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April 2010
R version 2.10.1
document version 2

A guide to using colors in R

There are three types of R colors:

- hexadecimal colors (#rrggbb)
- named colors
- integers referring to positions in the current color palette

Colors are graphic parameters described in the `par()` documentation of the graphics library.

Hexadecimal colors

R uses hexadecimal colors. These are represented as strings of six characters. Red, green, and blue components are specified as two hexadecimal digits (0–9, A–F), in the form #rrggbb.

Specify a hexadecimal color as a parameter by placing the name within quotes, such as

```
barplot(1, axes=FALSE, col="#4682B4")
```

The alpha parameter can be used to define tranparency. Simply add two more digits, in the form #rrggbbaa.

```
barplot(1, axes=FALSE, col="#4682B433")
```

Named colors

R can interpret hundreds of named colors, such as "plum", "seagreen2", and peachpuff3" as hexadecimal colors. To see a list of the named colors (just the names, not the colors themselves) use the command `colors()`.

Use this code to view the rgb values for all named colors:

```
crgb <- col2rgb(cc <- colors())
colnames(crgb) <- cc
t(crgb)
```

Specify a named color as a parameter by placing the name within quotes, such as:

```
barplot(1, axes=FALSE, col="steelblue")
```

This named colors are the "Netscape colors", which can be viewed at
http://www.febooti.com/products/iezoom/online-help/html-color-names-netscape-color-chart.html

The color palette

The `palette()` function within the grDevices library allows a table of colors to be referenced by a numeric index. The default color palette is: 1 = "black"
2 = "red"
3 = "green3"
4 = "blue"
5 = "cyan"
6 = "magenta"
7 = "yellow"
8 = "gray"

To set these colors as parameters, simply use the index:

```
barplot(1, axes=FALSE, col=4)
barplot(c(1, 1, 1), axes=FALSE, col=c(4,5,6))
```

The color palette can be changed by providing a vector of colors:

```
palette(c("red", "#4682B4", "#00008B", "darkgreen"))
barplot(c(1,1,1,1), axes=FALSE, col=c(1,2,3,4))
```

View the current palette with `palette()`.

Return to the default palette with `palette("default")`.

Converting rgb to hex color

The `rgb()` function converts red, green, and blue intensities to a hexidecimal representation.

The function has the form

```
rgb(red, green, blue, alpha, names = NULL, maxColorValue = 1)
```

`alpha` is an optional argument for transparency, and has the same intensity scale as the red, green, and blue values.

`names` is an optional argument that will print a name with the hexadecimal value.

`maxColorValue` must be specified if the maximum intensity is not 1 (for example, if intensity has a scale of 0–255). The minimum intensity must be zero.

```
new_orange = rgb(255, 127, 0, maxColorValue=255)
barplot(1, axes=FALSE, col=new_orange)
```

Converting an R color to rgb

The `col2rgb()` function converts R colors (a hexadecomal color, named color, or integer representing a palette position) to the rgb representations. The function takes either a single color or a vector of colors, and returns a matrix of three rows (red, green, blue), with one column for each color.

The function has the form
`col2rgb(color, alpha=FALSE)`

alpha is an optional argument to indicate whether alpha transparency values should be returned.

Converting a single color to rgb:

```
col2rgb("steelblue")
```

```
      [,1]
red     70
green  130
blue   180
```

Converting a vector of colors to rgb:

```
col2rgb(c("#4682B433", "#104E8b", "mistyrose"))
```

```
      [,1] [,2] [,3]
red     70   16  255
green  130   78  228
blue   180  139  225
```

Converting a vector of colors to rgb, with labels in matrix columns:

```
col2rgb(c(orange="#4682B433", blue="#104E8b", pink="mistyrose"))
```

```
      orange blue pink
red       70   16  255
green    130   78  228
blue     180  139  225
```

