SQUARING AWAY THE PANEL FUNCTION IN LATTICE GRAPHICS

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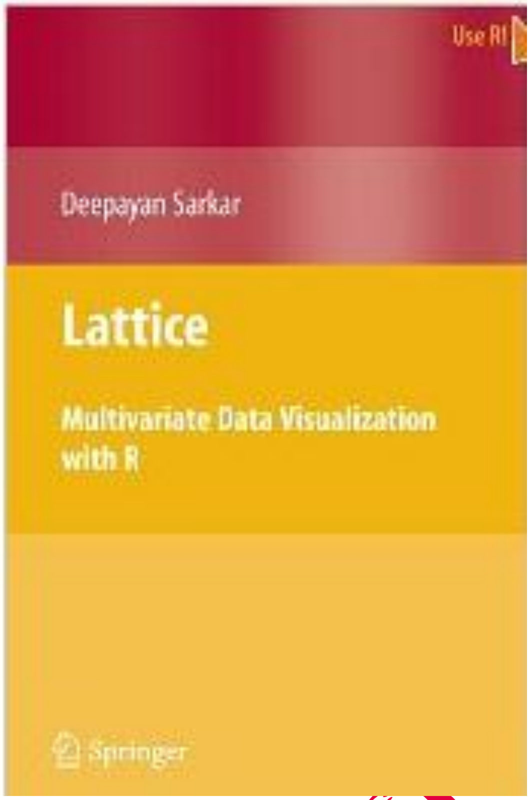
TRELLIS™

SOME OF THE HISTORY

- Included in S-Plus 3.3 for Windows (1995) and 3.4 for UNIX (1996)
- Trellis Display: Modeling Data from Designed Experiments.
  W. S. Cleveland and M. Fuentes (1997). Technical Report, Bell Labs.
- The Visual Design and Control of Trellis Display.
  R. A. Becker, W. S. Cleveland, and M. J. Shyu (1996).
  Journal of Computational and Statistical Graphics, 5:123-155.
- Bill Cleveland's web page: http://stat.bell-labs.com/wsc/webpapers.html

