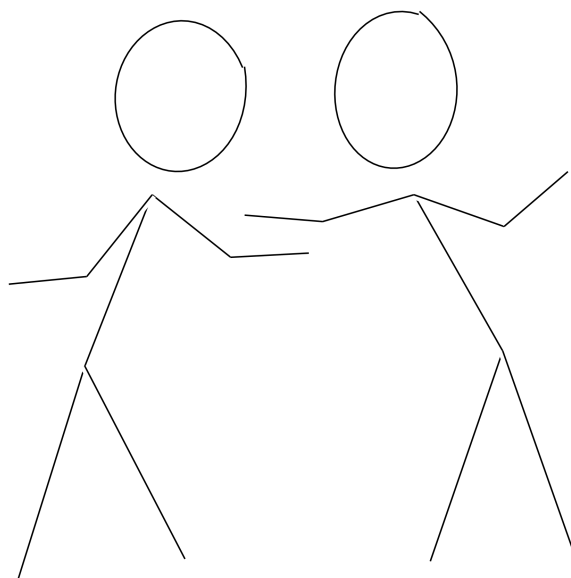# An introduction to the xkcd package

Emilio Torres-Manzanera
(torres@uniovi.es)

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Abstract

Contents

See more examples at `http://xkcd.r-forge.r-project.org/`.

1   The XKCD fonts

The package `xkcd` uses the XKCD fonts. Therefore, an easy way to check whether this fonts are installed in the computer is typing the following code and comparing the graphs:

```
library(sysfonts)
library(ggplot2)
if( "xkcd.ttf" %in% font.files()) {
  font.add("xkcd",  regular = "xkcd.ttf")
  p <-  ggplot() + geom_point(aes(x=mpg, y=wt), data=mtcars) +
    theme(text = element_text(size = 16, family = "xkcd"))
} else  {
  warning("Not xkcd fonts installed!")
  p <-  ggplot() + geom_point(aes(x=mpg, y=wt), data=mtcars)
}
p
```
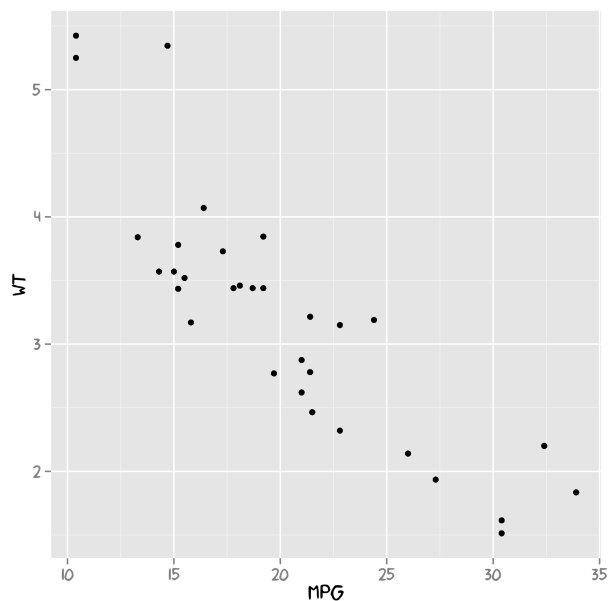
Installing fonts in R

The XKCD fonts are not installed in the system. You can use the package `sysfonts`, and the function `font.paths()` to check the current search path or add a new one, and use `font.files()` to list available font files in the search path.

```
1  library(sysfonts)
2  download.file("http://simonsoftware.se/other/xkcd.ttf", dest="xkcd.ttf", mode="wb")
3  font.paths()
4  system("mkdir ~/.fonts")
5  system("cp xkcd.tff -t ~/.fonts")
6  font.files()
7  font.add("xkcd",  regular = "xkcd.ttf")
8  font.families()
```

2 Installing xkcd

The xkcd homepage is located at `http://xkcd.r-forge.r-project.org`. From within R, you can install the latest version of xkcd by typing

```
1  install.packages("xkcd",dependencies = TRUE)
```

