An introduction to the xkcd package

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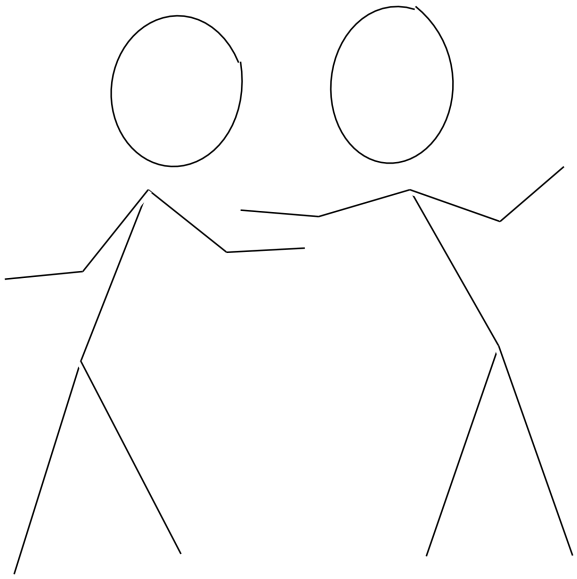
February 2014

Abstract



Contents

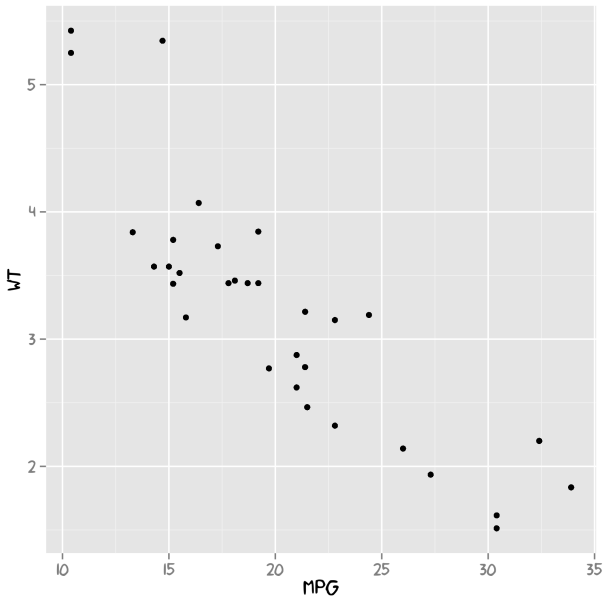
See more examples at `http://xkcd.r-forge.r-project.org/`.