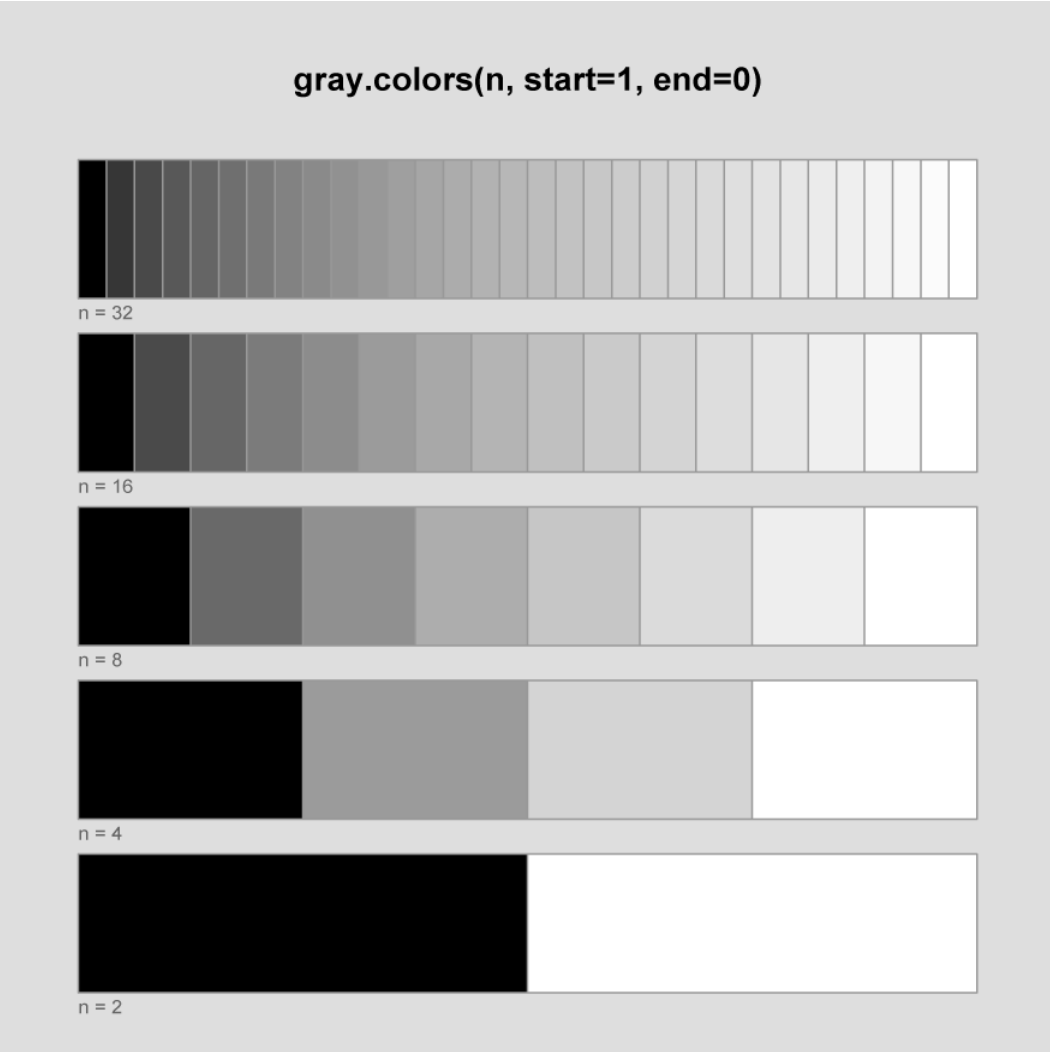
Creating a vector of grays

The `gray.colors()` function creates a vector of evenly-spaced gray colors.

The function has the form
`gray.colors(num_colors, start=value, end=value, gamma=value)`

`end` and `start` are used to specify the endpoints of the range of grays, with 0 = black and 1 = white. (By default, `start=0.3` and `end=0.9`.)

