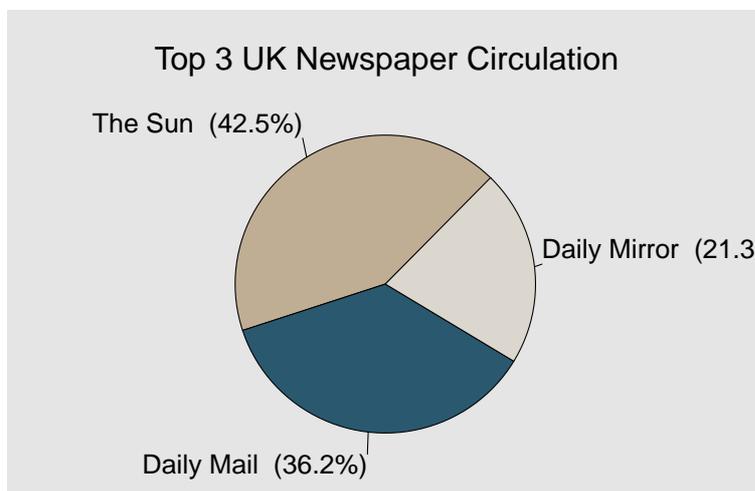
In this example we have also added a background colour to the frame and a caption, just so that it is easier to see the frame. Here's the parameters so far:-

```
.BGS
Frame:10c ^ 6.5c
Caption:\v'.4c'Top 3 UK Newspaper Circulation
BGcol:grey90
Series:The Sun   ^ 1,978,702
Series:Daily Mail  ^ 1,688,727
```

```
Series:Daily Mirror  ^ 992,235
.BGE
```

It still needs a bit of tweaking. The pie should be moved a little bit left and up within the frame. We can adjust the Origin, the middle of the pie. It defaults to the centre of the frame, but can be changed using this parameter:-
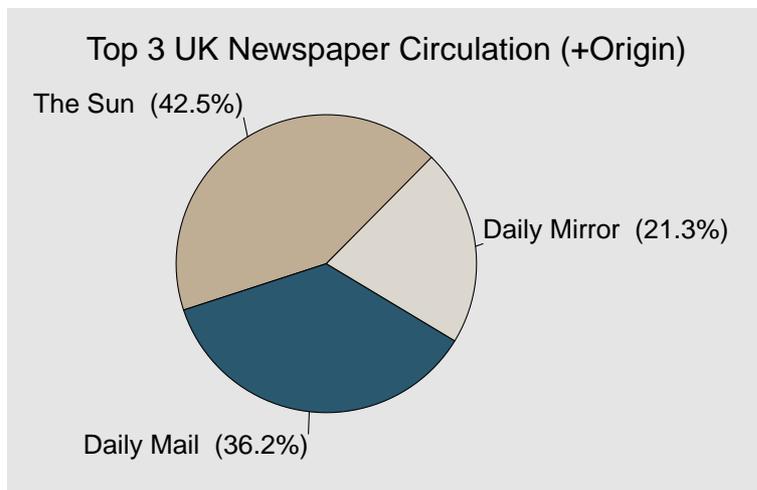
```
Origin:Xpos ^ Ypos
```

Where Xpos and Ypos are relative offsets to the top left corner of the frame. Since the frame is 10c x 6.5c this offset from the top left corner may do:-

```
Origin:4.2c ^ 3c
```

If X or Y start with a numerical sign, +-, the offset is applied to the default position, i.e. the middle of the frame for pies.

If we add this to our pie it now looks like:-

Up till now all the graphs have been left aligned, but this can be changed:-

```
Just:left|centre|right
```