Then, you may want to see the vignette and check the code:

```
1  help(package="xkcd")
2  vignette("xkcd-intro") # it opens the pdf
3  browseVignettes(package = "xkcd") # To browse the pdf, R and Rnw
```
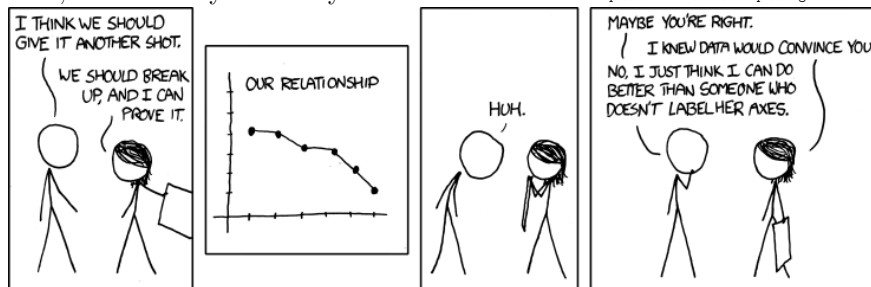
Once the package has been installed, it can be loaded by typing:

```
1  library(xkcd)
```

3 Axis

Man: No, I just think I can do better than someone who doesn't label her axes. Title text: And if you labeled your axes, I could tell you exactly how MUCH better. http://xkcd.com/833/ http://imgs.xkcd.com/comics/convincing.png



```
1  xrange <- range(mtcars$mpg)
2  yrange <- range(mtcars$wt)
3  set.seed(123) # for reproducibility
4  p <- ggplot() + geom_point(aes(mpg, wt), data=mtcars) +
5      xkcdaxis(xrange,yrange)
6  p
```
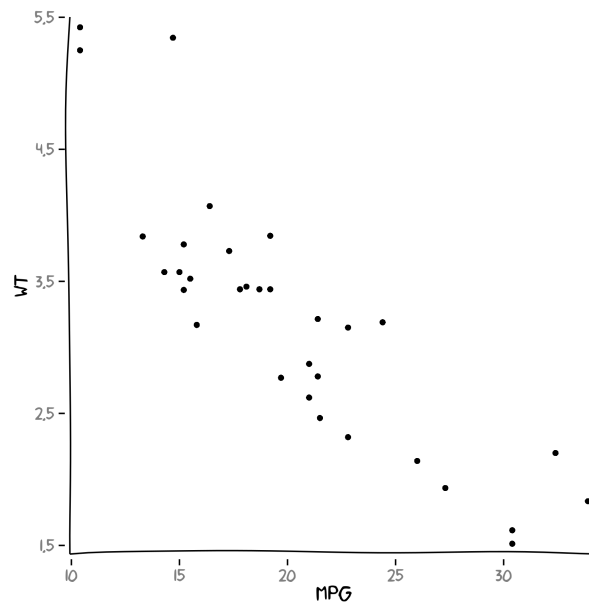
4   Cartoon characters