`gamma` is an optional argument for gamma correction.



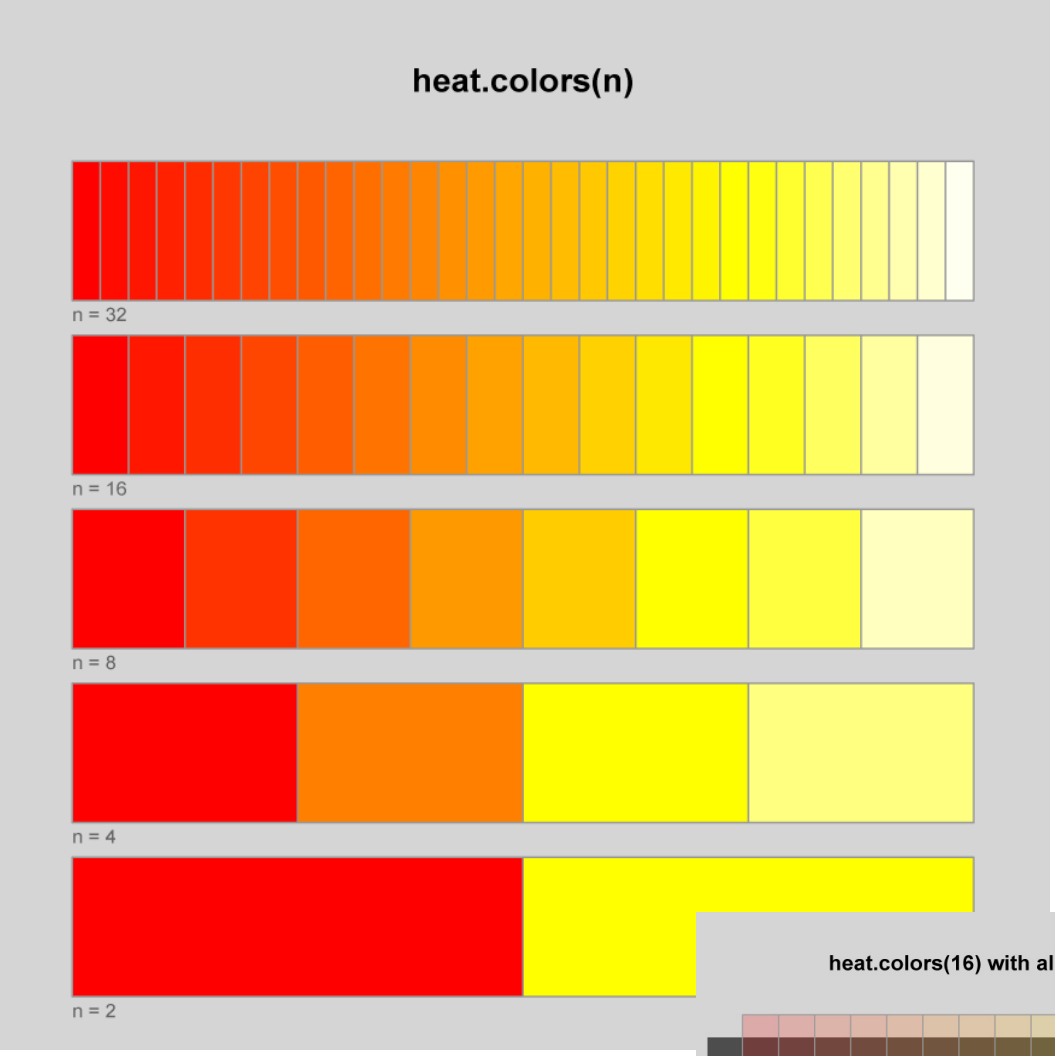
Code for all examples is included in the R script for this reference guide

