

-
1.
 - (a) Geographical location (latitude and longitude) has been encoded by the x/y position on the graph.
Population increase has been encoded by area.
Economic grouping has been encoded by colour.
The sign of population increase has been encoded by colour.
 - (b) The use of position to indicate geographical location works well.
The use of colour is unobtrusive and is used sensibly to indicate category membership.
The use of area to encode the population increase/decrease, understates the extremes.
 - (c) There are two main tasks in drawing the figure. The first is to draw the squares which make up each continent. The easy way to do this is to draw the squares a row at a time. Suppose that the squares have sides of length δ , and assume the strip begins at x_{left} and ends at x_{right} and that base y value is y_{base} then something like

```
x = seq(xleft, xright, by=delta)
n = length(x) - 1
rect(x[1:n], ybase, x[1:n+1] ybase+delta,
      col = ..., border = ...)
```

will do the job (I found it easy to write this code than to explain).
The second task is to draw the boundary around the continents and countries. The function `polygon` can be used to do this (using `col=NA`).
The rest of drawing the graph is pretty straightforward.
 2.
 - (a) We gain depth information from the following sources: perspective, stereoscopic vision, occlusion, light/shade patterns and the effect of haze. (There are also effects from focus and feedback from the muscles which shape the lens.)
 - (b) We can see depth when it isn't there. Examples of this are the Ponzo illusion. This effect is also used in IMAX movies.
We can also be misled by perspective cues to misjudge depth. The classic examples of this is the Ames room.
 - (c) Light coloured areas appear larger than dark ones of the same size. This causes radiation illusions.
Perspective cues can make us see depth that isn't there and this leads us to misjudging sizes. The Ponzo illusion is an example of this.
We perceive small angles as large than they really are. This produces the Poggendorf illusion.

3. (a) Colours are complementary if they have the same excitation purity and combine to produce white.
- (b) Distances between colours in LUV space correspond to how different we perceive those colours to be.
- (c) Colour is useful for discriminating different elements within a graph. It is not useful for conveying values on a numerical scale.
- (d) Our rod cells are most sensitive at the blue end of the spectrum, whereas cone cells are more sensitive toward the red end. At twilight the cone cells begin to shut down and the rod cells are activated. This produces a shift in sensitivity from red to blue. This is the Purkinje phenomenon (see notes).

Here is a stem-and-leaf plot of the marks for the test.

The decimal point is at the |

```
4 | 0
5 | 00
6 |
7 |
8 | 0
9 | 00
10 | 0000
11 | 000
12 | 0000
13 | 00
14 | 00
15 | 0
16 |
17 | 0
18 | 0
19 | 0
```