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 package `sysfonts`, and the functions `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.

```
library(sysfonts)
download.file("http://simonsoftware.se/other/xkcd.ttf", dest="xkcd.ttf", mode="wb")
font.paths()
system("mkdir ~/.fonts")
system("cp xkcd.tff -t ~/.fonts")
font.files()
font.add("xkcd",  regular = "xkcd.ttf")
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

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

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

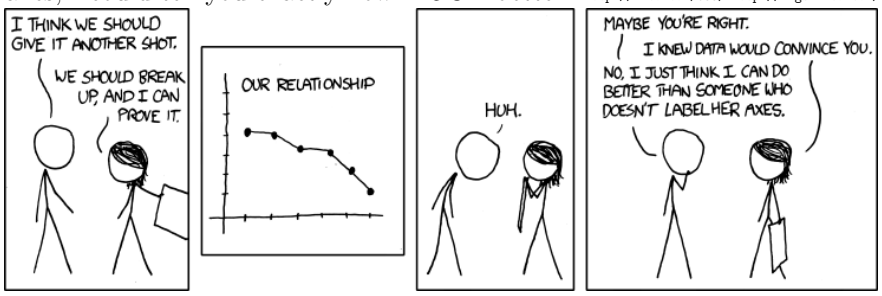
```
help(package="xkcd")
vignette("xkcd-intro") # it opens the pdf
browseVignettes(package = "xkcd") # To browse the pdf, R and Rnw
```

Once the package has been installed, it can be loaded by typing:

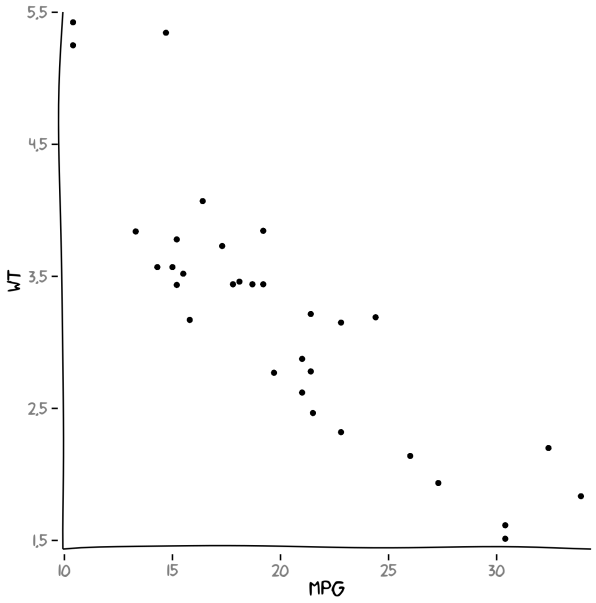
```
library(xkcd)
```

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



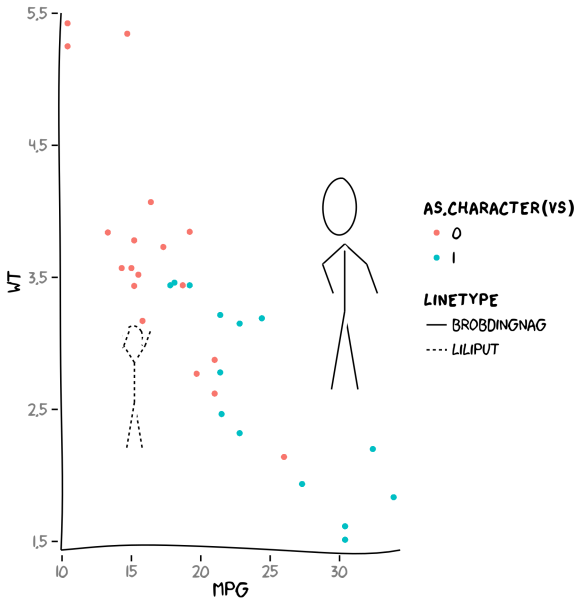

```
xrange <- range(mtcars$mpg)
yrange <- range(mtcars$wt)
set.seed(123) # for reproducibility
p <- ggplot() + geom_point(aes(mpg, wt), data=mtcars) +
 xkcdaxis(xrange,yrange)
p
```



4 Cartoon characters

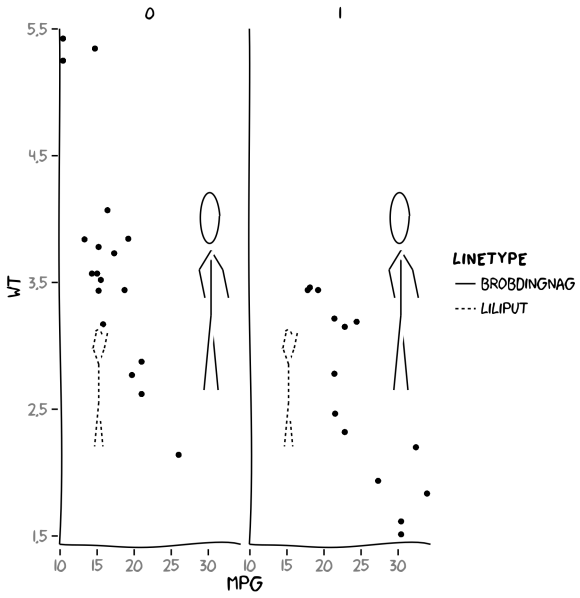
To include cartoon characters in the graph, use the `xkcdman` function.