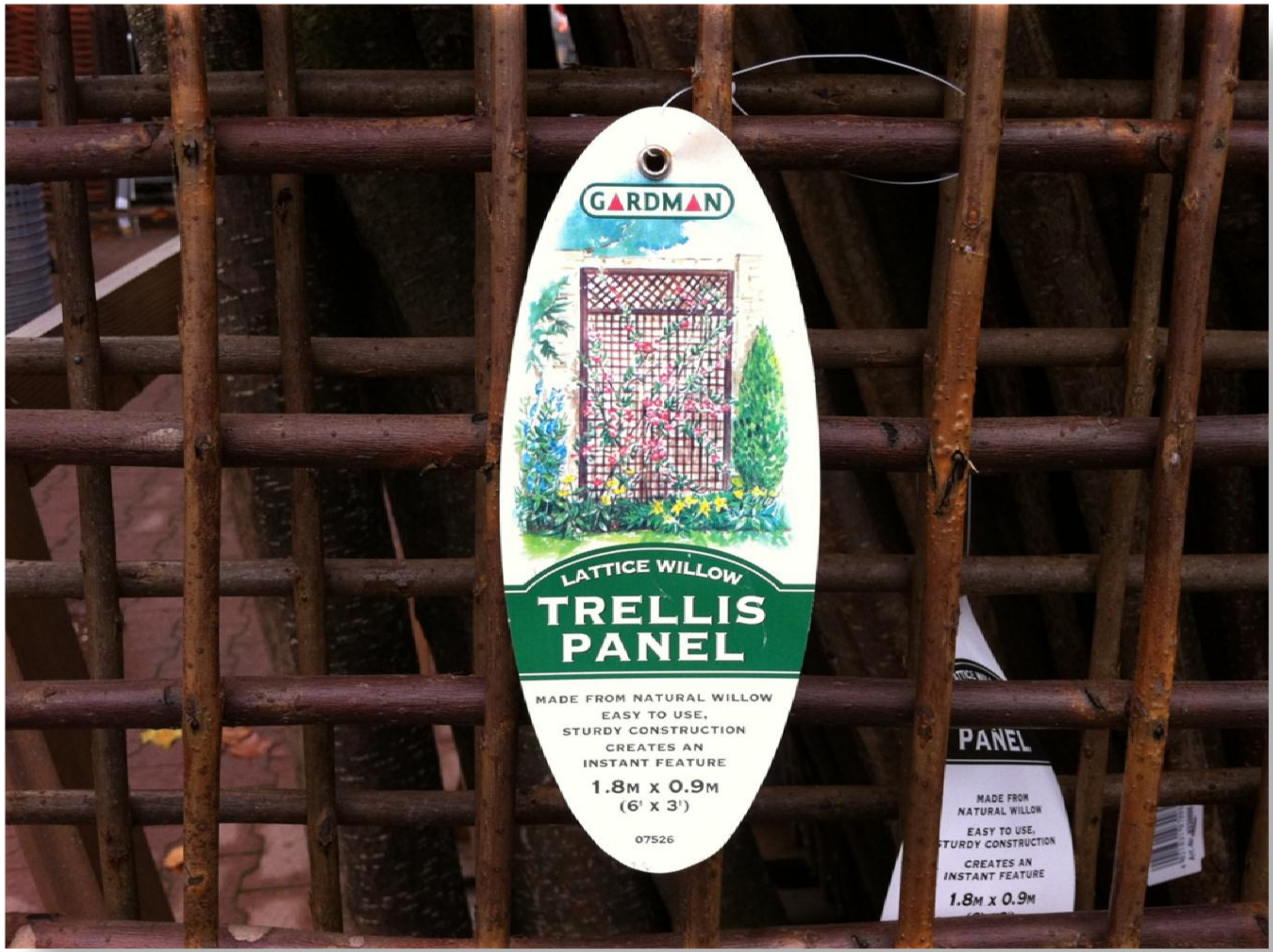
LATTICE AND TRELLIS

- Trademark owned by Statistical Sciences/ Mathsoft/ Insightful/ Tibco
- Trellis is a trademark owned by Tibco Inc
  - Thus the term cannot be used freely
- Therefore, in R, the library is called lattice
- The functionality is essentially identical
  - Lattice offers more functionality



LATTICE / TRELLIS™

WHAT IS IT?



LATTICE

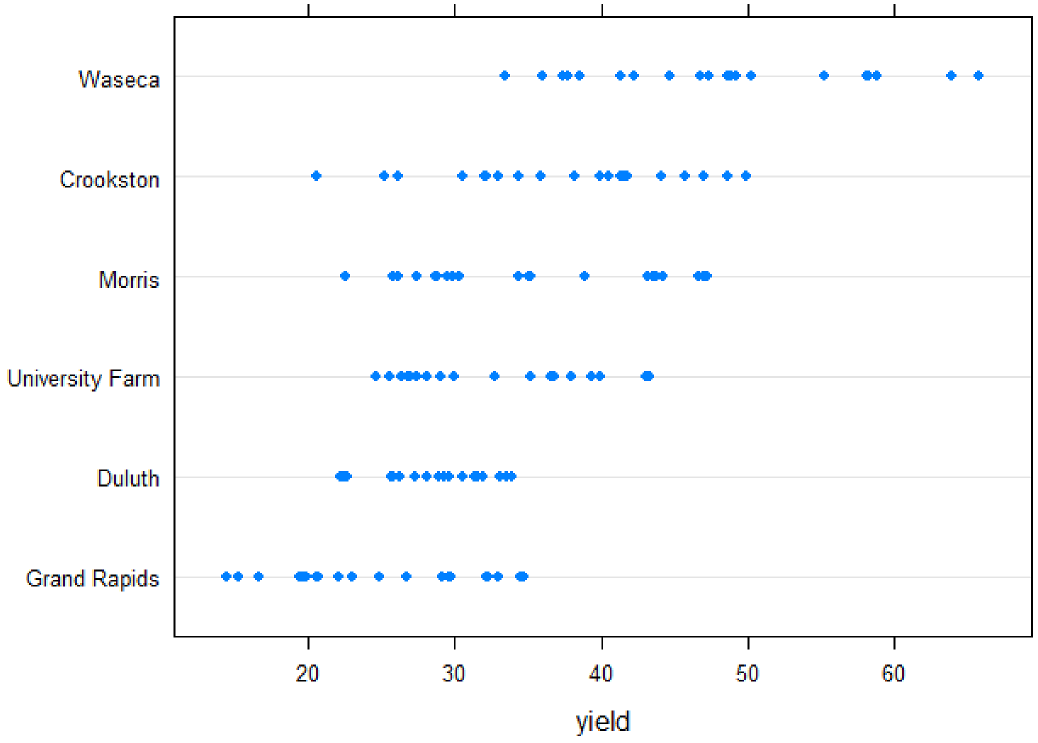
WHAT IS IT? (2)

- A graphical analysis of structure in data
- Analysis of conditional structures
- What is the effect of the drug over time in males versus females
- What is the effect of the drug over time in males versus females in different studies?

