**Why use Sweave?**

**Has this ever happened?** #2

- You manipulate some data: extract a subset, omit outliers, transform some variables, etc.
- You discuss variables and models with the discipline expert, fit possible models, examine diagnostic plots, and produce your final report.
- But when you need to write about what you did, you can't remember everything!

Solution: Use Sweave (if a LaTeX user) or \texttt{odfWeave}

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**Why use Sweave/odfWeave?**

- Sweave allows you to mix:
  - the R code that performs the analysis
  - the documentation explaining what you did, and why
- It's a way to document your analysis
- It permits reproducible research

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**What is Sweave/odfWeave?**

- Sweave is a framework for mixing R and \LaTeX.
- \texttt{odfWeave} is a framework for mixing R and Open Document office documents (produced by, for example, OpenOffice.org).
- It enables automatic document generation
- A single file contains R code and the documentation
- Graphics, tables, code, solutions, ... can all appear in the final document
- Allows automatic updating of results in document

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**How does Sweave work?**

- A Sweave document is R code, with \LaTeX documentation throughout.
- Or: A Sweave document a \LaTeX document with computation performed in R.
- Sweave is an R package that takes an .Rnw, .Rtex (or .latex or .tex) file and replaces all the R code by its R output.

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**How does \texttt{odfWeave} work?**

- An \texttt{odfWeave} document is R code, with Office documentation throughout.
- Or: An \texttt{odfWeave} document an Office document with computation performed in R.
- \texttt{odfWeave} is an R package that takes an .odt, .xml, and replaces all the R code by its R output.
**Swave/odfWeave basics**

- Create a `.tex` file (.odt file)
- Fill it with \LaTeX (Office) text
- Place R commands in which you want output (see following example)
- Swave: Run Swave from within R (ie, type `Swave(“Document.odt”)` from within R)
- odfWeave: Run odfWeave from within R (ie, odfWeave(“Document.odt”, “DocumentFinal.odt”) from within R)
- Swave: The `.tex` file is converted into a `.tex` file, replacing all the R code by appropriate \LaTeX commands Then run \LaTeX etc. as usual
- odfWeave: The `.odt` file is converted into another `.odt` file, replacing all the R code by appropriate Office commands

**Small examples**

**Example**

The Swave/odfWeave document contains the text:

> The sample size  
> \texttt{is fn = \texttt{round(\texttt{\var{\texttt{\pi}}}, 3)}} \%  

**Output**

After running through Swave or odfWeave, the resulting \LaTeX file contains

> The sample size  
> \texttt{is fn = 92\%}

**Swave commands**

- In the \LaTeX document, R instructions must be differentiated from \LaTeX instructions
- Start designated R code “chunks” with `<<==`
- A code “chunk” ends with `>>`  
- Various options may be contained within the `<<` and `>>` constructs
- Common options for the code chunk:
  - `echo=FALSE`: don’t show R code in the final document
  - `results=hide`: hides R’s results
  - `results=verbose`: The \LaTeX code is actually \LaTeX code
  - `results=escape`: The R output is actually XML code, which appears as formatted table
  - `figs=fit`: include the output as a figure in the final document
- Small (scalar) output specified using `\Sexpr[]`

**Small examples**

**Example**

```r
<<echo=FALSE,results=hide>>=
round(pi, 3)  
@
```

**Output**

No output, as results hide, and the code itself is not echoed

**Small examples**

**Example**

```r
<<echo=TRUE,results=verbatim>>=
round(pi, 3)  
@
```

**Output**

```r
> round(pi, 3)  
[1] 3.142
```

**Small examples (Swave only)**

**Example**

```r
<<echo=FALSE,results=sec>>=
  counts <- as.matrix(c(1,2,3), ncol=2)  
  xtable(counts)  # Needs package xtable  
@
```

The output is actual \LaTeX code for a table, that’s what the R package \texttt{xtable} does

**Small examples (Swave only)**

**Output appearing in .tex file**

- latex table generated in R 2.6.2 by \texttt{xtable} 1.5-1 package  
  \begin{table}[ht]  
  \begin{tabular}{|l|}  
  \hline  
  k \ & \ x  
  \hline  
  1 & 1.00  
  2 & 2.00  
  3 & 3.00  
  \hline  
  \end{tabular}  
  \caption{}  
  \end{table}  
```
Small examples (Sweave only)

Output in final document

\[
\begin{array}{c}
1 & 1.00 \\
2 & 2.00 \\
3 & 3.00 \\
\end{array}
\]

Small examples (Sweave only)

Output in final document

\[
\begin{array}{c}
1 & 1.00 \\
2 & 2.00 \\
3 & 3.00 \\
\end{array}
\]

Small examples (Sweave only)

Output in appearing in .tex file

- An eps and pdf file is generated, named `filename-001.epss` and `filename-001.pdf`
- The following code is included in the LATEX document to include the figure:

  \includegraphics{filename-001}

Small examples (Sweave only)

Example

\begin{verbatim}
<<echo=FALSE, results=mml>>=
counts <- as.matrix(c(1,2,3), ncol=2)
odfTable(counts)
\end{verbatim}

The output is a formatted table in the final document.

Small examples (Sweave only)

Example

\begin{verbatim}
<<fig=TRUE, echo=FALSE>>=
x <- seq(-1, 1, length=100)
y <- x^2
plot(y ~ x, type="l")
\end{verbatim}

Small examples (Sweave only)

Example

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plot(y ~ x, type="l")
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Small examples (odfWeave only)

Output in final document

\[
\begin{array}{c}
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2 & 2.00 \\
3 & 3.00 \\
\end{array}
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Small examples

Output in appearing in final document

Look at examples to show the capabilities of Sweave
What do I need?

Sweave:
- A working copy of R
- A working copy of LATEX
- and a bit of time to learn

Sweave: On my Linux system:
- A working copy of R
- A working copy of OpenOffice.org, or any other word processor using the Open Document format
- and a bit of time to learn

Where can I learn more?

See:
- The Sweave web page:
  http://www.ci.tuwien.ac.at/~leisch/Sweave
- The pdfSweave manual:
  http://mirror.anet.edu.au/pub/CRI/M/
- R News, Volume 2/3, December 2002; see
  http://CRAN.R-project.org/doc/Rnews