```
ratioxy <- diff(xrange)/diff(yrange)
mapping <- aes(x,  y,
               scale,
               ratioxy,
               angleofspine ,
               anglerighthumerus,
               anglelefthumerus,
               anglerightradius,
               angleleftradius,
               anglerightleg,
               angleleftleg,
               angleofneck,
               linetype=city)
dataman <- data.frame(x= c(15,30), y=c(3, 4),
                      scale = c(0.3,0.51) ,
                      ratioxy = ratioxy,
                      angleofspine =  -pi/2  ,
                      anglerighthumerus = c(pi/4, -pi/6),
                      anglelefthumerus = c(pi/2 + pi/4, pi +pi/6),
                      anglerightradius = c(pi/3, -pi/3),
                      angleleftradius = c(pi/3, -pi/3),
                      anglerightleg = 3*pi/2  - pi / 12,
                      angleleftleg = 3*pi/2  + pi / 12 ,
                      angleofneck = runif(1, 3*pi/2-pi/10, 3*pi/2+pi/10),
                      city=c("Liliput","Brobdingnag"))
q <- ggplot() + geom_point(aes(mpg, wt, colour=as.character(vs)), data=mtcars) +
 xkcdaxis(xrange,yrange) + xkcdman(mapping, dataman)
q
```

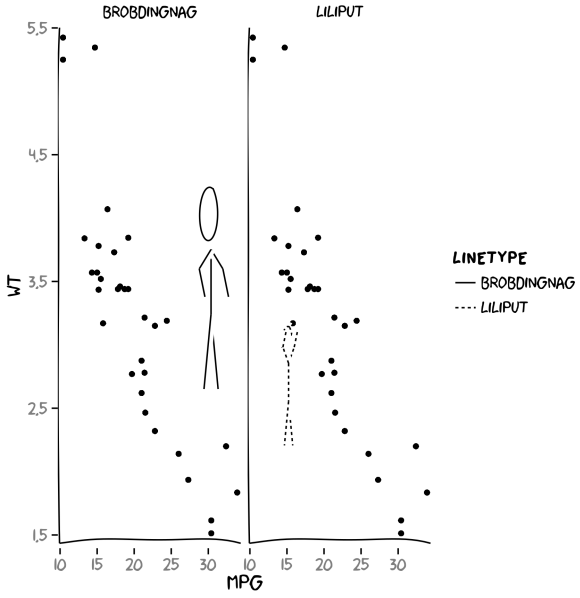


4.1 Facets

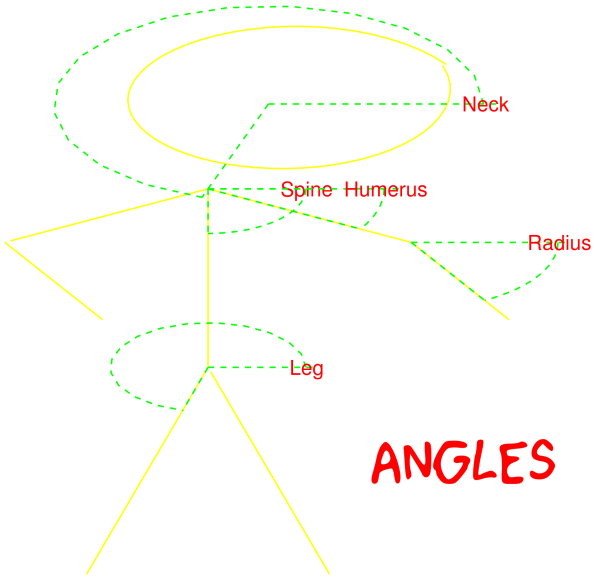
```
ggplot() + geom_point(aes(mpg, wt), data=mtcars) +
 xkcdaxis(xrange,yrange) + xkcdman(mapping, dataman) +
 facet_grid(.~vs)
```




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



4.2 Angles of the xkcdman



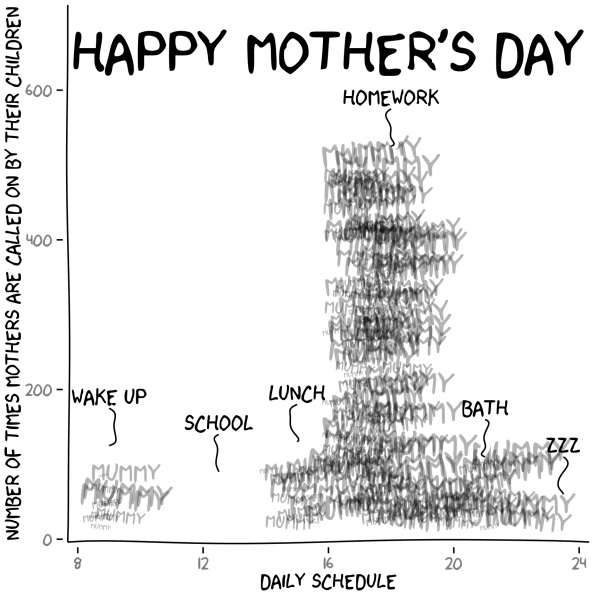
5 Mother's day

5.1 Bar chart

