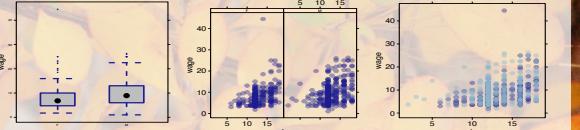


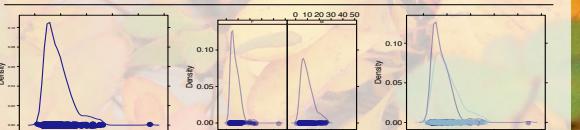
GRAPHICS FORMULA SYNTAX

```
goal ( [y] ~ [x] | [z] ,  
      groups=[w] , data = [mydata] )
```

- y — y-axis variable (OPTIONAL)
- x — x-axis variable (REQUIRED)
- z — facet-by variable (OPTIONAL)
- w — color-by variable (OPTIONAL)



LEFT: `bwplot(wage~sex, data= CPS85)`
MIDDLE: `xypplot(wage~educ | sex, data= CPS85)`
RIGHT: `xypplot(wage~educ, groups=sex, data=CPS85)`



LEFT: `densityplot(~wage, data= CPS85)`
MIDDLE: `densityplot(~wage | sex, data= CPS85)`
RIGHT: `densityplot(~wage,groups=sex, data=CPS85)`

RANDOMIZATION AND ITERATION

RESAMPLE/BOOTSTRAP:
`do(100)*mean(wage ~ sex, data=resample(CPS85))`

RANDOM PERMUTATIONS:
`do(100)*mean(wage ~ shuffle(sex), data=CPS85)`

CONFIDENCE INTERVALS & STATISTICAL TESTS

```
t.test(wage ~ sex, data=CPS85)  
prop.test(43, 100)
```

```
crosstab <- tally(~union+sex, data=CPS85)  
chisq.test( crosstab ) fisher.test(crosstab)  
mod <- lm(wage ~ sector, data=CPS85)
```

Then ... `anova(mod)` TukeyHSD(mod) etc.

MODELING & COVARIATES
`mod <- lm(wage ~ sex + educ, data=CPS85)`
`summary(mod)` or `anova(mod)` or `confint(mod)`

EXTRACT MODEL FUNCTION:
`fun <- makeFun(mod)`
`fun(sex="F", educ=10)`

```
plotFun(fun(sex="F", educ=x)} ~ x, x.lim=range(0,8))
```

A COMPENDIUM OF COMMANDS FOR TEACHING STATISTICS USING R is one of a series of books designed to help statistics educators master integrating modern computation in their courses. We refer to our approach as **computational statistics** because the availability of computation is shaping how statistics is done, taught, and understood. Computational statistics is a key component of **data science**, using data to answer questions and communicate results.

Other books in the series include:

- START MODELING WITH R
- START TEACHING WITH R
- START R IN CALCULUS

These materials have been shared with hundreds of statistics educators through workshops run under the auspices of Project MOSAIC, CAUSE, the Mathematical Association of America, the American Statistical Association, the W.M. Keck Foundation, the Howard Hughes Medical Institute, and the US National Science Foundation.

Nicholas Horton, **Randall Pruim**, and **Daniel Kaplan** teach statistics, mathematics, and computation at Amherst College, Calvin College, and Macalester College respectively. They are co-PIs on the National Science Foundation support Project MOSAIC (NSF DUE-0920350).



