sweave

the easiest language you'll ever learn*

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by Lizzie Wolkovich

with thanks to Flo and Ross

* Given that you know R and LaTeX to begin with.

What is Sweave?

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- Embedded R code in LaTeX documents

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2 Getting set up

The merged data files are currently on the Phenology WG website: Documents > Data > Phenology data > Compiled raw observational data and compiled derived data. You can use a right click (or command plus click) to download the .csv files themselves. You'll need to put the data in a directory.

We treat raw data (where we have phenology data for the specific year it goes with) and derived data (where we have only average phenology dates) in separate csv files.

2.1 Load data

So next, read in data. If you wanted to run the R code on your machine you would need to change the working directory.

```
> setwd("/Users/Lizzie/Documents/Subversion/phenology/Data")
> derived <- read.csv("pheno_derived.csv", header = TRUE)
> ffdfld <- read.csv("pheno_raw.csv", header = TRUE)
> dim(ffdfld)
```

1

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3 Results using PHLAWD trees

Table S7: Site information based on models using PHLAWD trees. Compare with Table 1 in the main text for differences between Phylomatic and PHLAWD trees in species sampling.

	exotic spp. n	native spp. n	exotic spp. n: flowering time shift models	native spp. n: flowering time shift models
Chinnor, UK	39	228	39	228
Concord, MA, USA	81	218	69	174
Fargo, ND, USA	56	134	11	65
Konza LTER, KS, USA	9	119		
Washington, DC, USA	157	215	158	215

Table S8: Results of LMs and PGLM for Concord data using USDA Plants to establish native status.

	DF	LM: exotic	LM: native	LM: p	PGLM: lambda	PGLM: exo	PGLM: nat	PGLM: p
mean FFD	297	165.78	167.74	0.636	0.910	141.95	140.47	0.686
flowering time shift	241	-5.11	0.93	0.006	0.000	-4.57	0.93	0.014
sensitivity (3 month)	297	-6.27	-4.95	0.221	0.045	-6.93	-5.74	0.284

What you need to know:

- LaTeX

- R

- <<>>=

- @

What I am here for:

<<>>=

@

What I am here for:

$$<<>>= \quad \text{means 'start R code here'}$$

$$@$$

What I am here for:

<<>>=   means 'start R code here'

@   means 'stop R code here, back to TeX'

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(and that's all the magic
I know of the @ part).

So. . .

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- You'll add a couple lines to the preamble.

- And otherwise you'll write LaTeX code, with some R code chunks here and there (chunks are within <<>>= and @).

Magic within <<>>=

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- results = tex : write the output of the R code with TeX formatting

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- fig=TRUE : Yes! Show the figure I am writing.

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xtable

- xtable is the beautiful package you need installed (in R) to write out pretty tables from R/Sweave into TeX formatting.

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Table S9: Results of LMs and PGLMs for Konza data using USDA Plants to establish native status.

	DF	LM: exotic	LM: native	LM: p	PGLM: lambda	PGLM: exotic	PGLM: native	PGLM: p
mean FFD	126	138.70	161.69	0.158	0.861	122.56	120.42	0.866
sensitivity (gdd)	126	-4.09	-3.70	0.844	0.000	-4.17	-3.71	0.806
sensitivity (gdd w/prec)	126	-1.86	-3.91	0.424	0.000	-1.97	-3.86	0.441
sensitivity (intxn)	126	-0.86	1.37	0.353	0.000	-0.86	1.39	0.330
sensitivity (prec w/gdd)	126	6.24	-2.80	0.089	0.000	6.25	-2.66	0.082
sensitivity (soil moisture)	126	3.12	-1.17	0.072	0.000	3.02	-1.10	0.077
sensitivity (3 month)	126	-3.40	-3.07	0.842	0.000	-3.47	-3.05	0.794
sensitivity (MAT)	126	-2.35	-3.06	0.529	0.091	-2.11	-3.24	0.311

Some examples

```
<<label=nqpugly, echo=FALSE, results=hide,
fig=TRUE>>=

qqnorm (rnorm(100))

@
```

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```
<<label=nqpugly, echo=FALSE, results=hide,
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qqnorm (rnorm(100))

@
```

gives you a figure of a normal quantile plot!

Some examples

```
<<label=getpinot, echo=FALSE>>=

setwd("/Users/Lizzie/Documents/git/
demoSweave")

pinot <- read.delim("data/pinotnoir.txt",
header=TRUE)

head(pinot)

range(pinot$year)

@
```

Some examples

```
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setwd("/Users/Lizzie/Documents/git/
demoSweave")

pinot <- read.delim("data/pinotnoir.txt",
header=TRUE)

head(pinot)

range(pinot$year)

@
```

Reads in data, looks at the top lines and takes the range.

Some examples

```
<<label=anovatable, echo=FALSE, results=tex>>=

aov1970 <- anova(lm(harvestdate~year, data=subset
(pinot, year>1970))) # Note that I can use the
regular anova command here...

library(xtable)

print(xtable(aov1970, caption = "An ANOVA table,
so little effort for so much prettiness",
caption.placement = "top"))

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Calculates a simple regression and writes the output to a pretty table.

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library(xtable)

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
year	1	560.96	560.96	7.68	0.0095
Residuals	30	2190.99	73.03		

Table 1: An ANOVA table, so little effort for so much prettiness

print(xtable(aov1970, caption = "An ANOVA table, so little effort for so much prettiness", caption.placement = "top"))

@

Calculates a simple regression and writes the output to a pretty table.

Custom tables too. . .

```
make.mytable <- xtable(mytable,
caption="Comparisons of regression of
harvest dates for Pinot Noir in Burgundy
region of France across different centuries",
digits=c(0, 2, 0, 2, 3))
```

```
print
(make.mytable,include.rownames=TRUE,
caption.placement="top", hline.after=c(-1,0))
```

Custom tables too. . .

make.mytable <- xtable(mytable, ← any dataframe works
caption="Comparisons of regression of
harvest dates for Pinot Noir in Burgundy
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caption here!

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control significant digits

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digits=c(0, 2, 0, 2, 3))

print
(make.mytable,include.rownames=TRUE,
caption.placement="top", hline.after=c(-1,0))

Table 2: Comparisons of regression of harvest dates for Pinot Noir in Burgundy region of France across different centuries

	days/year	DF	F	p-value
1970-2003	-0.44	30	7.68	0.009
1770-1803	0.03	30	0.04	0.836
1570-1603	0.15	30	0.74	0.396
1370-1403	-0.07	30	0.23	0.633

caption here!

any dataframe works

```
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region of France across different centuries",
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```

control significant digits

```
print
(make.mytable,include.rownames=TRUE,
caption.placement="top", hline.after=c(-1,0))
```

add lines!

Embed R values inline

- Sexpr{}

- Such as: \Sexpr{format(coef(aov19)[2], digits=2)}

- Which gives the regression estimate (change in days per year in winegrape harvest since 1970).

. . . and so much more!

. . . and so much more!

Two notes!

- **I am looking for feedback.** Were you confused and have a suggestion on what could have prevented it? Saw a typo here or in the Rnw file? Can help fix one of my many non-fatal TeX errors? Let me know sometime, for example, at a happy hour.
- The real logistics of Sweave are getting it to run **on your machine**. This whole talk is worth next to nothing if you don't stay and let us help you figure that out.