An introduction to the xkcd package

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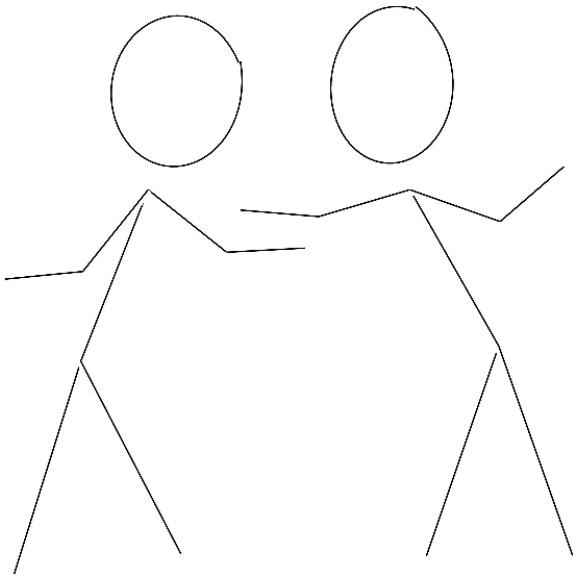
Abstract



Contents

1 The XKCD fonts **2**

2 Installing xkcd **4**

3 Axis **4**

4 Cartoon characters **5**
4.1 Facets 6
4.2 Angles of the xkcdman 8

5 Mother's day **8**
5.1 Bar chart 8

6 Volunteers at Cáritas Spain **10**
6.1 Scatterplot 10
6.2 Bar chart 12
6.3 Bar chart 13

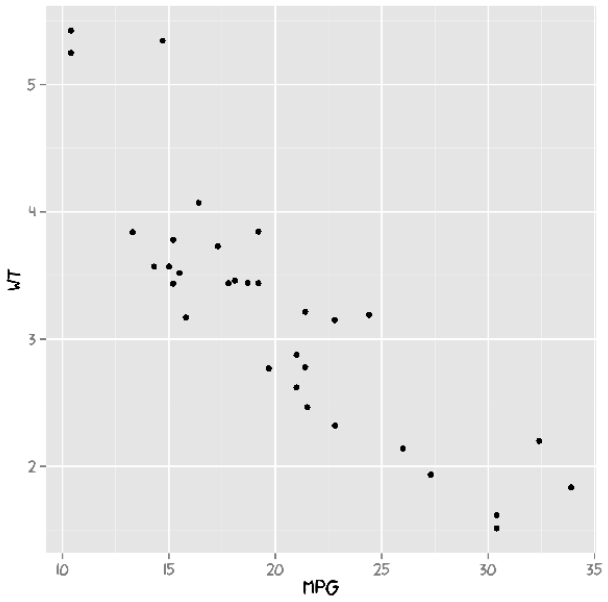
7 Saving the graphs **15**
7.1 png 15
7.2 pdf 15

8 References **15**

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(extrafont)
> library(ggplot2)
> if( "xkcd" %in% fonts()) {
 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

If the XKCD fonts, or other fonts, are not installed in the system, you may follow the tutorial *Change fonts in ggplot2, and create xkcd style graphs* to install them.

Or read the documentation of the package `extrafont`, with detailed instructions in `https://github.com/wch/extrafont`:

- Option I:

```
> ## Borrowed from
> ## fibosworld 2013. Change fonts in ggplot2, and create xkcd style graphs
> library(extrafont)
> if(! "xkcd" %in% fonts()) {
   xkcdFontURL <- "http://simonsoftware.se/other/xkcd.ttf"
   download.file(xkcdFontURL,dest="xkcd.ttf")
   font_import(".")   ## because we downloaded to working directory
   loadfonts()
 }
```

- Option II. The first option does not work for me (on a Linux machine). I installed the fonts in this way:

```
> library(extrafont)
> download.file("http://simonsoftware.se/other/xkcd.ttf", dest="xkcd.ttf")
> system("mkdir ~/.fonts")
> system("cp xkcd.tff -t ~/.fonts")
```

```
> library(extrafont)
> font_import()
> loadfonts()
```