EXAMPLE

BARLEY DATA

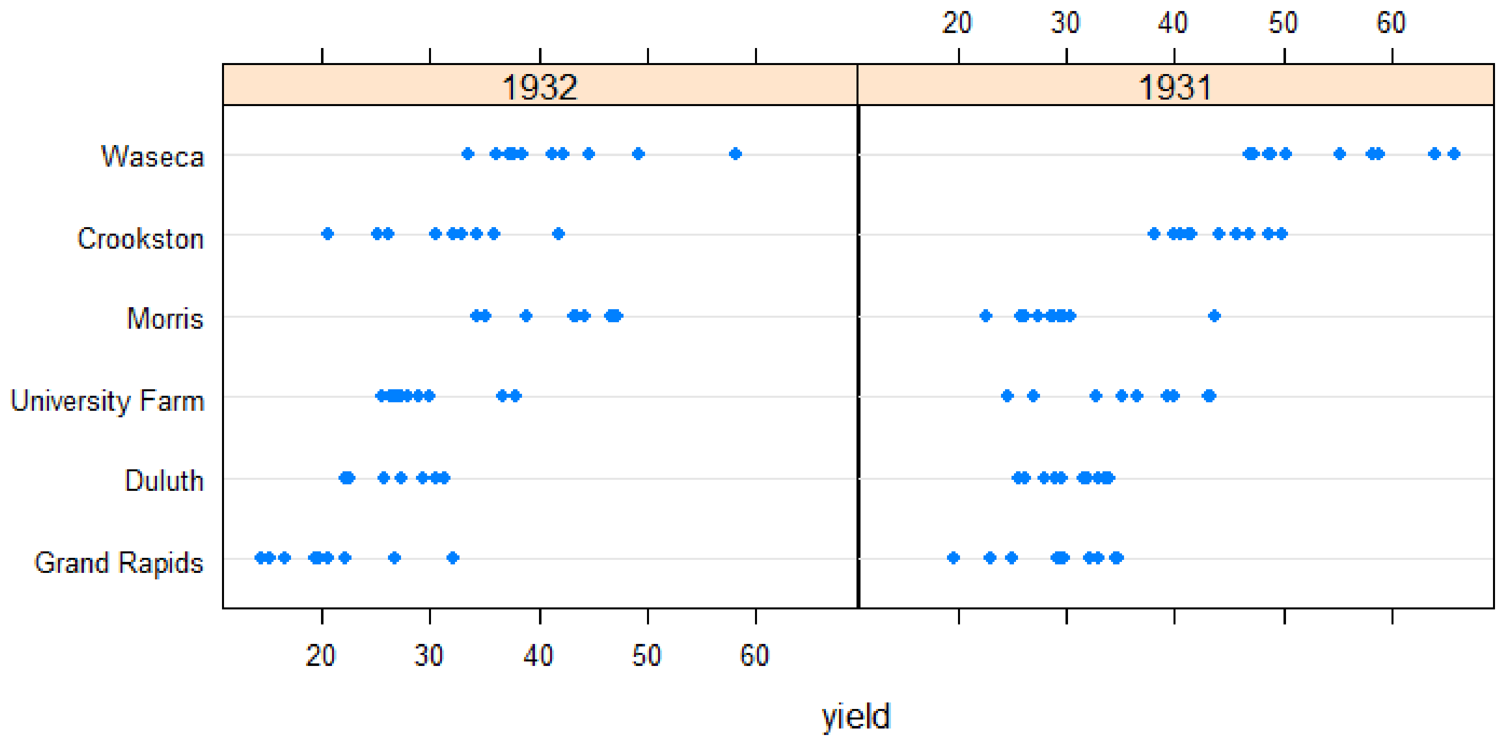
- dotplot(site ~ yield, data=barley)   # note the model-like syntax



EXAMPLE

BARLEY DATA

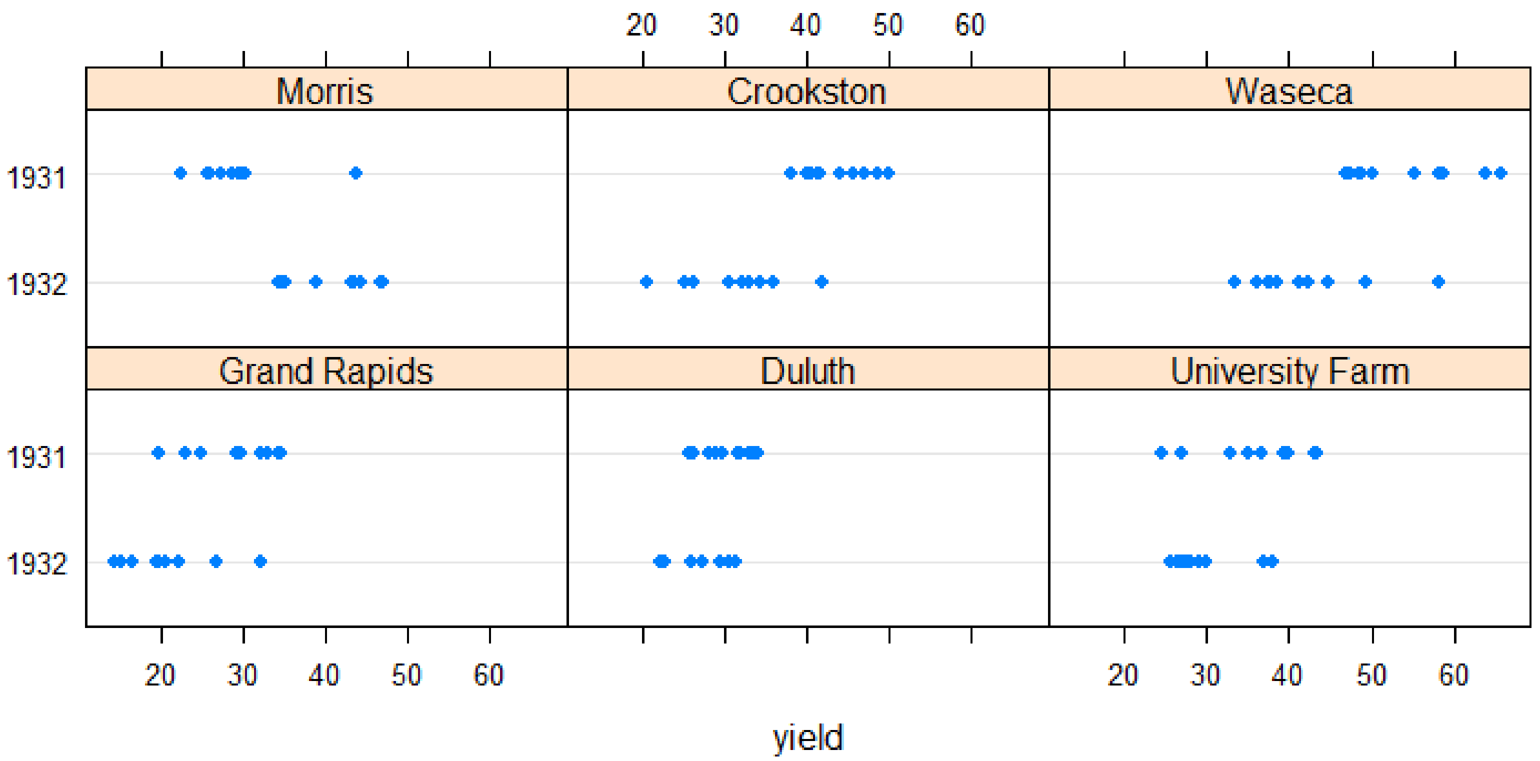
- dotplot(site ~ yield | year, data=barley)