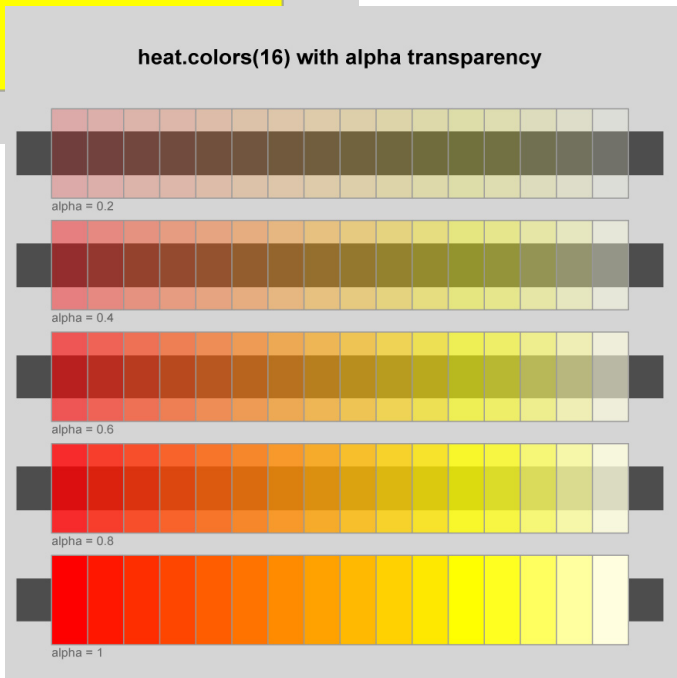
Creating a vector of heat colors

The `heat.colors()` function creates a vector of evenly-spaced red-to-yellow colors.

The function has the form
`heat.colors(num_colors, alpha=value)`

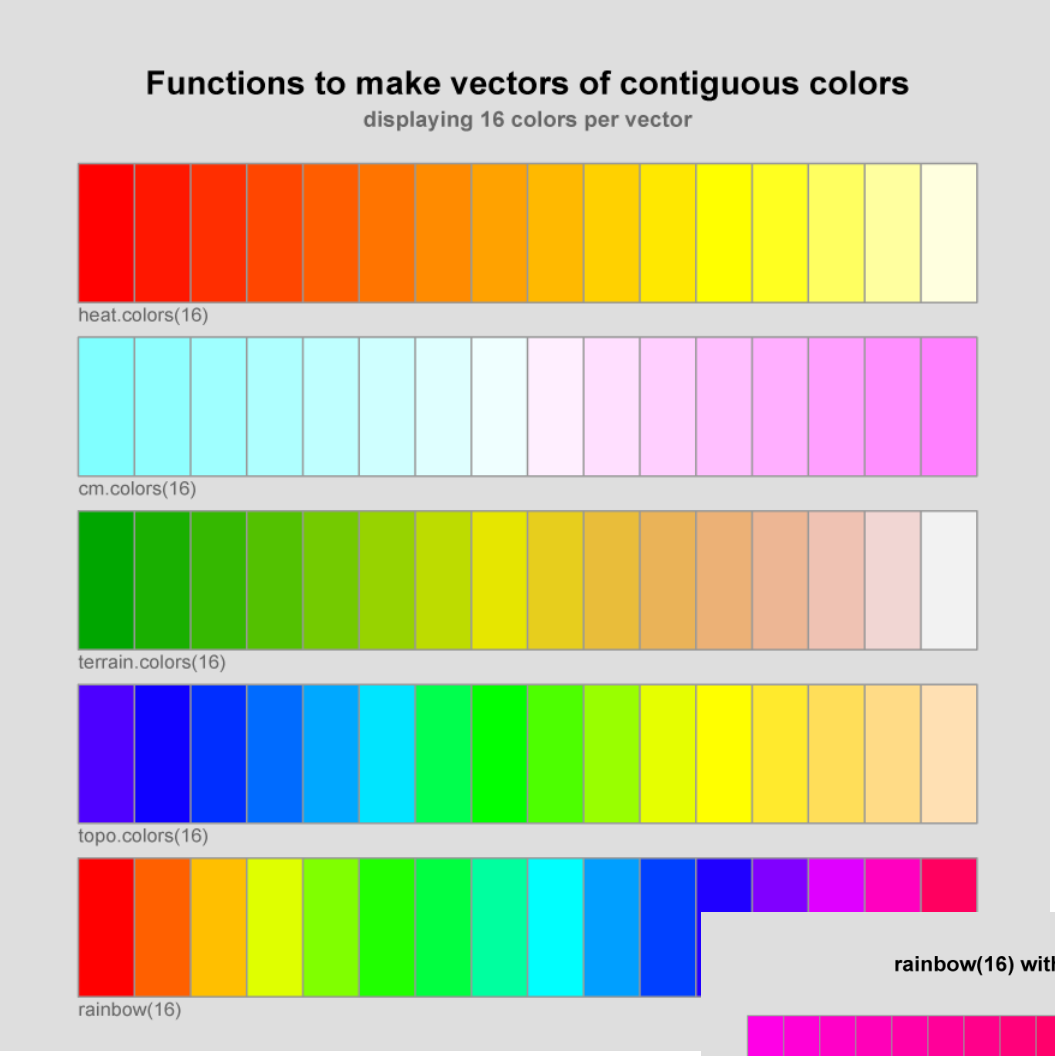
`alpha` is an optional argument to specify alpha transparency of the colors.