HORTON



PRUIM



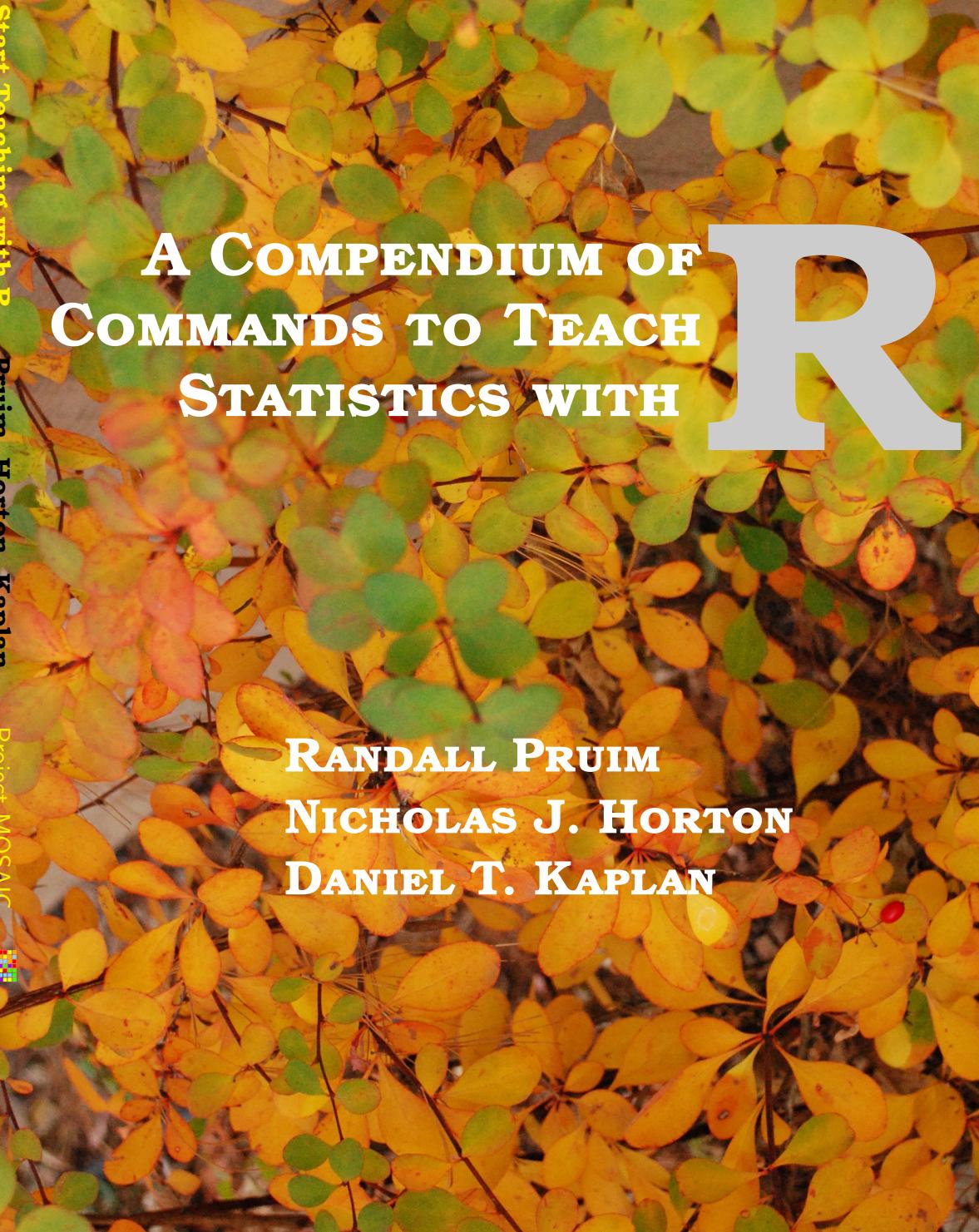
KAPLAN

Other books by the authors:

Using R for Data Management, Statistical Analysis and Graphics (NJH & KK)
Foundations and Applications of Statistics: An Introduction Using R (RJP),
Gems of Theoretical Computer Science (US & RJP), *Understanding Nonlinear Dynamics* (DTK), *Statistical Modeling: A Fresh Approach* (DTK), *Start R in Calculus* (DTK)

Project Mosaic

R Studio



LOAD PACKAGES

```
require(mosaic)  
require(mosaicData)
```

ESSENTIAL R SYNTAX

Function & arguments:
Optional arguments: `rflip(10, prob=0.3)`
Assignment: `x <- rflip(10, prob=0.3)`

`rflip(10)`

FORMULA INTERFACE

Used for graphics, statistics, inference, and modeling operations.

```
goal ( [y] ~ [x] , data = [mydata] )
```

Read as: Calculate goal using mydata for y “broken down” by x, or “modeled by” x. Examples:
`mean(age~homeless, data=HELPrc)`

```
| homeless housed  
| 36.4 35.0
```

```
quantile(age~sex,data=HELPrc,p=c(.2,.8))  
| .group 20% 80%  
| 1 female 30 42.8  
| 2 male 29 41.0
```

`tally(homeless~sex, data=HELPrc)`

```
| sex  
| homeless female male  
| homeless 0.374 0.488  
| housed 0.626 0.512
```

R MARKDOWN DOCUMENTS

```
---  
title: "Homework #3"  
author: "Abby Seidel"  
date: "January 7, 2015"  
output: pdf_document  
---  
```{r include=FALSE}  
require(mosaic)
require(mosaicData)
```  
## Problem 1  
Build a model of wage as a function of sex, adjusting for relevant covariates.  
```{r}  


lm(wage ~ sex + exper, data=CPS85)

Coefficients:
(Intercept) sex exper
7.072 2.180 0.028

Problem 2
Show whether the covariate is related to sex.
```{r}  
bwplot(exper ~ sex, data=CPS85)  
```
```

```
Homework #3
Abby Seidel
January 7, 2015
Problem 1
Build a model of wage as a function of sex, adjusting for relevant covariates.
```{r}  
#  
#  
# lm(wage ~ sex + exper, data=CPS85)  
#  
#  
# Coefficients:  
# (Intercept) sex exper  
# 7.072 2.180 0.028  
#  
# Problem 2  
Show whether the covariate is related to sex.  
```{r}  
bwplot(exper ~ sex, data=CPS85)
```
```

Compile to any of HTML, PDF, or Word.
See `mosaic plain` template through RStudio menu:
FILE/NEW FILE/RMarkdown/FROM TEMPLATE