EXAMPLE

BARLEY DATA

- dotplot(year ~ yield | site, data=barley)



ACTELION

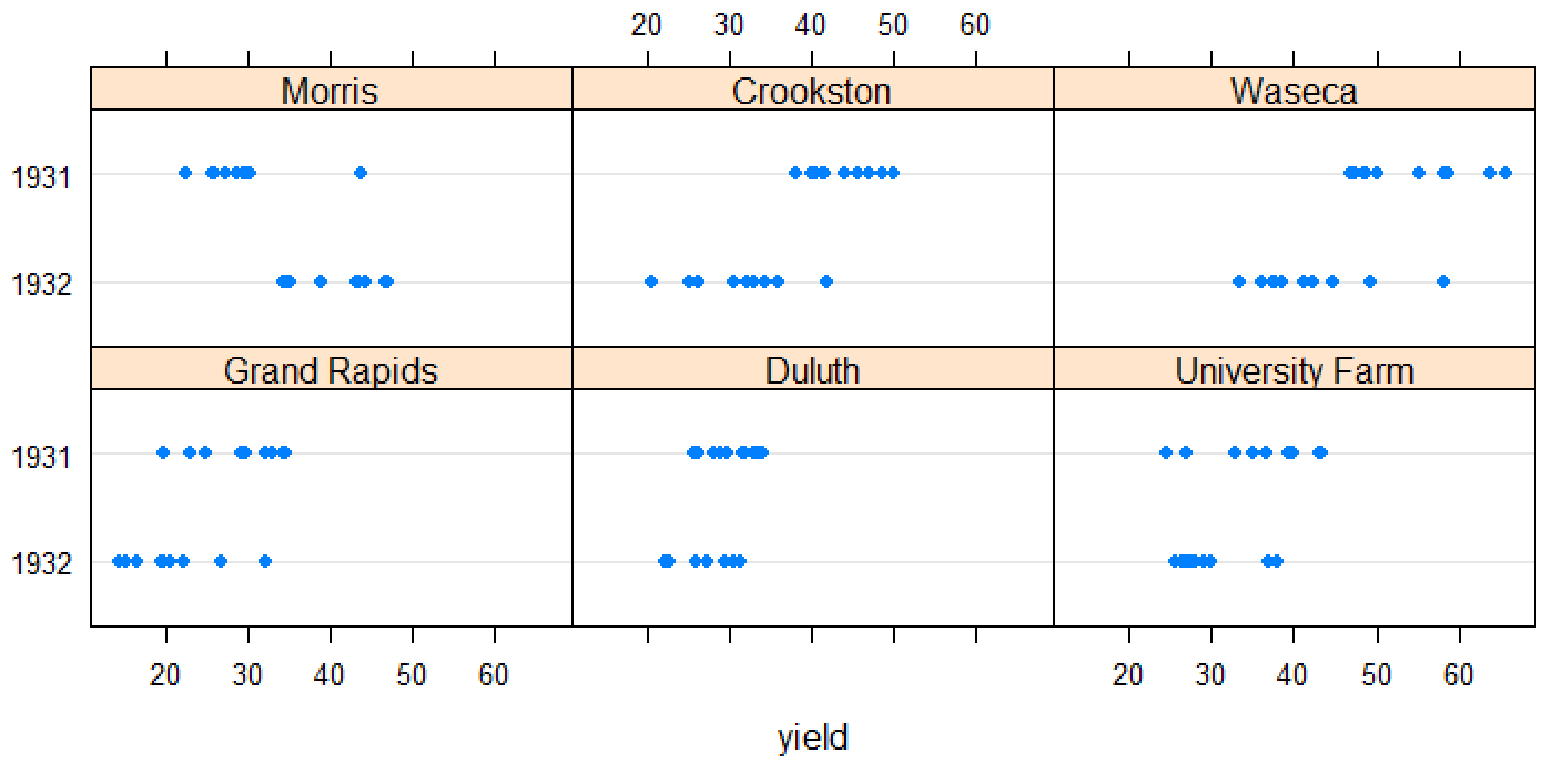
CREATING A SERIES OF GRAPHS

LATTICE GRAPHS CAN BE STORED AS OBJECTS (CLASSICAL PLOTS CAN NOT)

```
graphs <- list()

graphs[["histogram"]] <- histogram(~rnorm(1234))

graphs[["histograms uniform"]] <- histogram(~runif(1234))

graphs[["hist with title"]] <- update(graphs[["histogram"]], main="this is a histogram")

print(graphs) # prints all graphs

png(“graphs.%03d.png”)
    print(graphs)
    dev.off()
    # prints all graphs to files graphs.001.png, graphs.002.png, etc.
```