If you want to uninstall the fonts, you may remove the following packages:

```
> remove.packages(c("extrafonts","extrafontdb"))
```

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:

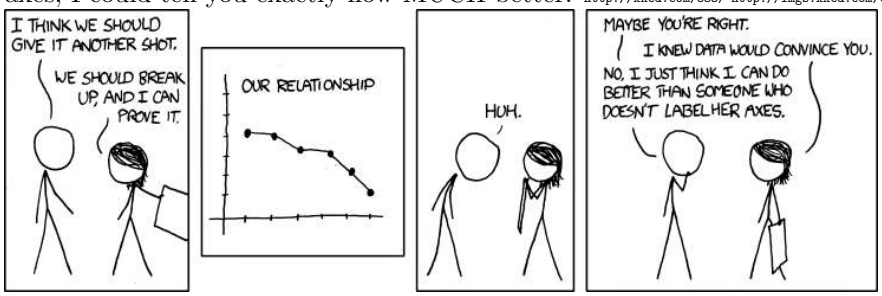
```
> help(package="xkcd")
> vignette("xkcd-intro") # it opens the pdf
> browseVignettes(package = "xkcd") # To browse the pdf, R and Rnw
```

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

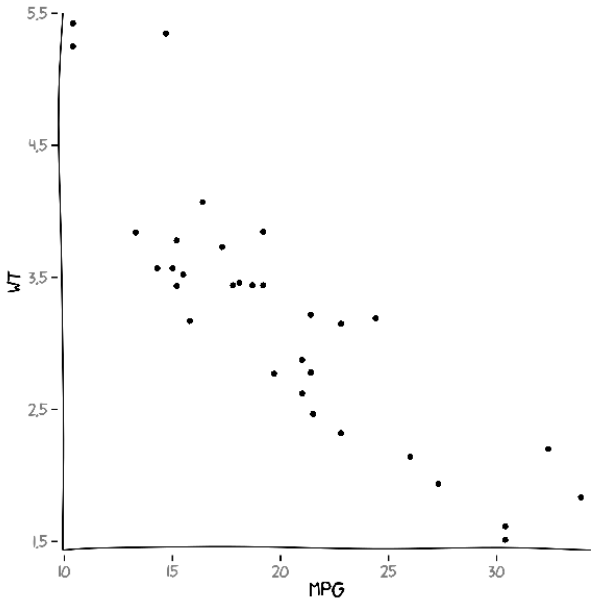
```
> library(xkcd)
```

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
```

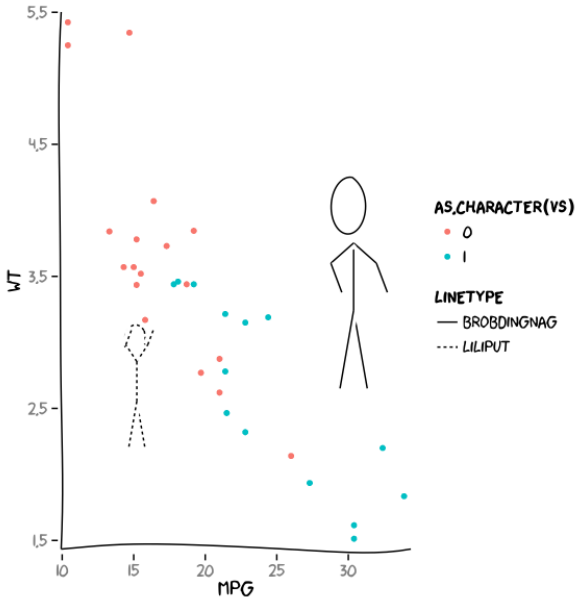


4 Cartoon characters

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

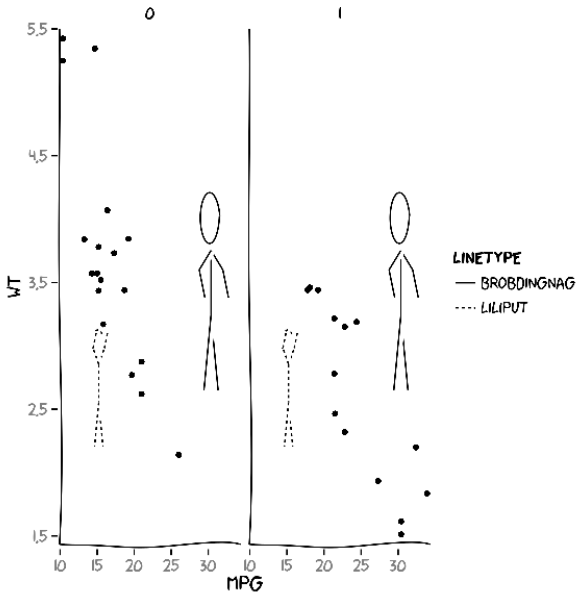
```
> ratioxy <- diff(xrange)/diff(yrange)