```
mommy <- read.table(sep=" ",text ="
 100
 0
0 0
1 0
2 0
3 0
4 100
5 100
6 500
7 420
8 75
9 50
0 100
1 40
2 0
)
names(mommy) <- c("hour","number")
data <- mommy
data$xmin <- data$hour - 0.25
```

```
data$xmax <- data$xmin + 1
data$ymin <- 0
data$ymax <- data$number
xrange <- range(8, 24)
yrange <- range(min(data$ymin) + 10 , max(data$ymax) + 200)
ratioxy <- diff(xrange)/diff(yrange)
timelabel <-  function(text,x,y) {
 if( "xkcd" %in% font.families()){
   te1 <- annotate("text", x=x, y = y + 65, label=text, size = 6,family ="xkcd")
 } else {
   te1 <- annotate("text", x=x, y = y + 65, label=text, size = 6)}
 list(te1,
 xkcdline(aes(xbegin=xbegin, ybegin= ybegin, xend=xend,yend=yend),
          data.frame(xbegin=x,ybegin= y + 50, xend=x,yend=y), xjitteramount = 0.5))
 }
n <- 1800
set.seed(123)
x <- runif(n, xrange[1],xrange[2] )
y <- runif(n, yrange[1],yrange[2] )
inside <- unlist(lapply(1:n, function(i) any(data$xmin <= x[i] & x[i] < data$xmax &
                           data$ymin <= y[i] & y[i] < data$ymax)))
x <- x[inside]
y <- y[inside]
nman <- length(x)
sizer <- round(runif(nman, 1, 10),0)
angler <- runif(nman, -10,10)
if( "xkcd" %in% font.families()){
 <- ggplot() +
 geom_text(aes(x,y,label="Mummy",angle=angler,hjust=0, vjust=0),
           family="xkcd",size=sizer,alpha=0.3) +
 xkcdaxis(xrange,yrange) +
 annotate("text", x=16, y = 650,
          label="Happy Mother's day", size = 16,family ="xkcd") +
 xlab("daily schedule") +
 ylab("Number of times mothers are called on by their children") +
 timelabel("Wake up", 9, 125) + timelabel("School", 12.5, 90) +
 timelabel("Lunch", 15, 130) +
 timelabel("Homework", 18, 525) +
 timelabel("Bath", 21, 110) +
 timelabel("zzz", 23.5, 60)
 else {
 <- ggplot() +
 geom_text(aes(x,y,label="Mummy",angle=angler,hjust=0, vjust=0),
           size=sizer,alpha=0.3) +
 xkcdaxis(xrange,yrange) +
 annotate("text", x=16, y = 650,
          label="Happy Mother's day", size = 16) +
 xlab("daily schedule") +
 ylab("Number of times mothers are called on by their children") +
```

```
  timelabel("Wake up", 9, 125) + timelabel("School", 12.5, 90) +
  timelabel("Lunch", 15, 130) +
  timelabel("Homework", 18, 525) +
  timelabel("Bath", 21, 110) +
  timelabel("zzz", 23.5, 60)}
p
```



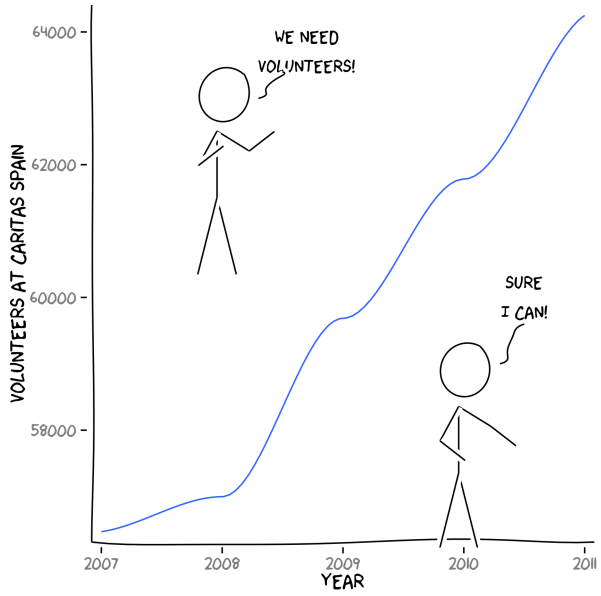
6 Volunteers at Cáritas Spain

6.1 Scatterplot