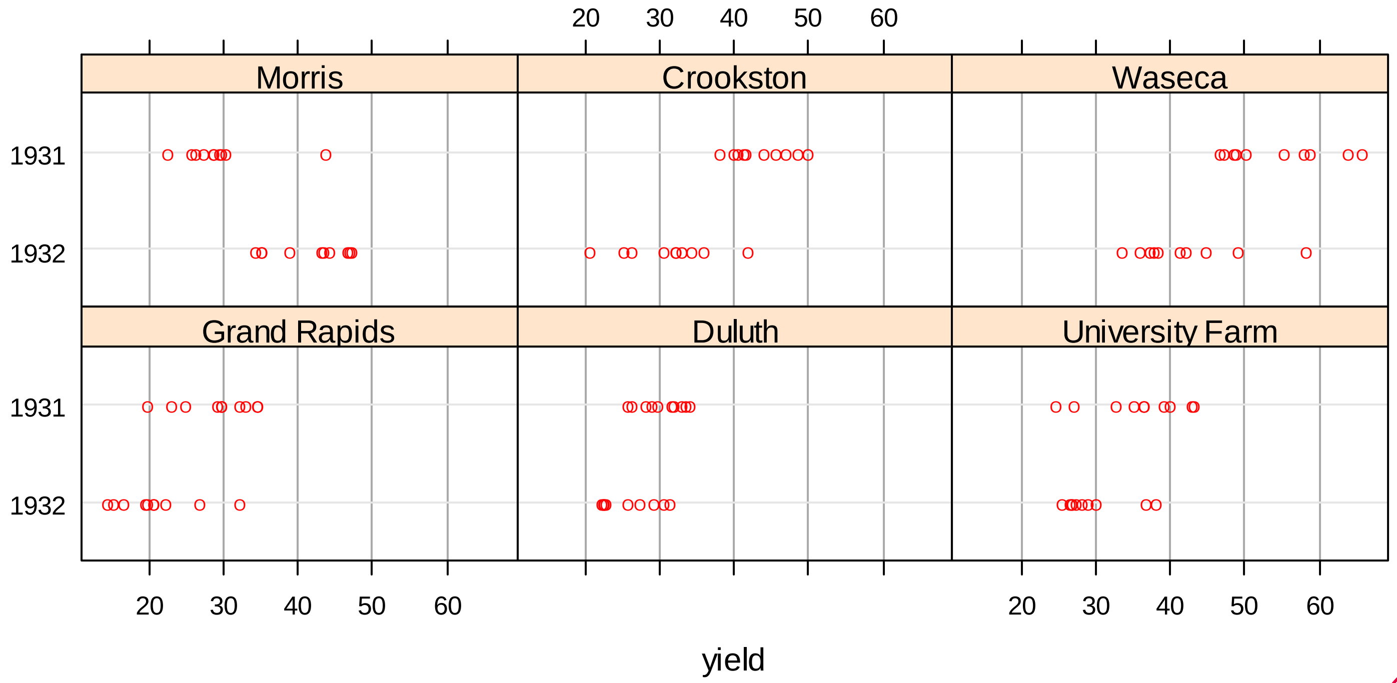
PANEL FUNCTION

- dotplot(year ~ yield | site, data=barley)
- dotplot(year ~ yield | site, data=barley, **panel=panel.dotplot**)



PANEL FUNCTION

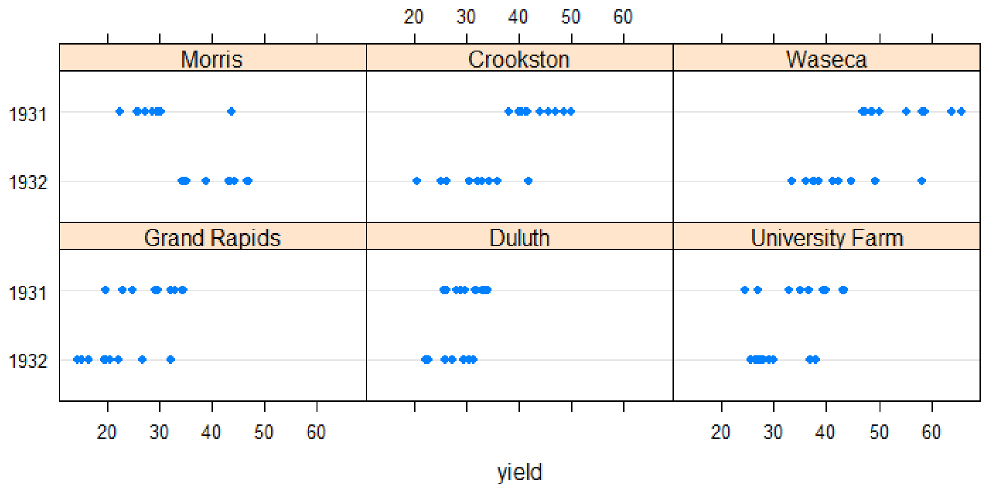
```
dotplot(year ~ yield | site, data=barley,
    panel=function(x, y, ...)
    {
          panel.grid(v=-1, h=0, col="darkgray")
           panel.dotplot(x, y, ..., col="red", pch="O")
    }
)
```