> mapping <- aes(x,  y,
                 scale,
                 ratioxy,
                 angleofspine ,
                 anglerighthumerus,
                 anglelefthumerus,
                 anglerightradius,
                 angleleftradius,
                 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
```

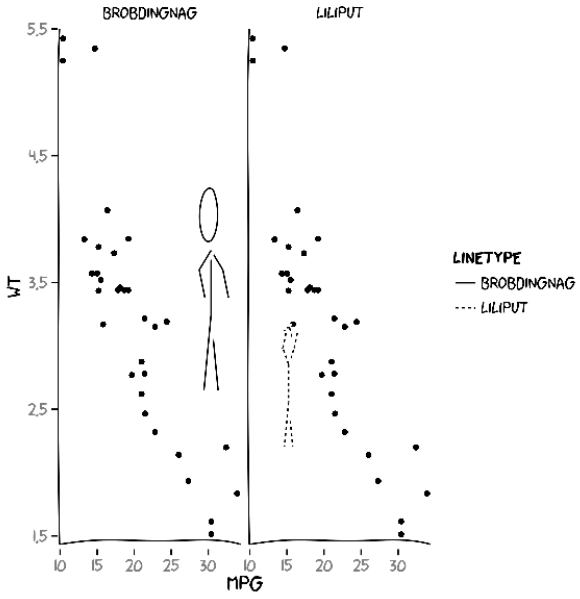


4.1 Facets

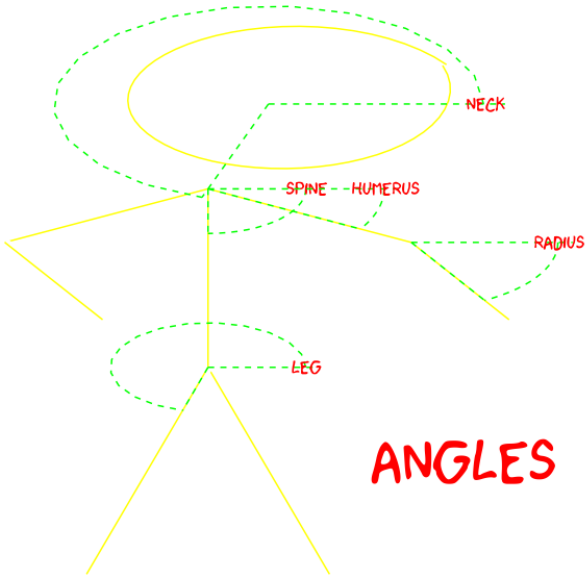
```
>     ggplot() + geom_point(aes(mpg, wt), data=mtcars) +
      xkcdaxis(xrange,yrange) + xkcdman(mapping, dataman) +
      facet_grid(.~vs)
```




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



4.2 Angles of the xkcdman



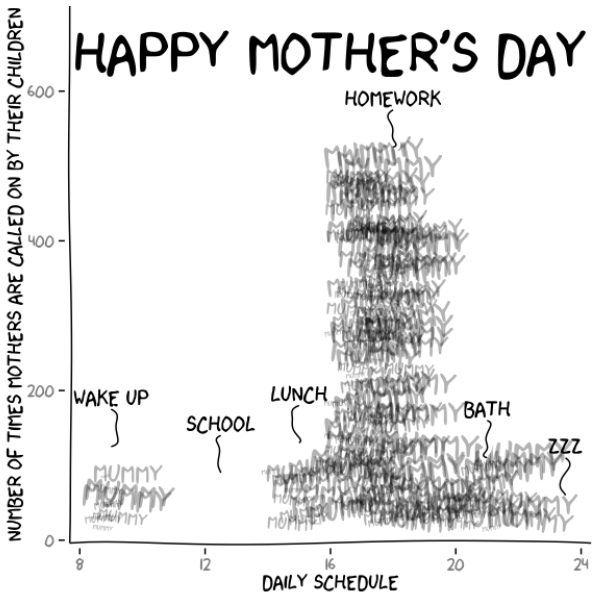
5 Mother's day

5.1 Bar chart