```
volunteers <- data.frame(year=c(2007:2011), number=c(56470, 56998, 59686, 61783, 64251))
xrange <- range(volunteers$year)
yrange <- range(volunteers$number)
ratioxy <-  diff(xrange) / diff(yrange)
mapping <- aes(x,  y,
               scale,
               ratioxy,
               angleofspine ,
               anglerighthumerus,
               anglelefthumerus,
               anglerightradius,
               angleleftradius,
               anglerightleg,
               angleleftleg,
               angleofneck)
```

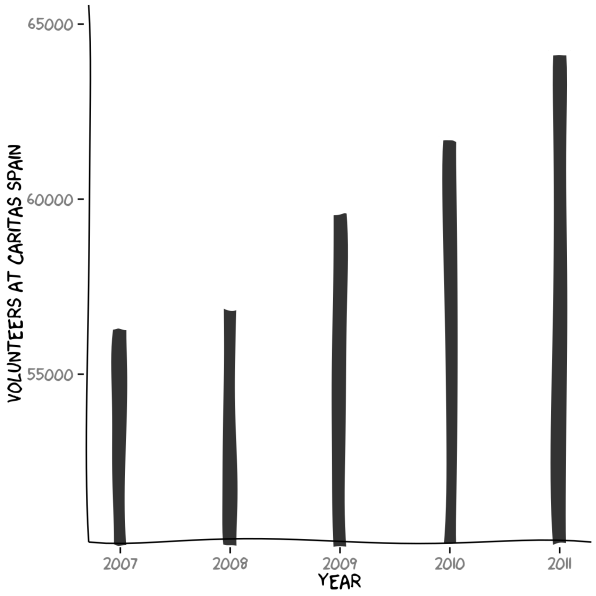
```
dataman <- data.frame( x= c(2008,2010), y=c(63000, 58850),
                       scale = 1000 ,
                       ratioxy = ratioxy,
                       angleofspine =  -pi/2  ,
                       anglerighthumerus = c(-pi/6, -pi/6),
                       angleleftthumerus = c(-pi/2 - pi/6, -pi/2 - pi/6),
                       anglerightradius = c(pi/5, -pi/5),
                       angleleftradius = c(pi/5, -pi/5),
                       angleleftleg = 3*pi/2  + pi / 12 ,
                       anglerightleg = 3*pi/2  - pi / 12,
                       angleofneck = runif(1, 3*pi/2-pi/10, 3*pi/2+pi/10))
datalines <- data.frame(xbegin=c(2008.3,2010.5),ybegin=c(63000,59600),
                        xend=c(2008.5,2010.3), yend=c(63400,59000))
p <- ggplot() + geom_smooth(mapping=aes(x=year, y =number), data =volunteers,method="loess")
if( "xkcd" %in% font.families()){
 + xkcdaxis(xrange,yrange) +
 ylab("Volunteers at Caritas Spain") +
 xkcdman(mapping, dataman) +
 annotate("text", x=2008.7, y = 63700, label = "We Need\nVolunteers!", family="xkcd" ) +
 annotate("text", x=2010.5, y = 60000, label = "Sure\nI can!", family="xkcd" ) +
xkcdline(aes(xbegin=xbegin,ybegin=ybegin,xend=xend,yend=yend),datalines, xjitteramount = 0.12)
 else {
 + xkcdaxis(xrange,yrange) +
 ylab("Volunteers at Caritas Spain") +
 xkcdman(mapping, dataman) +
 annotate("text", x=2008.7, y = 63700, label = "We Need\nVolunteers!") +
 annotate("text", x=2010.5, y = 60000, label = "Sure\nI can!") +
xkcdline(aes(xbegin=xbegin,ybegin=ybegin,xend=xend,yend=yend),datalines, xjitteramount = 0.12)

```



6.2 Bar chart