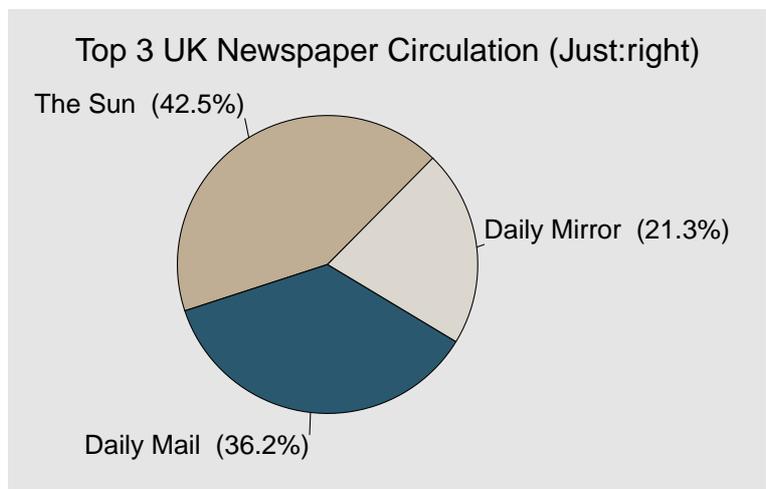if we add "Just:right" the frame will move to the right margin.

If you use left or right as the justification value there is another parameter:-

```
Flow:yes|no
```

Which will allow following text to flow beside the frame. The complete code for this pie is now:-

```
.BGS
Frame:10c ^ 6.5c
Origin:4.2c ^ 3c
Just:right
Flow:yes
Caption:\v'.3c'Top 3 UK News-
paper Circulation (Just:right)
BGcol:grey90
```
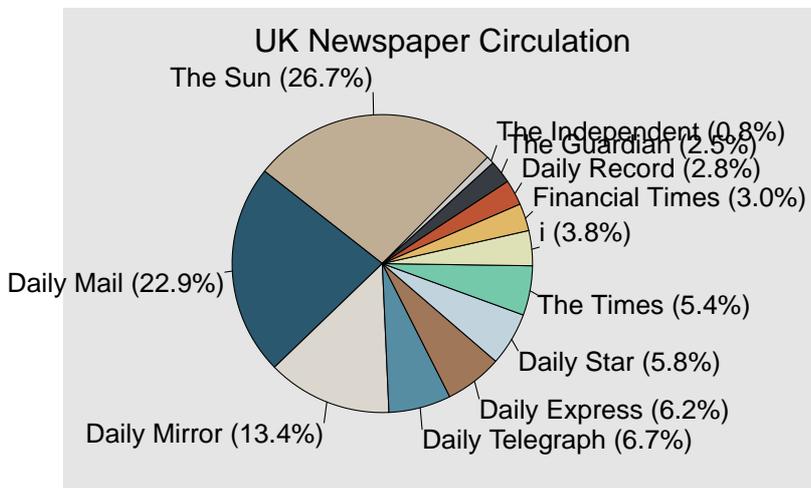
```
PDFBookMark:2
Series:The Sun   ^ 1,978,702
Series:Daily Mail  ^ 1,688,727
Series:Daily Mirror  ^ 992,235
.BGE
```

All the pies so far have shown the name of the nespaper and the percentage of the total circulation. The label use for the wedges of the pie is customisable using 3 variables: $text is replaced by the series name (in this case the newspaper), $value is the actual number passed in the Series: parameter, and $percent is the calculated percent of the total of all the values. The actual format of the label can be controlled by the Label parameter which takes as its value a string template which can include the 3 variables given above.

```
Label:$text = $value
```

Top 3 UK Newspaper Circulation (Labels)

The Sun = 1,978,702

Daily Mirror = 992,235

Daily Mail = 1,688,727
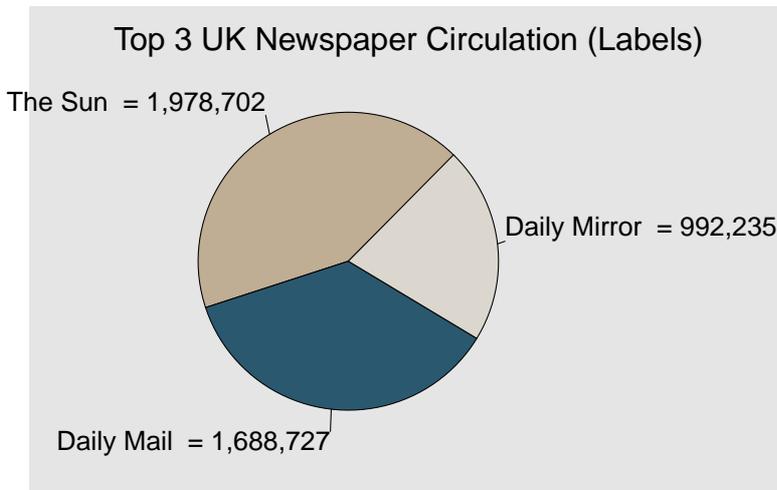
When the number of pie wedges gets larger there will be problems with the labels overwriting each other.