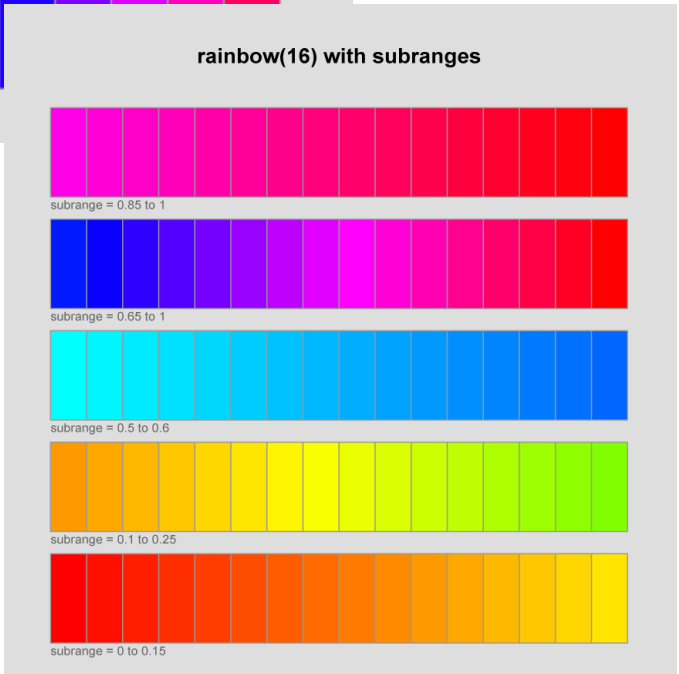




Creating vectors of contiguous colors

Five functions are available in the `grDevices` library for creating vectors of contiguous colors: `heat.colors()`, `cm.colors()`, `terrain.colors()`, `topo.colors()`, and `rainbow()`. The `rainbow()` function is the only one that allows start and end points within the spectum to be selected, as well as the saturation and value of the colors. See the R documentation for more details.