```
data <- volunteers
data$xmin <- data$year - 0.1
data$xmax <- data$year + 0.1
data$ymin <- 50000
data$ymax <- data$number
xrange <- range(min(data$xmin)-0.1, max(data$xmax) + 0.1)
yrange <- range(min(data$ymin)+500, max(data$ymax) + 1000)
mapping <- aes(xmin=xmin,ymin=ymin,xmax=xmax,ymax=ymax)
p <- ggplot() + xkcdrect(mapping,data) +
 xkcdaxis(xrange,yrange) +
 xlab("Year") + ylab("Volunteers at Caritas Spain")
p
```



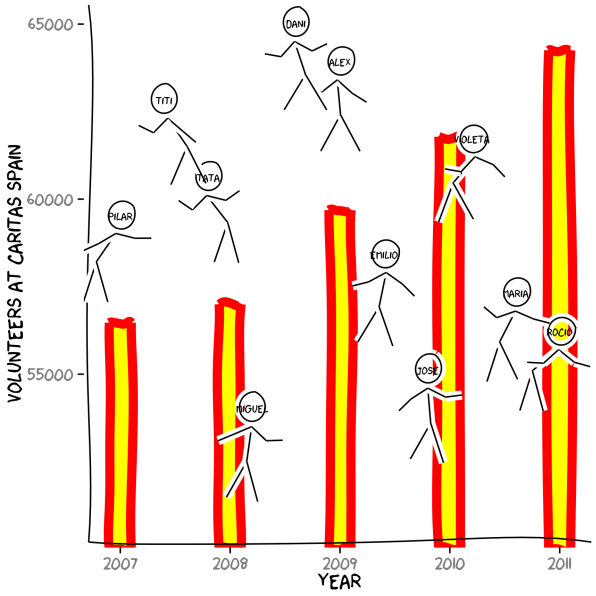
6.3 Bar chart

```
data <- volunteers
data$xmin <- data$year - 0.1
data$xmax <- data$year + 0.1
data$ymin <- 50000
data$ymax <- data$number
xrange <- range(min(data$xmin) - 0.1, max(data$xmax) + 0.1)
yrange <- range(min(data$ymin) +500 , max(data$ymax) + 1000)
ratioxy <- diff(xrange)/diff(yrange)
plotmen <- function(x,y, scale,ratioxy,...){
mapping <- aes(x,  y,
                scale,
                ratioxy,
                angleofspine ,
                anglerighthumerus,
                anglelefthumerus,
                anglerightradius,
                angleleftradius,
                anglerightleg,
                angleleftleg,
                angleofneck)
 n <- length(x)
 data <- data.frame(x=x,
                    y=y,
                    scale = scale,
```

```
                    ratioxy = ratioxy,
                    angleofspine = runif(n, - pi/2 - pi/3, -pi/2 + pi/3),
                    anglerighthumerus = runif(n, -pi/6- pi/10, - pi/6 + pi/10),
                    anglelefthumerus = runif(n, pi + pi/6 -pi/10, pi + pi/6 + pi/10),
                    anglerightradius =  runif(n, -pi/4, pi/4),
                    angleleftradius =  runif(n, pi -pi/4, pi + pi/4),
                    anglerightleg = runif(n,  3* pi/2 + pi/12 , 3* pi/2  + pi/12 + pi/10),
                    angleleftleg = runif(n, 3* pi/2  - pi/12 - pi/10, 3* pi/2 - pi/12 ),
                    angleofneck = runif(n, -pi/2-pi/10, -pi/2 + pi/10))
 xkcdman(mapping,data,...)

volun <- c("Miguel","Jose","Rocio","Maria","Emilio",
          "Pilar","Tata","Violeta","Titi","Alex","Dani")
positionx <- seq(2007,2011, length.out=length(volun))
set.seed(123)
positionx <- positionx[sample(1:length(volun),length(volun))]
positiony <- seq(54000,65000,length.out = length(volun))
a <- ggplot() +
 xkcdrect(mapping,data,fill="yellow",colour="red") +
 xkcdaxis(xrange,yrange) +
 xlab("Year") + ylab("Volunteers at Caritas Spain")
b <- a + plotmen(positionx, positiony,1000, ratioxy)
if( "xkcd" %in% font.families()){
 <- b + annotate("text",
                 x= positionx, y= positiony,
                 label=volun, family="xkcd",size=3)
 else {
 <- b + annotate("text",
                 x= positionx, y= positiony,
                 label=volun,size=3)

c
```



7 Saving the graphs

7.1 png

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

7.2 pdf

Remember to embed the fonts!

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

```

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