UK Newspaper Circulation

The Sun (26.7%)

The Independent (0.8%)
The Guardian (2.5%)
Daily Record (2.8%)
Financial Times (3.0%)
i (3.8%)

The Times (5.4%)

Daily Mail (22.9%)

Daily Star (5.8%)

Daily Express (6.2%)
Daily Telegraph (6.7%)

Daily Mirror (13.4%)

One possible solution is to adjust the size of the frame and also increase the parameters which control the size of the pie circle:-

```
XRad:size
YRad:size
```

These affect the size of the X and Y radius. If they are the same size the pie will be circular, if they differ it will be an ellipse.

UK Newspaper Circulation (Large)

The Sun (26.7%)

The Independent (0.8%)
The Guardian (2.5%)
Daily Record (2.8%)
Financial Times (3.0%)
i (3.8%)
The Times (5.4%)
Daily Star (5.8%)
Daily Express (6.2%)
Daily Telegraph (6.7%)

Daily Mail (22.9%)

Daily Mirror (13.4%)
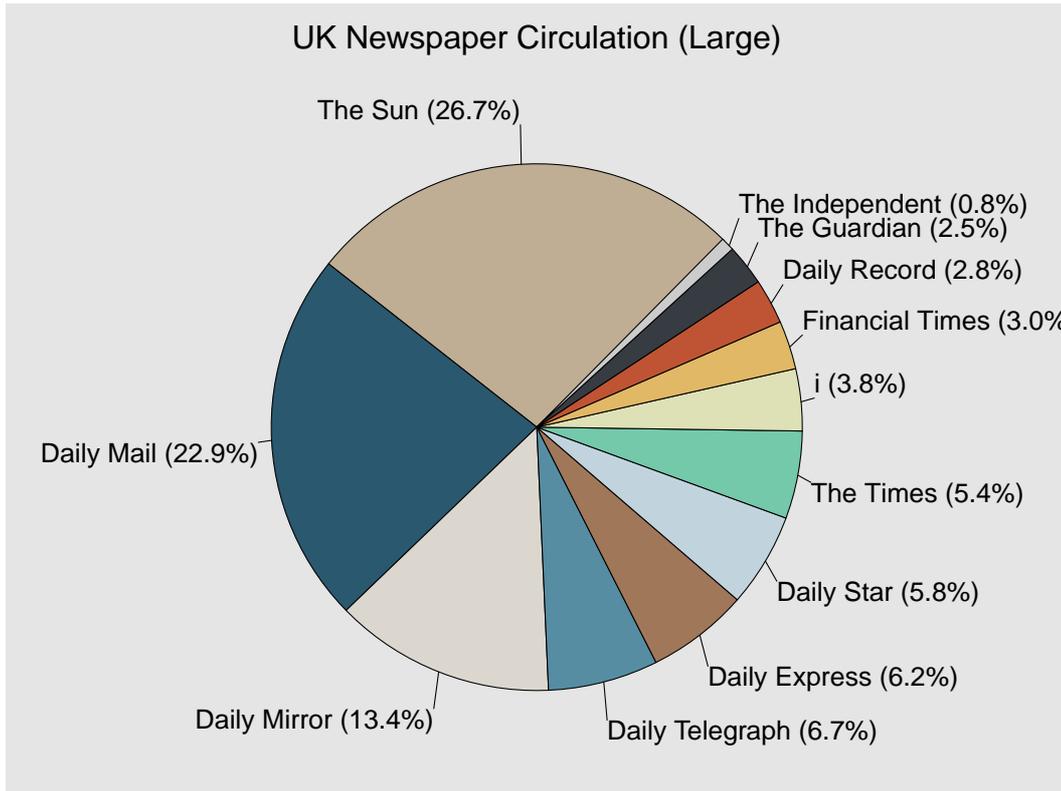
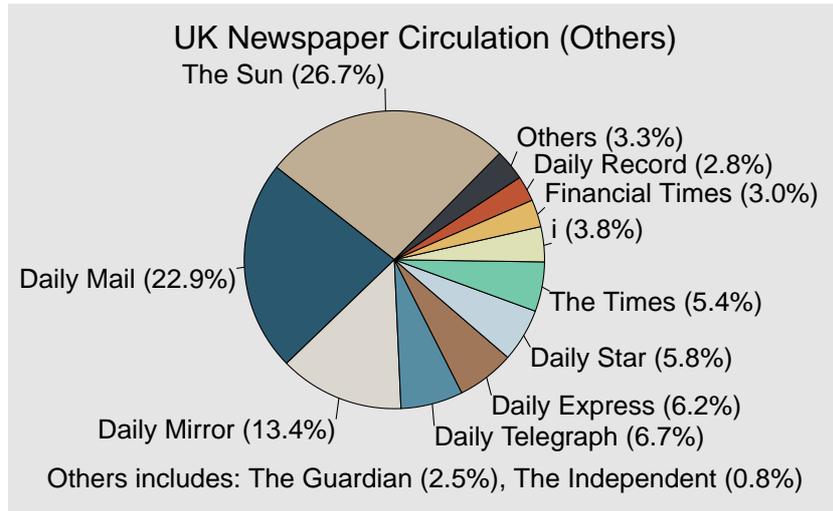If the size of the pie can't be increased sufficiently to prevent text being overwritten, one option is to set the "Others" parameter.

```
Others:number
```