To include cartoon characters in the graph, use the `xkcdman` function.

```
1   ratioxy <- diff(xrange)/diff(yrange)
2   mapping <- aes(x,  y,
3                  scale,
4                  ratioxy,
5                  angleofspine ,
6                  anglerighthumerus,
7                  anglelefthumerus,
8                  anglerightradius,
9                  angleleftradius,
10                 anglerightleg,
11                 angleleftleg,
12                 angleofneck,
13                 linetype=city)
14  dataman <- data.frame(x= c(15,30), y=c(3, 4),
15                        scale = c(0.3,0.51) ,
16                        ratioxy = ratioxy,
17                        angleofspine =  -pi/2  ,
18                        anglerighthumerus = c(pi/4, -pi/6),
19                        anglelefthumerus = c(pi/2 + pi/4, pi +pi/6),
20                        anglerightradius = c(pi/3, -pi/3),
21                        angleleftradius = c(pi/3, -pi/3),
22                        anglerightleg = 3*pi/2  - pi / 12,
23                        angleleftleg = 3*pi/2  + pi / 12 ,
24                        angleofneck = runif(1, 3*pi/2-pi/10, 3*pi/2+pi/10),
25                        city=c("Liliput","Brobdingnag"))
26  q <- ggplot() + geom_point(aes(mpg, wt, colour=as.character(vs)), data=mtcars) +
27    xkcdaxis(xrange,yrange) + xkcdman(mapping, dataman)
28  q
```
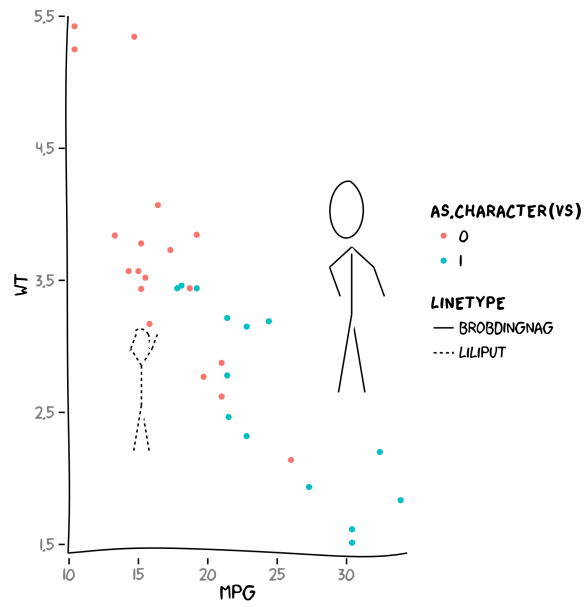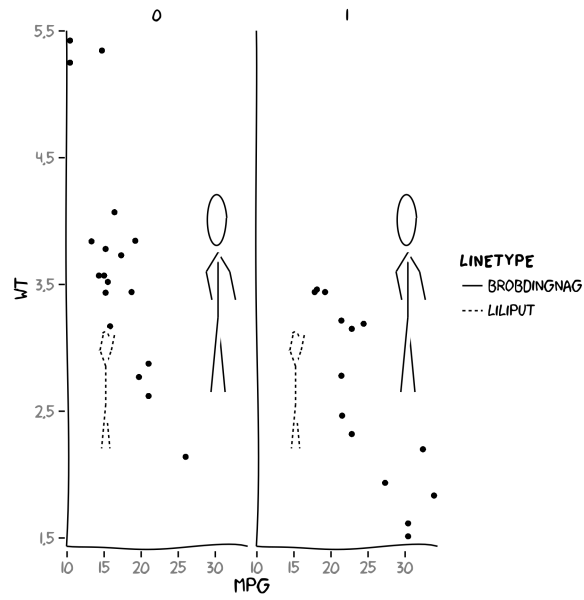
4.1 Facets

```
1  ggplot() + geom_point(aes(mpg, wt), data=mtcars) +
2    xkcdaxis(xrange,yrange) + xkcdman(mapping, dataman) +
3    facet_grid(.~vs)
```

```
1  ggplot() + geom_point(aes(mpg, wt), data=mtcars) +
2    xkcdaxis(xrange,yrange) + xkcdman(mapping, dataman) +
3    facet_grid(.~city)
```
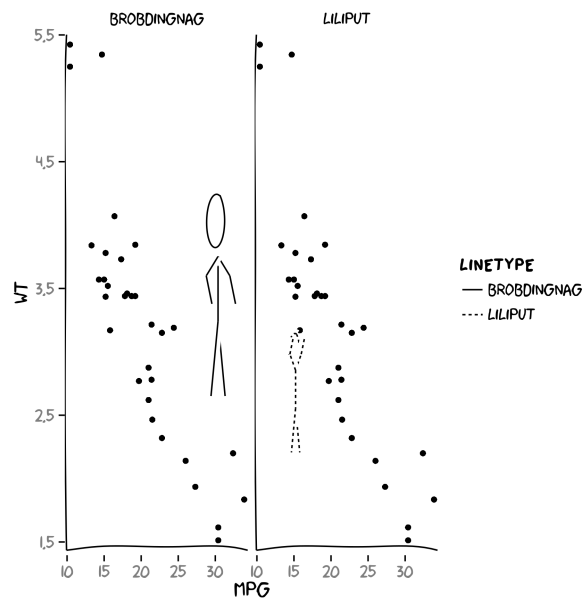
4.2 Angles of the xkcdman
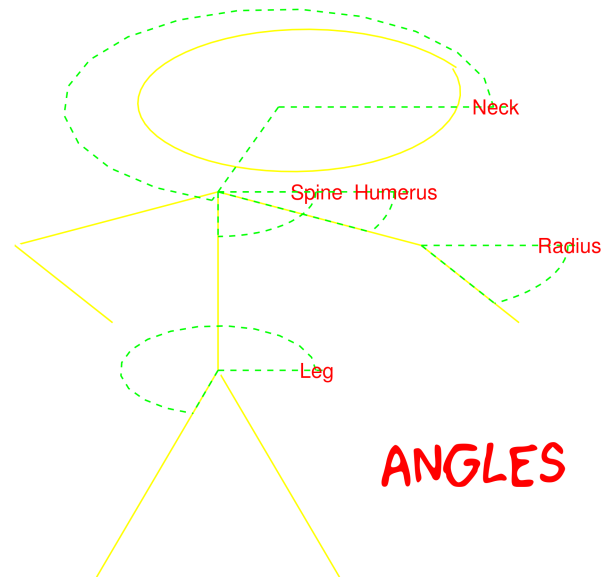
5 Mother's day