PANEL FUNCTIONS

USE OF ADDITIONAL DATA

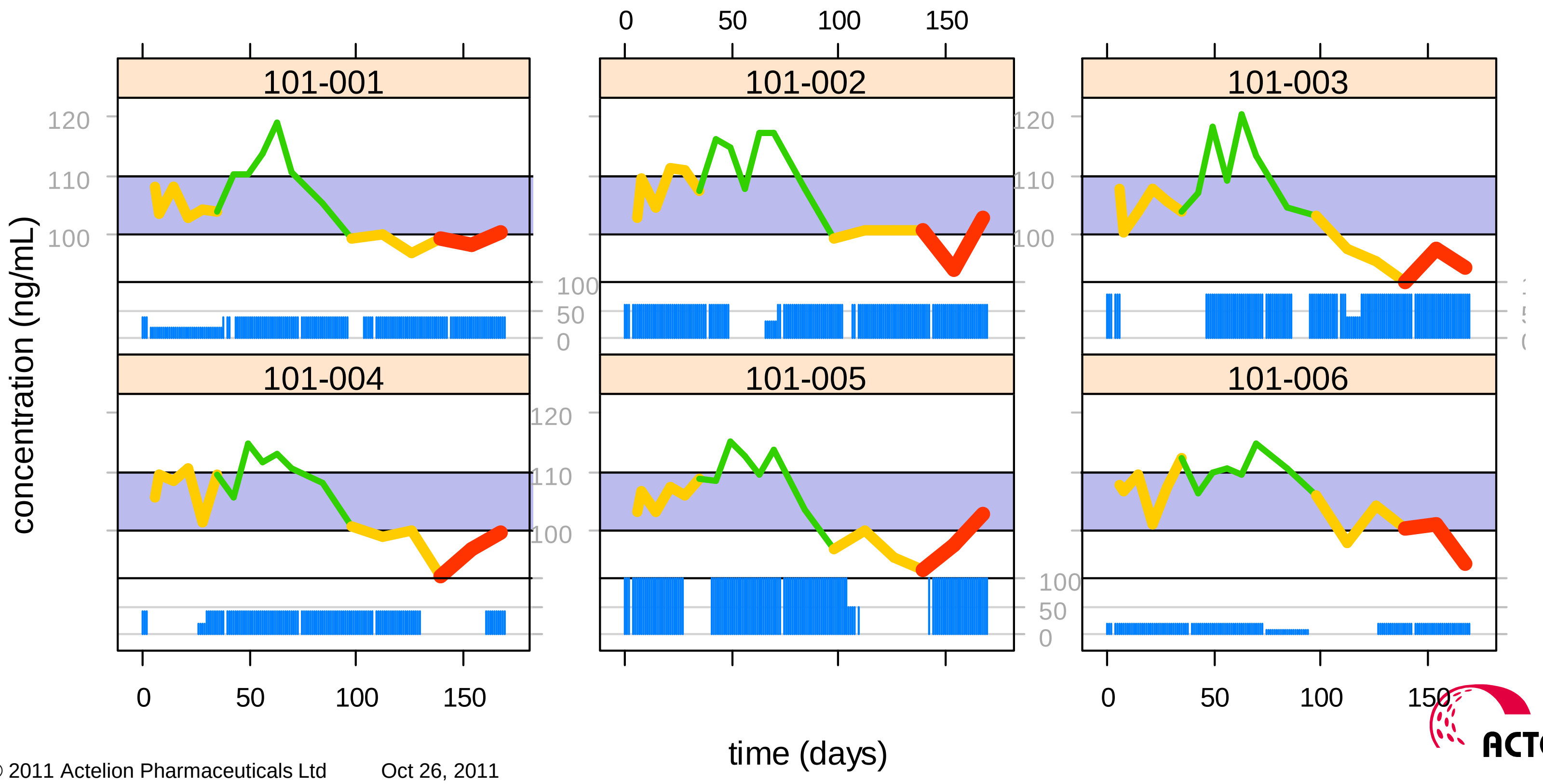
- The lattice framework subsets the x and y data automatically
- Your panel function needs to take x and y as arguments and that's it
- For additional data, you need to
  - Pass it to the panel function
  - Handle the subsetting



PANEL FUNCTIONS

USE OF ADDITIONAL DATA

- Biomarker over time by patient
- The color indicates the disease status (red-progressive, yellow-stable, green-response to treatment)
- The additional data is the disease status, the normal range, and the dose history



ACTELION

PANEL FUNCTIONS

PASSING ADDITIONAL DATA: THIS IS WHERE THE SUBSCRIPTS ARGUMENT COMES IN

- **This is where the subscripts argument to the panel function comes in**

```
xyplot(conc ~ time | ID, data=data,
    limit.up=data$limit.up,
    limit.low=data$limit.low,
    response=data$response,
    xlab=“time (days)”,
    etc. pp.
    panel=function(x, y, …, limit.up, limit.low, response, subscripts)
    {
            panel.abline(limit.up  [subscripts])
            panel.abline(limit.low[subscripts])
            etc.
    }
)
```