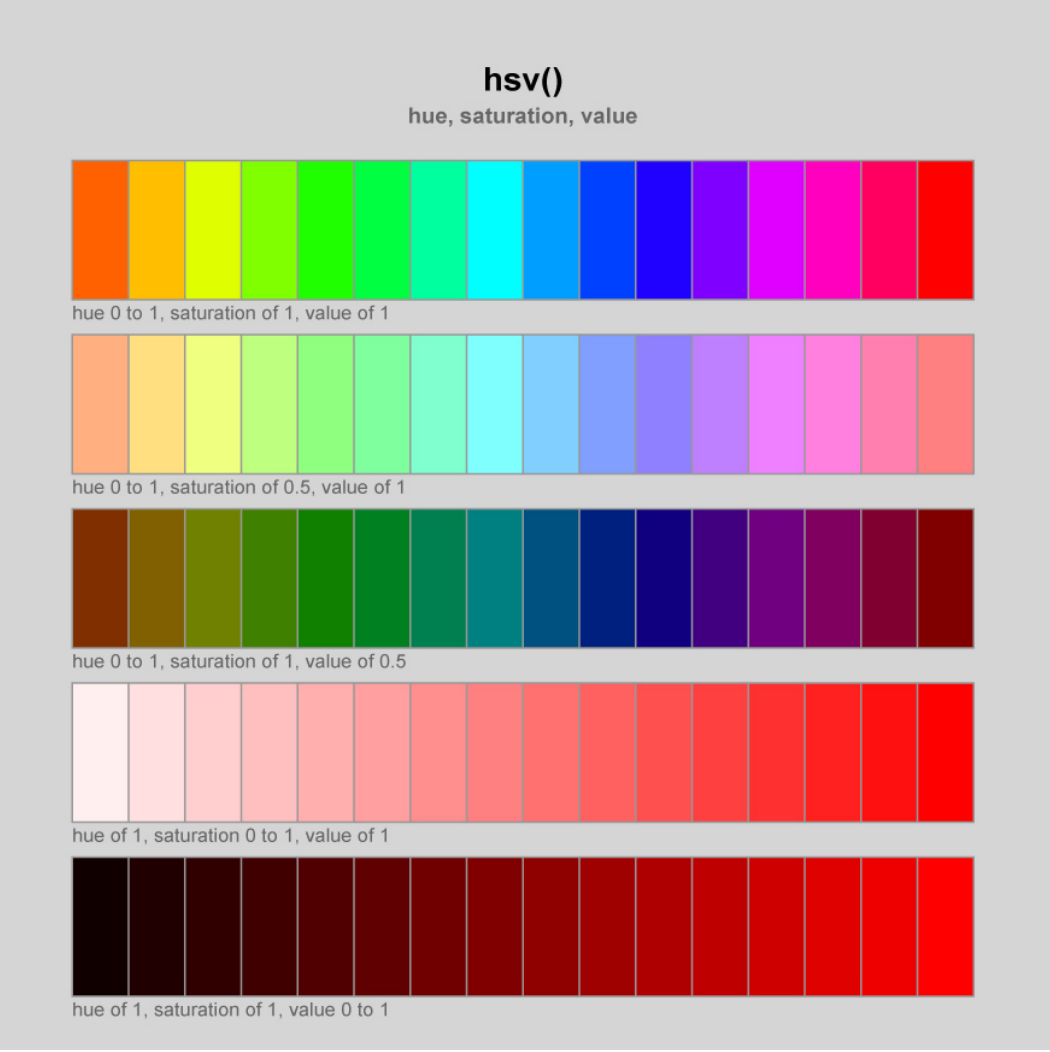


Specifying colors with hsv()

The hsv() function uses values of hue, saturation, and value (ranging from 0 to 1) to specify a color. The function accepts either a single values or vectors of values, and returns a vector of hexadecimal values.

The function has the form

```
hsv(h=value, s=value, v=value, gamma=value, alpha=value)
```



Specifying colors with `hcl()`

The `hcl()` function uses values of hue, chroma, and luminance to specify a color. The function accepts either a single set of values or vectors of values, and returns a vector of hexadecimal values. Values for hue range from 0 to 360. The range for chroma depends upon the hue and luminance, and the range for luminance depends upon the hue and chroma. See the R documentation for details.

This function is useful for creating a series of colors that have approximately equal perceptual changes.