5.1 Bar chart

```
1   mommy <- read.table(sep=" ",text ="
2   8 100
3   9 0
4   10 0
5   11 0
6   12 0
7   13 0
8   14 100
9   15 100
10  16 500
11  17 420
12  18 75
13  19 50
14  20 100
15  21 40
16  22 0
17  ")
18  names(mommy) <- c("hour","number")
19  data <- mommy
20  data$xmin <- data$hour - 0.25
```

```
21   data$xmax <- data$xmin + 1
22   data$ymin <- 0
23   data$ymax <- data$number
24   xrange <- range(8, 24)
25   yrange <- range(min(data$ymin) + 10 , max(data$ymax) + 200)
26   ratioxy <- diff(xrange)/diff(yrange)
27   timelabel <-  function(text,x,y) {
28     if( "xkcd" %in% font.families()){
29       te1 <- annotate("text", x=x, y = y + 65, label=text, size = 6,family ="xkcd")
30     } else {
31       te1 <- annotate("text", x=x, y = y + 65, label=text, size = 6)}
32     list(te1,
33     xkcdline(aes(xbegin=xbegin, ybegin= ybegin, xend=xend,yend=yend),
34             data.frame(xbegin=x,ybegin= y + 50, xend=x,yend=y), xjitteramount = 0.5))
35   }
36   n <- 1800
37   set.seed(123)
38   x <- runif(n, xrange[1],xrange[2] )
39   y <- runif(n, yrange[1],yrange[2] )
40   inside <- unlist(lapply(1:n, function(i) any(data$xmin <= x[i] & x[i] < data$xmax &
41                           data$ymin <= y[i] & y[i] < data$ymax)))
42   x <- x[inside]
43   y <- y[inside]
44   nman <- length(x)
45   sizer <- round(runif(nman, 1, 10),0)
46   angler <- runif(nman, -10,10)
47   if( "xkcd" %in% font.families()){
48   p <- ggplot() +
49     geom_text(aes(x,y,label="Mummy",angle=angler,hjust=0, vjust=0),
50               family="xkcd",size=sizer,alpha=0.3) +
51     xkcdaxis(xrange,yrange) +
52     annotate("text", x=16, y = 650,
53             label="Happy Mother's day", size = 16,family ="xkcd") +
54     xlab("daily schedule") +
55     ylab("Number of times mothers are called on by their children") +
56     timelabel("Wake up", 9, 125) + timelabel("School", 12.5, 90) +
57     timelabel("Lunch", 15, 130) +
58     timelabel("Homework", 18, 525) +
59     timelabel("Bath", 21, 110) +
60     timelabel("zzz", 23.5, 60)
61   } else {
62   p <- ggplot() +
63     geom_text(aes(x,y,label="Mummy",angle=angler,hjust=0, vjust=0),
64               size=sizer,alpha=0.3) +
65     xkcdaxis(xrange,yrange) +
66     annotate("text", x=16, y = 650,
67             label="Happy Mother's day", size = 16) +
68     xlab("daily schedule") +
69     ylab("Number of times mothers are called on by their children") +
```
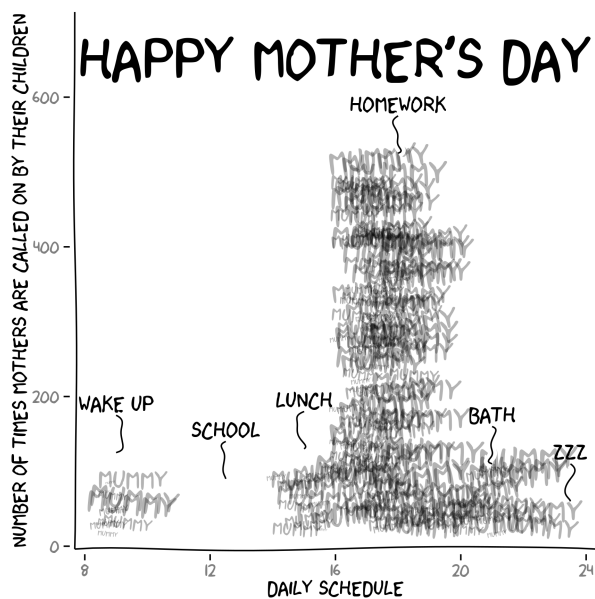
```
70    timelabel("Wake up", 9, 125) + timelabel("School", 12.5, 90) +
71    timelabel("Lunch", 15, 130) +
72    timelabel("Homework", 18, 525) +
73    timelabel("Bath", 21, 110) +
74    timelabel("zzz", 23.5, 60)}
75  p
```


