

Pitfalls of 'dynamite' plunger plots

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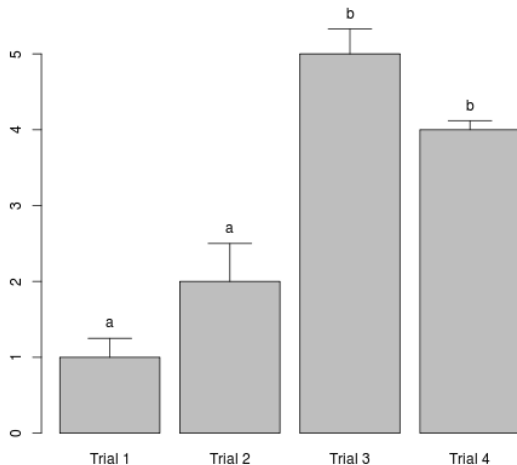
Bridges-Leverhulme Doctoral Training Programme

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*One of my professional pet peeves is dynamite plots.
Sometimes they are incorrectly referred to as bar plots.
Dynamite plots do not have a formal name because they are
not a part of conventional statistical graphics that should be
used in reporting scientific results. But they are everywhere!*

—Tatsuki Koyama (Vanderbilt Biostatistics)

Dynamite plunger plot example



Intuition behind the name and possible consequences!



Problems with plunger plots

- ▶ Wastes ink: only displays mean and standard deviation/error
- ▶ Whiskers may distort height of bar (looks taller?)
- ▶ Conceals data: spread, distribution, outliers, sample size?

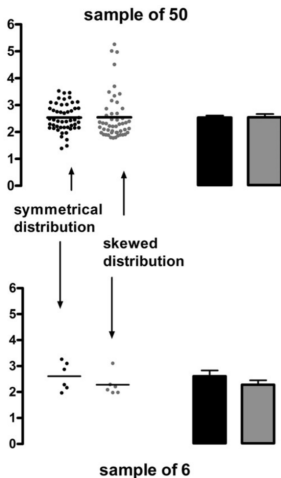
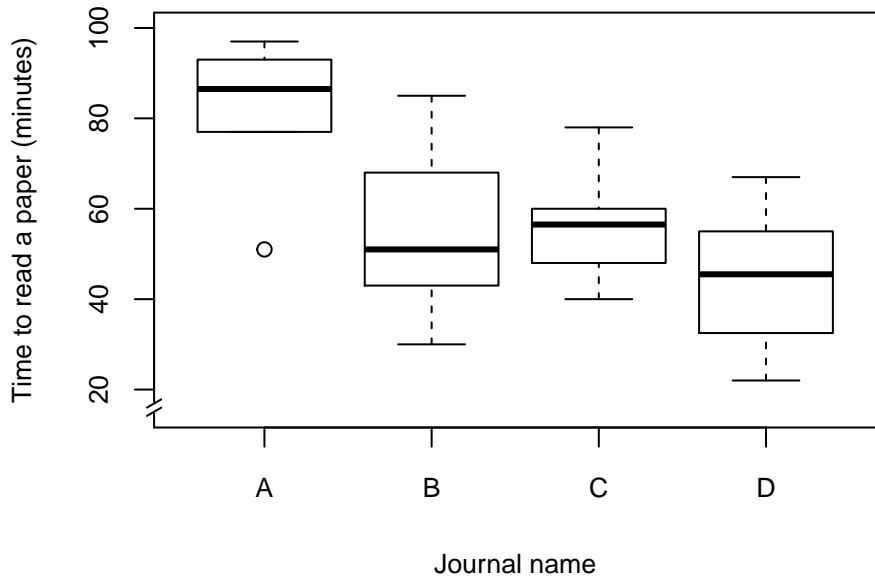


Figure 1

Comparison of a dot plot with a plunger plot. A. two datasets, with the same mean value, displayed as either dot plots or plunger plots. The bars are mean values: error bars indicate SEM. B. subsamples of 6 data points from the above datasets. The line indicates the mean of these values.

Alternative: Box plots. Illustrated with personal data.

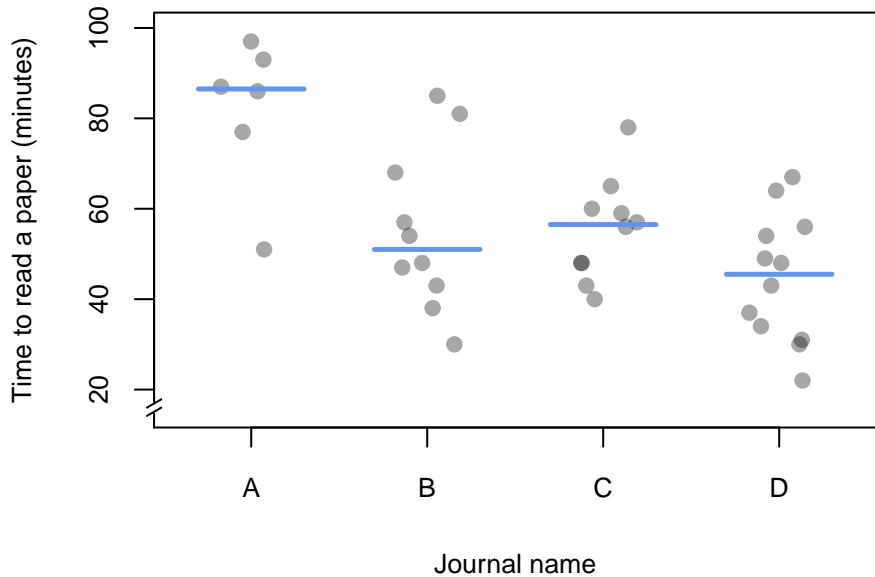


Code for box plots* using personal data.

```
boxplot(df$time~df$journal,  
        ylab="Time to read a paper (minutes)",  
        xlab="Journal name")
```

*Does not include truncated axis; for next talk!

Alternative (small samples): Strip chart, jittered with median values



Code for strip chart* using personal data.

```
stripchart(df$time~df$journal, method="jitter",
           jitter=0.2, cex=1, vertical=TRUE,
           # how much jitter and size of "dots"
           pch=19, col=rgb(0,0,0, alpha=.35),
           # shape and colour + transparency of "dots"
           ylab="Time to read a paper (minutes)",
           xlab="Journal name")

meds <- tapply(df$time,df$journal, median)
#median value of time by journal

loc <- 1:length(meds)

segments(loc-0.3, meds, loc+0.3, meds, lwd=2.5,
         col="cornflowerblue")
#This draws the median lines in "cornflowerblue" colour
```

*Does not include truncated axis; for next talk!

Graphics reveal data, communicate complex ideas and dependencies with clarity, precision and efficiency

—Edward Tufte