The number given is in fact a minimum percentage. If a particular wedge is less than this amount it will be coalesced into a group called "Others". If the minimum is given as zero then no segments are coalesced. Here's an example:-

UK Newspaper Circulation (Others)

The Sun (26.7%)

Others (3.3%)
Daily Record (2.8%)
Financial Times (3.0%)
i (3.8%)
The Times (5.4%)
Daily Star (5.8%)
Daily Express (6.2%)
Daily Telegraph (6.7%)

Daily Mail (22.9%)

Daily Mirror (13.4%)

Others includes: The Guardian (2.5%), The Independent (0.8%)

Sometimes a satisfactory graph is produced by simply reducing the font size slightly. This is done by passing the parameter:-

```
PS:size
```

Where "size" is the value of the required font size

Sometimes it is necessary to not label the pie chart directly, but have a separate colour keyed box containing the segment details. This is achieved using these parameters:-

```
KEYBOX:y
BOXFRAME:9c ^ 0.5c
BOXLABELS:$text ^ $value ^ $percent
BOXHEADS:Col1 ^ Col2 ^ Col3
```

```
BOXTABS:Tab1 ^ Tab2 ^ Tab3
```

The "KeyBox" parameter simply turns the facility on or off. "BoxFrame" is specifies the X and Y offset from the top left corner of the graph frame. The size of the "Frame" you specify must completely include the key box frame as well. The BoxFrame will contain one line per pie segment which is controlled by the template given in BoxLabel. This is very similar to the Label template shown earlier, except it is now split into columns. Each value for the parameter describes the content of one column, and you can again use the three variables ($text/$value/$percent) in the template. The format of the line which will make up this BoxFrame is controlled by BoxTabs, it is simply a groff tab declaration. The first one should usually be 0cL. Each tab stop defines a column in the table. It is possible to control the number of places of decimals in the values returned in "$percent" with the parameter:-

```
PDecimals:2
```