6 Volunteers at Cáritas Spain

6.1 Scatterplot

```
1   volunteers <- data.frame(year=c(2007:2011), number=c(56470, 56998, 59686, 61783, 64251))
2   xrange <- range(volunteers$year)
3   yrange <- range(volunteers$number)
4   ratioxy <-  diff(xrange) / diff(yrange)
5   mapping <- aes(x,  y,
6                  scale,
7                  ratioxy,
8                  angleofspine ,
9                  anglerighthumerus,
10                 anglelefthumerus,
11                 anglerightradius,
12                 angleleftradius,
13                 anglerightleg,
14                 angleleftleg,
15                 angleofneck)
```

```
16   dataman <- data.frame( x= c(2008,2010), y=c(63000, 58850),
17                          scale = 1000 ,
18                          ratioxy = ratioxy,
19                          angleofspine =  -pi/2  ,
20                          anglerighthumerus = c(-pi/6, -pi/6),
21                          anglelefthumerus = c(-pi/2 - pi/6, -pi/2 - pi/6),
22                          anglerightradius = c(pi/5, -pi/5),
23                          angleleftradius = c(pi/5, -pi/5),
24                          angleleftleg = 3*pi/2  + pi / 12 ,
25                          anglerightleg = 3*pi/2  - pi / 12,
26                          angleofneck = runif(1, 3*pi/2-pi/10, 3*pi/2+pi/10))
27   datalines <- data.frame(xbegin=c(2008.3,2010.5),ybegin=c(63000,59600),
28                          xend=c(2008.5,2010.3), yend=c(63400,59000))
29   p <- ggplot() + geom_smooth(mapping=aes(x=year, y =number), data =volunteers,method="loess")
30   if( "xkcd" %in% font.families()){
31   p + xkcdaxis(xrange,yrange) +
32     ylab("Volunteers at Caritas Spain") +
33     xkcdman(mapping, dataman) +
34     annotate("text", x=2008.7, y = 63700, label = "We Need\nVolunteers!", family="xkcd" ) +
35     annotate("text", x=2010.5, y = 60000, label = "Sure\nI can!", family="xkcd" ) +
36    xkcdline(aes(xbegin=xbegin,ybegin=ybegin,xend=xend,yend=yend),datalines, xjitteramount = 0.12)
37   } else {
38   p + xkcdaxis(xrange,yrange) +
39     ylab("Volunteers at Caritas Spain") +
40     xkcdman(mapping, dataman) +
41     annotate("text", x=2008.7, y = 63700, label = "We Need\nVolunteers!") +
42     annotate("text", x=2010.5, y = 60000, label = "Sure\nI can!") +
43    xkcdline(aes(xbegin=xbegin,ybegin=ybegin,xend=xend,yend=yend),datalines, xjitteramount = 0.12)
44   }
```
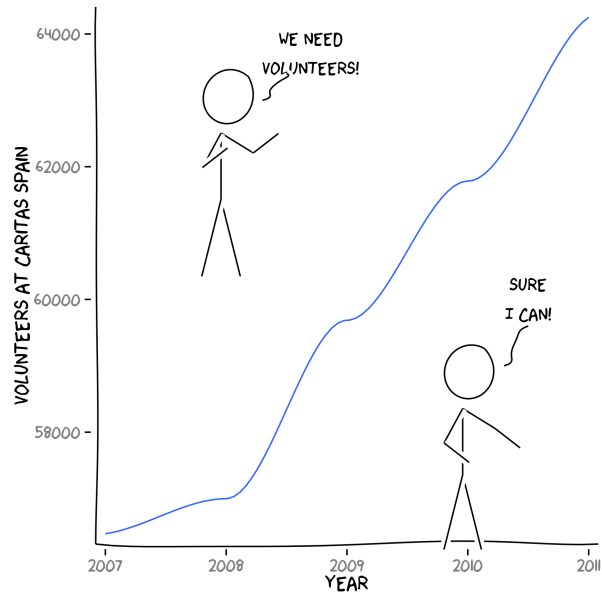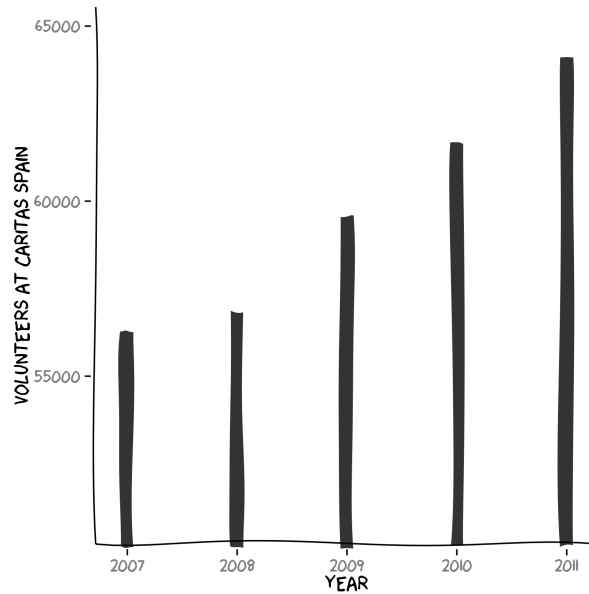
6.2 Bar chart

```
1   data <- volunteers
2   data$xmin <- data$year - 0.1
3   data$xmax <- data$year + 0.1
4   data$ymin <- 50000
5   data$ymax <- data$number
6   xrange <- range(min(data$xmin)-0.1, max(data$xmax) + 0.1)
7   yrange <- range(min(data$ymin)+500, max(data$ymax) + 1000)
8   mapping <- aes(xmin=xmin,ymin=ymin,xmax=xmax,ymax=ymax)
9   p <- ggplot() + xkcdrect(mapping,data) +
10    xkcdaxis(xrange,yrange) +
11    xlab("Year") + ylab("Volunteers at Caritas Spain")
12  p
```