PANEL FUNCTIONS

PASSING ADDITIONAL DATA: METHOD 2

```
xyplot(conc ~ time | ID, data=data,
    limit.up=data$limit.up,
    limit.low=data$limit.low,
    response=data$response,
    xlab=“time (days)”,
    etc. pp.
    panel=function(x, y, …, limit.up, limit.low, response, subscripts)
    {
           limit.up <- limit.up[subscripts]
           limit.low <- limit.low[subscripts]
           response <- response[subscripts]

           panel.abline(limit.up)
           panel.abline(limit.low)
           etc.
    }
)
```

PANEL FUNCTIONS

PASSING ADDITIONAL DATA: METHOD 3

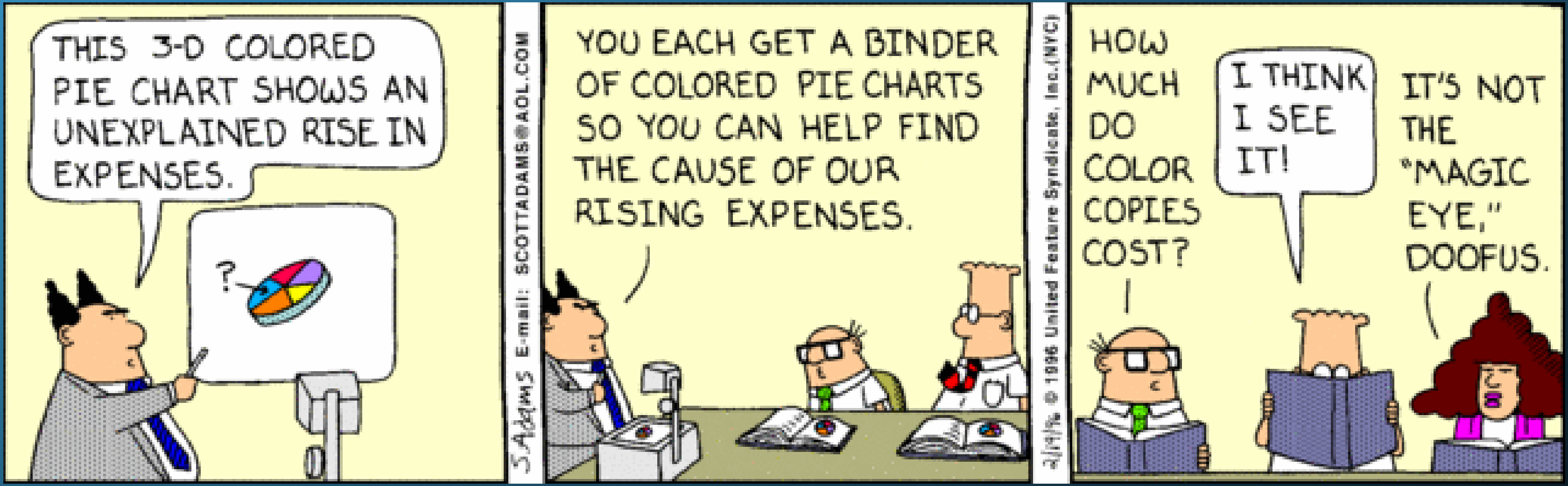
```
xyplot(conc ~ time | ID, data=data, alldata=data,
    xlab="time (days)",
    etc. pp.
    panel=function(x, y, …, alldata, subscripts)
    {
        thisdata <- alldata[subscripts, ]

        panel.abline(thisdata$limit.up)
        panel.abline(thisdata$limit.low)
        etc.
    }
)
```

DISCUSSION

SUBSCRIPTS INTRODUCES MANY ADDITIONAL LINES OF CODE

- Any experience with panel functions?
- Any tricks to share?
- Any other alternatives to using additional data/ subscripts?