Would produce this:-
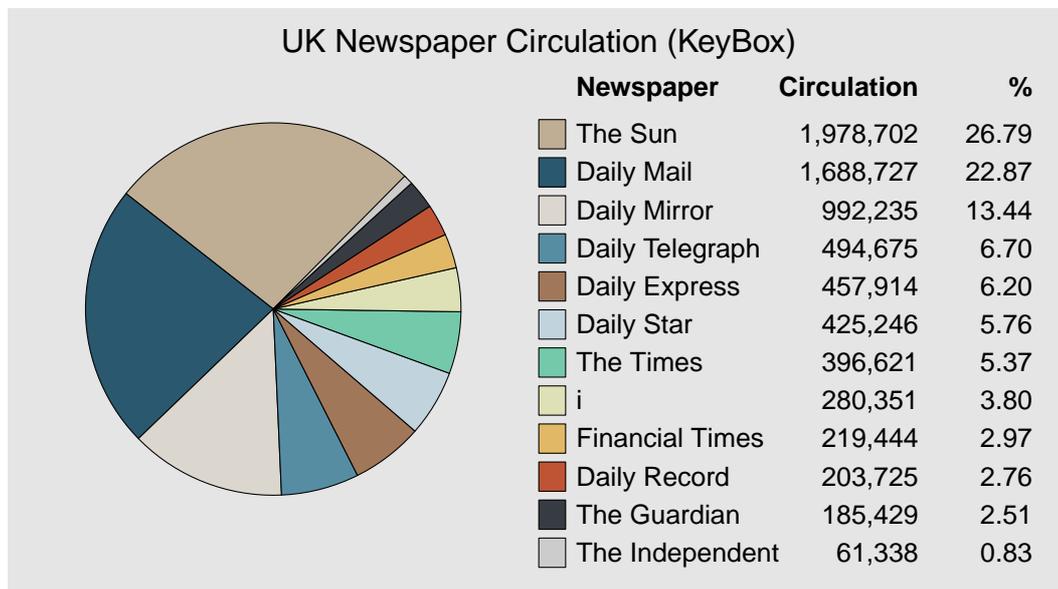
Here are the complete set of parameters which created this graph:-

```
.BGS
Frame:14c ^ 7.8c
Origin:3.5c ^ 4c
XR:2.5c
YR:2.5c
Just:centre
Flow:No
KeyBox:y
BoxFrame:7c ^ 0.8c
BoxHead:Newspaper ^ Circulation ^ %
BoxLabel:$text ^ $value ^ $percent
BoxTabs:0cL ^ 4.5cR ^ 6cR
PDecimals:2
Others:2.05
Caption:\v'.5'UK Newspaper Circulation (KeyBox)
BGcol:grey90
PDFBookMark:2
SER:The Sun ^ 1,978,702
SER:Daily Mail ^ 1,688,727
SER:Daily Mirror ^ 992,235
SER:Daily Telegraph ^ 494,675
SER:Daily Express ^ 457,914
SER:Daily Star ^ 425,246
```
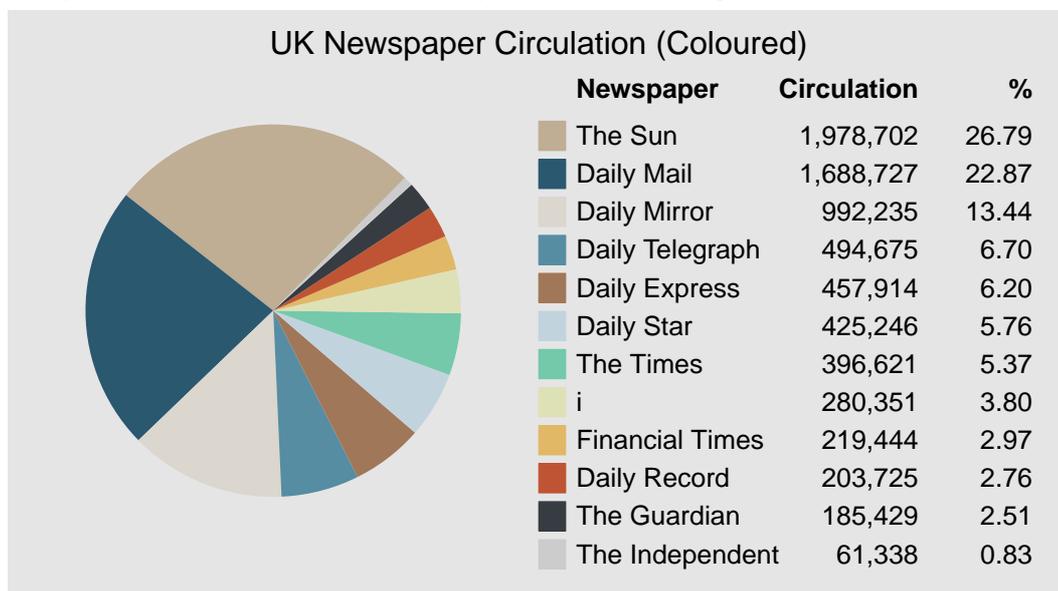
```
SER:The Times ^ 396,621
SER:i ^ 280,351
SER:Financial Times ^ 219,444
SER:Daily Record ^ 203,725
SER:The Guardian ^ 185,429
SER:The Independent ^ 61,338
.BGE
```