6.3 Bar chart

```
1   data <- volunteers
2   data$xmin <- data$year - 0.1
3   data$xmax <- data$year + 0.1
4   data$ymin <- 50000
5   data$ymax <- data$number
6   xrange <- range(min(data$xmin) - 0.1, max(data$xmax) + 0.1)
7   yrange <- range(min(data$ymin) +500 , max(data$ymax) + 1000)
8   ratioxy <- diff(xrange)/diff(yrange)
9   plotmen <- function(x,y, scale,ratioxy,...){
10   mapping <- aes(x,  y,
11                    scale,
12                    ratioxy,
13                    angleofspine ,
14                    anglerighthumerus,
15                    anglelefthumerus,
16                    anglerightradius,
17                    angleleftradius,
18                    anglerightleg,
19                    angleleftleg,
20                    angleofneck)
21    n <- length(x)
22    data <- data.frame(x=x,
23                       y=y,
24                       scale = scale,
```

```
25                     ratioxy = ratioxy,
26                     angleofspine = runif(n, - pi/2 - pi/3, -pi/2 + pi/3),
27                     anglerighthumerus = runif(n, -pi/6- pi/10, - pi/6 + pi/10),
28                     anglelefthumerus = runif(n, pi + pi/6 -pi/10, pi + pi/6 + pi/10),
29                     anglerightradius =  runif(n, -pi/4, pi/4),
30                     angleleftradius =  runif(n, pi -pi/4, pi + pi/4),
31                     anglerightleg = runif(n,  3* pi/2 + pi/12 , 3* pi/2  + pi/12 + pi/10),
32                     angleleftleg = runif(n, 3* pi/2  - pi/12 - pi/10, 3* pi/2 - pi/12 ),
33                     angleofneck = runif(n, -pi/2-pi/10, -pi/2 + pi/10))
34    xkcdman(mapping,data,...)
35  }
36  volun <- c("Miguel","Jose","Rocio","Maria","Emilio",
37             "Pilar","Tata","Violeta","Titi","Alex","Dani")
38  positionx <- seq(2007,2011, length.out=length(volun))
39  set.seed(123)
40  positionx <- positionx[sample(1:length(volun),length(volun))]
41  positiony <- seq(54000,65000,length.out = length(volun))
42  a <- ggplot() +
43    xkcdrect(mapping,data,fill="yellow",colour="red") +
44    xkcdaxis(xrange,yrange) +
45    xlab("Year") + ylab("Volunteers at Caritas Spain")
46  b <- a + plotmen(positionx, positiony,1000, ratioxy)
47  if( "xkcd" %in% font.families()){
48  c <- b + annotate("text",
49                    x= positionx, y= positiony,
50                    label=volun, family="xkcd",size=3)
51  } else {
52  c <- b + annotate("text",
53                    x= positionx, y= positiony,
54                    label=volun,size=3)
55  }
56  c
```
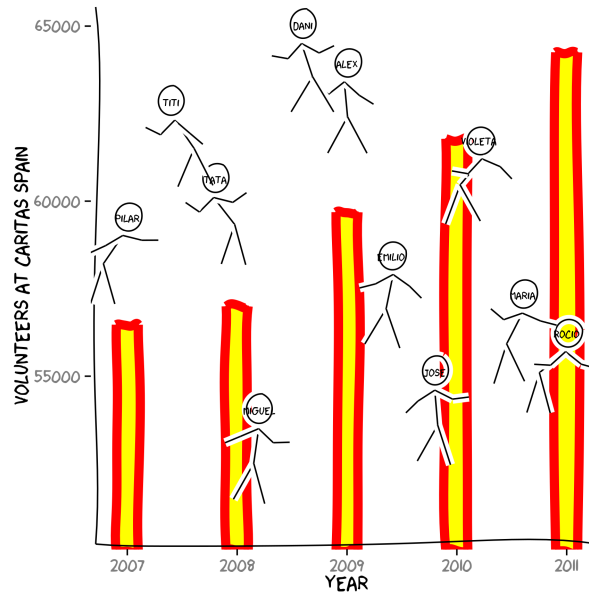
7 Saving the graphs

7.1 png

```
1  ggsave("fig.png")
```

7.2 pdf

Remember to embed the fonts!

```
1  ggsave("font_ggplot.pdf", plot=p,  width=12, height=4)
2
```

8 References

Hadley Wickham 2012. ggplot2 `http://ggplot2.org/`

Randall Munroe. A webcomic of romance, sarcasm, math, and language `http://xkcd.com/`

Various Authors 2012. How can we make xkcd style graphs in R? `http://stackoverflow.com/questions/12675147/how-can-we-make-xkcd-style-graphs-in-r`

fibosworld 2013. Change fonts in ggplot2, and create xkcd style graphs `http://fibosworld.wordpress.com/2013/02/17/change-fonts-in-ggplot2-and-create-xkcd-style-graphs/`

Winston Chang. extrafont `https://github.com/wch/extrafont`