```
> mommy <- read.table(sep=" ",text ="
 8 100
 9 0
 10 0
 11 0
 12 0
 13 0
 14 100
 15 100
 16 500
 17 420
 18 75
 19 50
 20 100
 21 40
 22 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$ymax) + 200)
> ratioxy <- diff(xrange)/diff(yrange)
> timelabel <-  function(text,x,y) {
   if( "xkcd" %in% fonts()) {
     te1 <- annotate("text", x=x, y = y + 65, label=text, size = 6,family ="xkcd")
   } else {
     te1 <- annotate("text", x=x, y = y + 65, label=text, size = 6)}
   list(te1,
   xkcdline(aes(xbegin=xbegin, ybegin= ybegin, xend=xend,yend=yend),
            data.frame(xbegin=x,ybegin= y + 50, xend=x,yend=y), xjitteramount = 0.5))
   }
> n <- 1800
> set.seed(123)
> x <- runif(n, xrange[1],xrange[2] )
> y <- runif(n, yrange[1],yrange[2] )
> inside <- unlist(lapply(1:n, function(i) any(data$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% fonts()) {
 p <- 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 {
 p <- 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
>
```

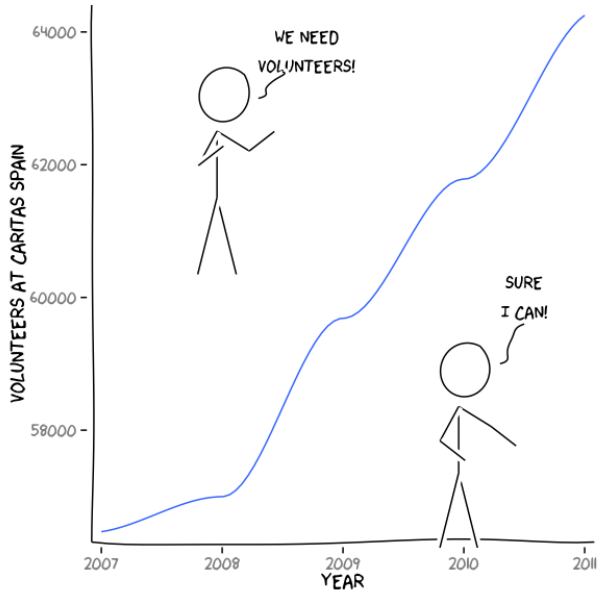


6 Volunteers at Cáritas Spain

6.1 Scatterplot

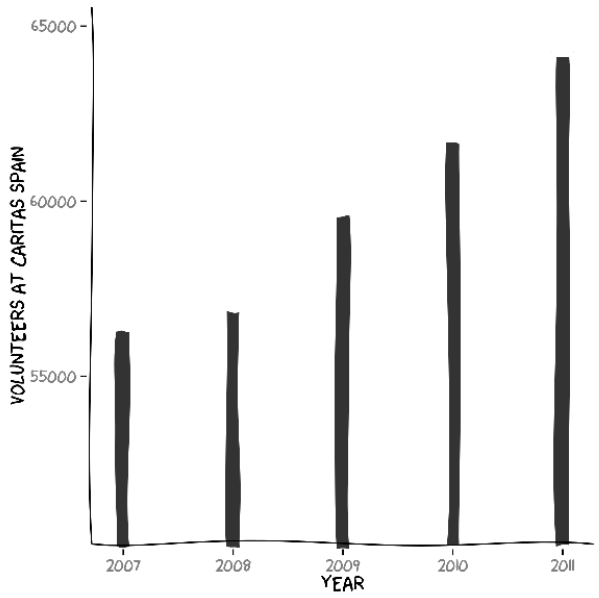
```
> volunteers <- data.frame(year=c(2007:2011), number=c(56470, 56998, 59686, 61783, 64251))
> xrange <- range(volunteers$year)
> yrange <- range(volunteers$number)
> ratioxy <-  diff(xrange) / diff(yrange)
> mapping <- aes(x,  y,
                 scale,
```