Different Styles

There are a number of parameters which change the style of the pie chart. We have already seen BGcol which changes the background of the graphic frame, but there are several more which alter the look of the graph. The first to look at is:-

```
Coloured:yes|no
```

If it is set to "yes" no lines are drawn on the pie, just the coloured segments.

UK Newspaper Circulation (Coloured)

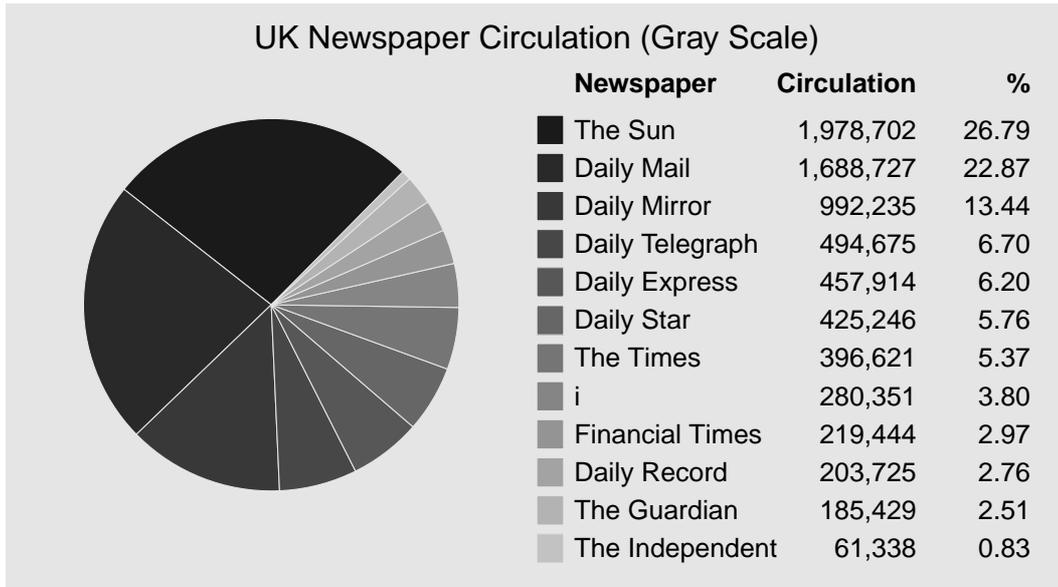| Newspaper	Circulation	%
The Sun	1,978,702	26.79
Daily Mail	1,688,727	22.87
Daily Mirror	992,235	13.44
Daily Telegraph	494,675	6.70
Daily Express	457,914	6.20
Daily Star	425,246	5.76
The Times	396,621	5.37
i	280,351	3.80
Financial Times	219,444	2.97
Daily Record	203,725	2.76
The Guardian	185,429	2.51
The Independent	61,338	0.83

These parameters control various colour settings:-

```
BGcolour:colour
Textcolour:colour
Linecolour:colour
BRDcolour:colour
Scolours:colour{ ^ colour ...}
```

Any format which is accepted by groff ".defcolor" can be used as a colour component. So it can be a colour name, or "rgb #ffffff" or "rgb ##ffffffffffff", rgb 0.1 0.1 0.2, and all the other formats. If just #ffffff is given then rgb is assumed.

