

# LyX and Sweave with R on Windows XP or Vista

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These are some notes I compiled to help others install LyX (<http://www.lyx.org>) and create the links needed to get LyX working with R through Sweave (<http://www.r-project.org/>). I wrote up an initial version of this document and subsequently both Dave Hewitt and Bret Collier have tested the instructions and modified the wording and presentation based on their sometimes frustrating experiences. When I first installed LyX/Sweave on my machine running Microsoft Windows Vista, I depended heavily on [Murat Yildizoglu's blog entry](#), and I'm quite grateful for his blog. His instructions were for machines running Windows XP, but I found that they worked fine on my Vista machine. So when colleagues asked for instructions on how to set this up, I sent them to Murat's blog. But their installation attempts were unsuccessful. I subsequently tried to get things working on an XP machine and another Vista machine and was unsuccessful as well. This befuddled me somewhat, but after much fussing I discovered in part why I was so lucky. I had a previous installation of MiKTeX on the machine and had a local `texmf` directory, but I had forgotten how I created it because I had only used L<sup>A</sup>T<sub>E</sub>X for a single book project. But I ran into other differences on the XP machine that I had to work through as well. For example, it turned out that I already had the L<sup>A</sup>T<sub>E</sub>X package `ragged2e` on my machine and it was not on the other machines.

I think Murat's description is fine if you are already a regular L<sup>A</sup>T<sub>E</sub>X user, but if you are not then the instructions may not be sufficient. So, with that in mind, here are some more complete instructions and tips that may help. Note that for some of the steps below you must have Administrator privileges on the machine, and this may vary between XP and Vista. For example, in Vista, make sure you open Command Prompts (what used to be DOS) or text editors with "Run as Administrator" to save yourself frustration. If you work for the government and they have stripped you of your Admin privileges, this will be much more difficult than if you do have Admin privileges. For example, in XP, some of the steps must be performed by an Administrator.

In all of the instructions below, you MUST modify the drive and directory/path names if yours differ from the ones used here. For example, you may be using different versions of R, LyX, or MiKTeX, or have installed the programs into different directories or on different drives. I used default paths for R-2.12.0, MiKTeX 2.9, and LyX 1.6.8. On a Vista 64 bit system, the default installation directory will be in `C:\Program Files (x86)`.

# Installing LyX

Install a complete version of LyX. You will need Administrator privileges to do this. A complete LyX installation takes a long time, so be prepared to spend some time on this step. It's worth it. There are two options for Windows users and either should work. See:

<http://www.lyx.org/Download>

and

<http://wiki.lyx.org/Windows/LyXWinInstaller>

## Getting the Various Pieces to Talk to Each Other

You must have Administrator privileges to perform steps 1 and 2 below.

1. Go to the Windows Control Panel and double-click the System icon. Find the Environment Variables (under Advanced System Settings). Click on the Environment variables and under System Variables find Path in the list. Click on it and choose Edit. At the end of the string, add the paths to the bin directory for each of MiKTeX (e.g., `C:\Program Files\MiKTeX 2.9\miktex\bin`) and LyX (e.g., `C:\Program Files\LyX 1.6.8\bin`) [if they are not already present]. Each path here should be separated by a semicolon.

2. Install the appropriate version of Rtools for R from:  
<http://www.murdoch-sutherland.com/Rtools/index.html>

When you do the installation, near the end of the setup process be sure to check the box to have the installer add the appropriate Rtools paths (this option is not checked by default). Make sure the drive and directories it uses in the paths are correct if you choose a non-default location. It is not clear to me that you need Rtools for using Sweave through LyX, but it adds several useful Unix utilities and you'll need these if you choose to create R packages.

