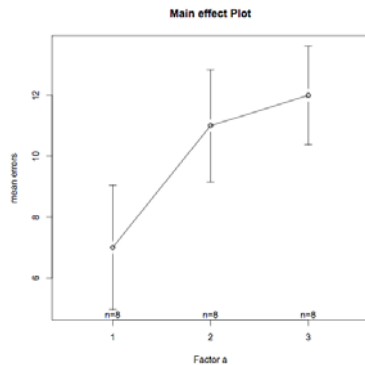


This is a companion document to R4. It includes some extra graphing options for displaying data from two-way between group designs.

### Another way to graph main effects:

```
> library(gplots) # first download and install 'gplots' package, then activate it with a library command  
> plotmeans(errors~A,xlab="Factor A",ylab="mean errors", p=.68, main="Main  
effect Plot",barcol="black")
```



Plots the main effect means with +/- 1 s.e. You can make 95% c.i. bars by setting  $p=.95$  in the statement above. This makes a line graph.

### How about bar graphs?

We can use the means and se's we calculated.

Set up a function that allows error bars to be superimposed. Here it is, copy this into R and type a return.

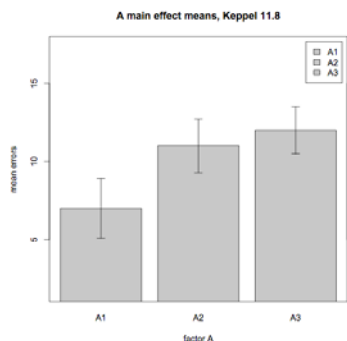
```
> superpose.eb <-  
function(x, y, ebl, ebu = ebl, length = 0.08, ...)  
arrows(x, y + ebu, x, y - ebl, angle = 90, code = 3,  
length = length, ...)
```

Now make the bar graph using R's built in barplot function.

```
> Abar = barplot(Ameans, beside=T, ylim=c(1,18), main="A main effect means,  
Keppel 11.8", xlab="factor A", ylab="mean errors", axes=T, legend.text=T,  
offset=0, xpd=F)  
> box() # add a box around the graph  
> axis(4, labels=F) # add tick marks on the right side
```

Lastly add the error bars using the superpose function. Remember we saved the A main effect standard errors earlier in the vector 'seA'.

```
> superpose.eb(Abar, Ameans, seA, col="black", lwd=1)
```



The superpose.eb function and other useful R things can be found on the website of Raoul Grasman:

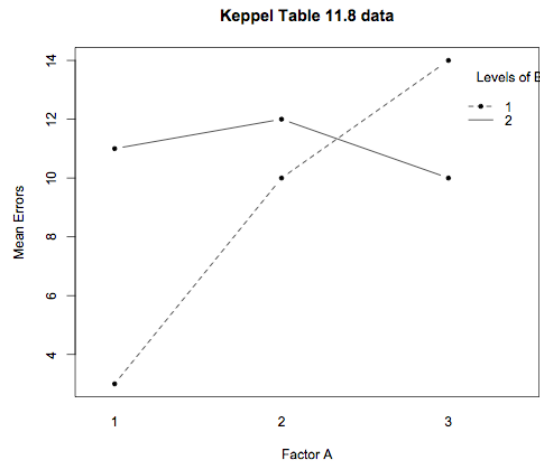
<http://users.fmg.uva.nl/rgrasman/rpages/2005/09/error-bars-in-plots.html>

### Make the interaction plot.

The built-in interaction plot function doesn't include standard errors, but it is quick and easy just to get a look. Plot the interaction and look at it. After you look at it, you can change things to make it look the way you want. `pch` is the character to use to plot the points. Type is whether to draw lines, use points, or both ("b" is for both).

I like **line graphs for thinking** about interactions. Yes, with a qualitative Factor A, the reviewers will tell you to graph it as a bar graph. But first we need to think about our results, and I like line graphs for that.

```
> interaction.plot(A, B, errors, fun=mean, type="b", main="Keppel Table 11.8 data", xlab="Factor A", ylab="Mean Errors", trace.lab="Levels of B", pch=20, fixed=F)
```



### Bar graph with factor B on the x-axis.

Here we are specifying many parameters that can be omitted, to give a sense of how much you can customize your graphs. You can see what all the parameters do by typing `help(bargraph.CI)`.

Remember that you need the `sciplot` library installed and loaded to use this.

```
> bargraph.CI(B, errors, group=A, split=F, col=NULL, angle=NULL, density=NULL, lc=TRUE, uc=TRUE, legend=T, ncol=1, leg.lab=NULL, x.leg=NULL, y.leg=NULL, cex.leg=1, bty="n", bg="white", err.width=if(length(levels(as.factor(B)))>10) 0 else .1, err.col="black", err.lty=1, fun = function(x) mean(x, na.rm=TRUE), xlab="Factor B", ylab="mean errors", ylim=c(0,18), xpd=FALSE, cex.axis=1, yaxt="s", xaxt="s", data=NULL, subset=NULL, main="Keppel Table 11.8")
> box()
> axis(4, labels=F)
```