Scolours accepts a list of colours, there should be one per segment of the pie. Here's the pie with a different colour palette.

```
Scolours:grey10 ^ grey16 ^ grey22 ^ grey28 ^ grey34 ^ grey40
 ^ grey46 ^ grey52 ^ grey58 ^ grey64 ^ grey70 ^ grey76 ^ grey82
```

UK Newspaper Circulation (Gray Scale)

Newspaper	Circulation	%
The Sun	1,978,702	26.79
Daily Mail	1,688,727	22.87
Daily Mirror	992,235	13.44
Daily Telegraph	494,675	6.70
Daily Express	457,914	6.20
Daily Star	425,246	5.76
The Times	396,621	5.37
i	280,351	3.80
Financial Times	219,444	2.97
Daily Record	203,725	2.76
The Guardian	185,429	2.51
The Independent	61,338	0.83

By changing the line thickness and colour, plus using a parameter "Hole" you can make a doughnut rather than a pie. Using this will produce the "doughnut" below:-

```
Thick:2.5p
Linecolour:white
BGcolour:white
Hole:.5
```

Top 3 UK Newspaper Circulation (Doughnut)

The Sun (42.5%)
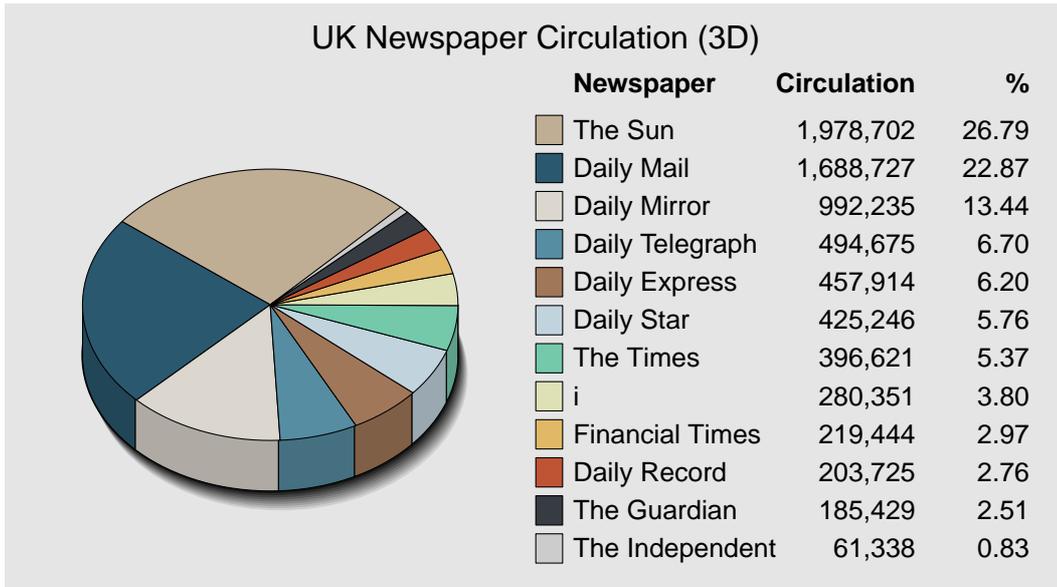
Daily Mirror (21.3%)

Daily Mail (36.2%)
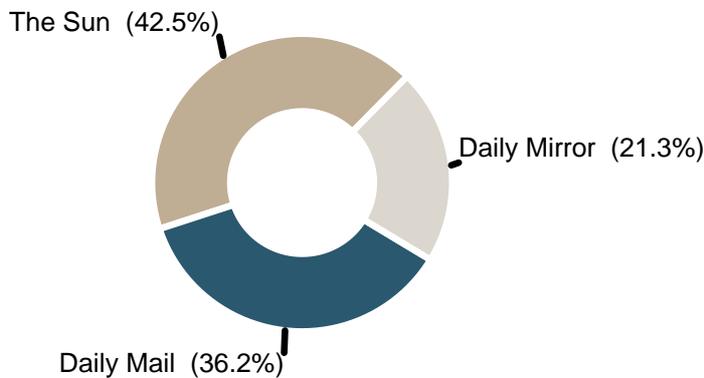
Another option is to show the pie in 3D. To do this you should change XRad/YRad so that it is an ellipse and add:-

```
3D:size
```

The size is the depth of the 3D effect, normally a figure less than 1c. The following graph uses these settings:-

```
XRad:2.5c
YRad:1.8c
3D:.7c
Darker:.8
```

The Darker parameter defaults to 0.8 which means that the darker colour used for the sides of the pie is 80% of the full colour.