THANK YOU.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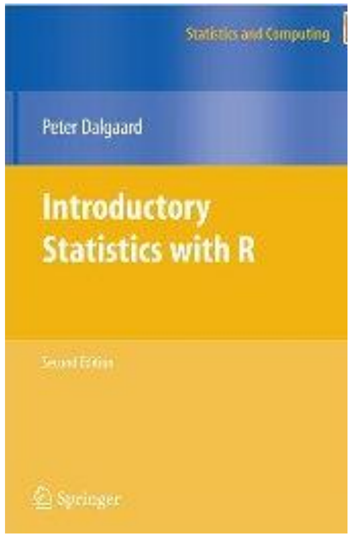
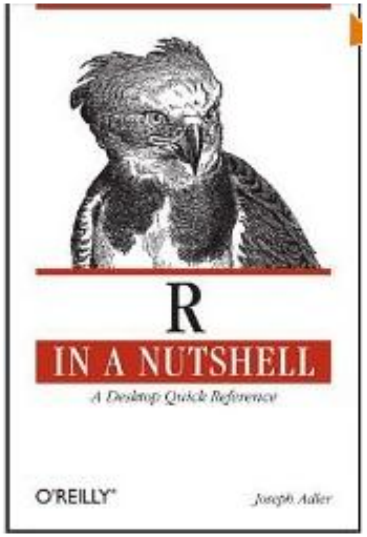
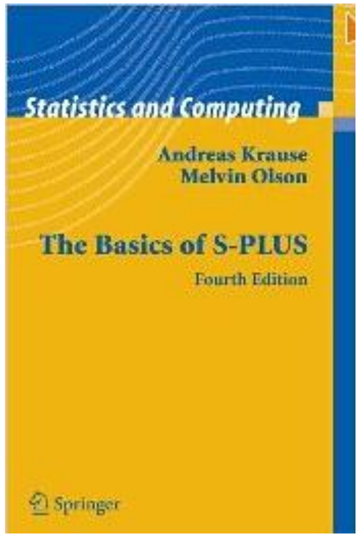
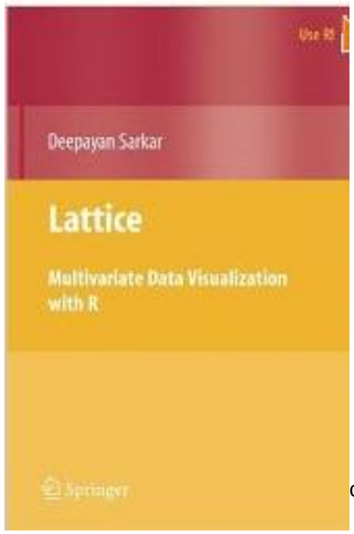
IT'S NOT THE "MAGIC EYE," DOOFUS.

BOOKS ON R/S-PLUS AND LATTICE/TRELLIS


Statistics and Computing
Peter Dalgaard
Introductory Statistics with R
Second Edition
Springer


R IN A NUTSHELL
A Desktop Quick Reference
O'REILLY
Joseph Adler


Statistics and Computing
Andreas Krause
Melvin Olson
The Basics of S-PLUS
Fourth Edition
Springer


Use R!
Deepayan Sarkar
Lattice
Multivariate Data Visualization with R
Springer

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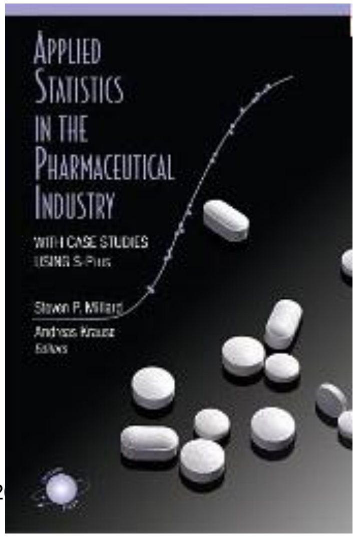
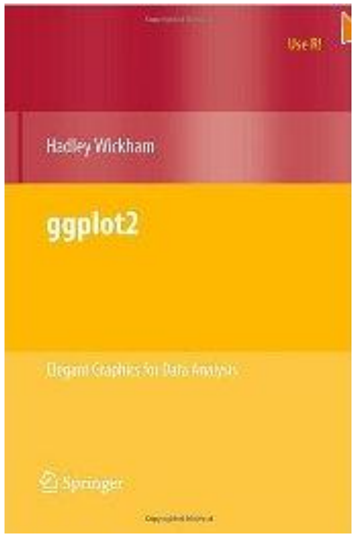

Applied Statistics in the Pharmaceutical Industry
With Case Studies Using S-Plus
Steven P. Millard
Andreas Krause
Editors

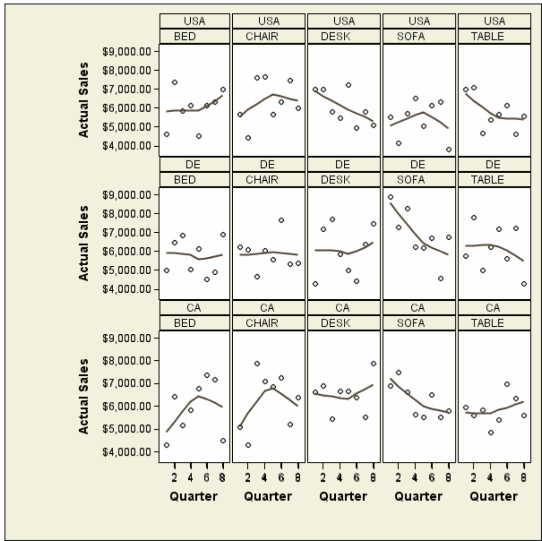

Use R!
Hadley Wickham
ggplot2
Elegant Graphics for Data Analysis
Springer

SAS

- SAS introduced the Trellis concept in version 9.1
- Version 9.2 improves the implementation substantially

```
ODS GRAPHICS ON / ANTIALIASMAX=10000 width=600px height=600px;
    PROC SGPANEL DATA=prdsale;
    PANELBY cntry product / COLUMNS=5 ROWS=3 NOVARNAME;
    LOESS X=yq Y=actual;
    RUN;
    ODS GRAPHICS OFF;
```

Source: http://www.hollandnumerics.co.uk/pdf/Trellis_Graphs%28presentation%292.pdf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Actual Sales
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Quarter