```
                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),
                       anglelefthumerus = 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% fonts()) {
 p + 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 {
 p + 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

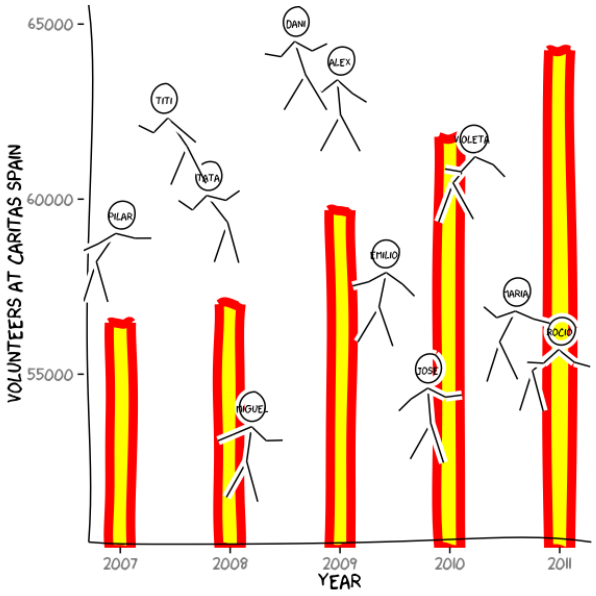
```
> data <- volunteers
> data$xmin <- data$year - 0.1
> data$xmax <- data$year + 0.1
> data$ymin <- 50000
> data$ymax <- data$number
> xrange <- range(min(data$xmin)-0.1, max(data$xmax) + 0.1)
> yrange <- range(min(data$ymin)+500, max(data$ymax) + 1000)
> mapping <- aes(xmin=xmin,ymin=ymin,xmax=xmax,ymax=ymax)
> 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% fonts()) {
 c <- b + annotate("text",
                   x= positionx, y= positiony,
                   label=volun, family="xkcd",size=3)
 } else {
 c <- b + annotate("text",
                   x= positionx, y= positiony,
                   label=volun,size=3)
 }
> c
```



7 Saving the graphs

7.1 png

```
> png("myfigure.png")
> print(p)
> dev.off()
```

7.2 pdf

Remember to embed the fonts!

```
> ## Borrowed from
> ## fibosworld 2013. Change fonts in ggplot2, and create xkcd style graphs
> ## \url{http://fibosworld.wordpress.com/2013/02/17/change-fonts-in-ggplot2-and-create-xkcd-style-grapl
>
> ggsave("font_ggplot.pdf", plot=p,  width=12, height=4)
> ## needed for Windows - make sure YOU have the correct path for your machine:
> ## Sys.setenv(R_GSCMD = "C:\\Program Files (x86)\\gs\\gs9.06\\bin\\gswin32c.exe")
> embed_fonts("font_ggplot.pdf")
```

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