UK Newspaper Circulation (3D)

Newspaper	Circulation	%
The Sun	1,978,702	26.79
Daily Mail	1,688,727	22.87
Daily Mirror	992,235	13.44
Daily Telegraph	494,675	6.70
Daily Express	457,914	6.20
Daily Star	425,246	5.76
The Times	396,621	5.37
i	280,351	3.80
Financial Times	219,444	2.97
Daily Record	203,725	2.76
The Guardian	185,429	2.51
The Independent	61,338	0.83

It is also possible to add a border around the frame, its properties are controlled by:-

```
Border:size
BRDcolour:colour
```

Notes

All parameters with sizes use the normal groff units, so values such as 1i, 2.54c, 20p etc. are valid sizes.
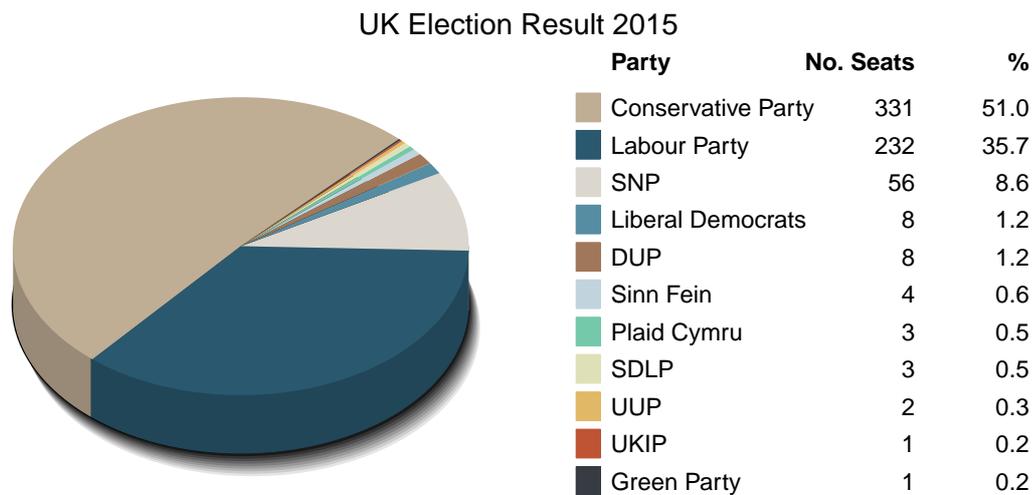
If you combine a 3D pie with a Hole, it won't be quite how you imagined!!

The parameter:-

```
PDFmark:level
```

Inserts a PDF Bookmark pointing to the frame at the level given by "level".

All parameter commands can be shortened to their shortest unique name, and they are not case sensitive.

UK Election Result 2015

Party	No. Seats	%
Conservative Party	331	51.0
Labour Party	232	35.7
SNP	56	8.6
Liberal Democrats	8	1.2
DUP	8	1.2
Sinn Fein	4	0.6
Plaid Cymru	3	0.5
SDLP	3	0.5
UUP	2	0.3
UKIP	1	0.2
Green Party	1	0.2

```
.BGS
PDFBOOKMARK:2
FT:H
PS:9
VS:+20%
3D:0.8c
THIC:.1p
#BORD:.2p
Shadow:y
TEXT:black
line:brown
XR:3c
Frame:16.5c ^ 7.1c
ORIGIN:4.6c ^ 3.4c
BOXFRAME:9c ^ 0.7c
BOXTABS:0cL ^ 4cR ^ 5.5cR
BOXHEADS:Party ^ No. Seats ^ %
KEYBOX:y
COLOURED:y
BGCOL:bisque
SORT:y
LABEL:$text($value)
Capt:\v'.5'UK Election Result 2015
FLOW:n
SER:Conservative Party ^ 331
SER:Labour Party ^ 232
SER:SNP ^ 56
SER:Liberal Democrats ^ 8
SER:DUP ^ 8
SER:Sinn Fein ^ 4
SER:Plaid Cymru ^ 3
SER:SDLP ^ 3
SER:UUP ^ 2
SER:UKIP ^ 1
SER:Green Party ^ 1
.BGE
```