3. Download the file `noweb.sty` from  
<http://tug.ctan.org/tex-archive/web/noweb/src/tex/>

Also, get the file `Sweave.sty` from the `share\texmf` directory under your R installation (e.g., `C:\Program Files\R\R-2.12.0\share\texmf\tex\latex`). Put both of these files into your local `texmf` directory (if you have one) under `texmf\tex\latex\misc`. If you have not used L<sup>A</sup>T<sub>E</sub>X before, create a `texmf` directory in a place of your choosing. If you are not an Administrator, do not create this folder using Administrator privileges (at least on XP). Also, it's probably best to avoid creating this directory in locations that are protected for Administrators. Create the subdirectory structure noted above and put the two files in the terminal directory `misc`. Next, open a Command Prompt (usually found under All Programs -> Accessories; or Start -> Run... -> "cmd" [Enter]). If you have followed the steps above to modify the system path then you should be able to run MiKTeX programs from the command prompt. I have seen alternate forms of this command given for Windows, but what I found that works is:

```
initexmf --user-roots=dir
```

where `dir` is the path to your local `texmf` directory (e.g., `"C:\texmf"`). If you did this correctly then you should be able to type

```
initexmf --report
```

and you'll see the path to your local `texmf` directory displayed in the list. You can also perform these steps using the MiKTeX Settings application (from the Start Menu). Under the "Roots" tab, you can add the path to your local `texmf` directory and also see all of the paths that are assigned.

4. From the Windows Start Menu, run the MiKTeX Settings application (typically found under MiKTeX -> Maintenance; NOT the one labeled "(Admin)"). Under the "Packages" tab (it may take a second), click the button at the bottom to start the Package Manager. It will take a second or 2 and then you'll see a list of packages. Scroll down the list to the package named `ms`. If no date is displayed in the column "Installed on", click the "+" in the top left corner of the program window to install the package. MiKTeX will go to a CTAN web repository to download and install the package. (This is how you install L<sup>A</sup>T<sub>E</sub>X packages in the future, and you can change the repository under the Repository menu in the Package Manager. Note that you can configure MiKTeX to automatically download and install packages that you need "on-the-fly" – see the General tab in the Settings program). Once the `ms` package is installed, close the Package Manager and return to the General tab of the Settings program. Click the button labeled Refresh FNDB and then click the one labeled Update Formats (I'm not sure this last one is necessary). Now you can close out of the Settings program. If you get an error like "Windows API error 87", it is apparently because there are multiple instances of MiKTeX running. If this happens, restart your computer before going on to the next step. (You can search the web for "Windows API error 87: The parameter is incorrect" for more details.)
5. Start LyX. On the menu bar under Tools, select Reconfigure. You'll see a note in the bottom left of the program window letting you know that the configuration script is running. This might take a little while. When you get the message box letting you know that configuration is complete, close LyX and then re-open it. Create a new file (File -> New) and then select Document -> Settings from the menu bar. On the right, click the down arrow to choose a document class. You should see "article (Noweb)" as one of the choices. If the class only shows up at the bottom as "Unavailable: article (Noweb)", that's not good and you probably didn't complete steps 3 and 4 correctly. If the class appears in the list as "article (Noweb)", move on to the next step.
6. In a plain text editor, you need to create a batch script called `Rweave.bat` in the LyX bin directory (e.g., `C:\Program Files\LyX 1.6.8\bin`). [At least on Windows XP, if you don't have Admin. privileges you may not be allowed to create a file in a directory under Program Files. A great solution to this and other similar situations is to ask an Administrator to grant your user account with Full Control privileges on top-level directories for programs like LyX, MiKTeX, R, etc. That way you can move and edit files and programs can work within these directories as needed.] The batch script file should contain a single line (the line below is broken on purpose) with something like the following (including the quotes):

```
"C:\Program Files\R\R-2.12.0\bin\i386\Rterm.exe" --no-save --args %1 <  
"C:/Program Files/LyX 1.6.8/bin/MakeSweave.R"
```

Note that you need to change the paths to match your versions of R and LyX and their locations. Also, the directory separators are indeed \ for the first part and / for the second part because the first part is for a DOS command and the second part is for R (which either uses \\ or /). The above instruction that I got from Murat's blog worked fine on my Vista machine, but I've been unable to get it to work on 3 different XP machines. I'm not sure why. However, the following works on XP:

```
"C:\Program Files\R\R-2.12.0\bin\i386\Rterm.exe" --no-save -f
"C:/Program Files/LyX 1.6.8/bin/MakeSweave.R" --args %1
```

7. In a text editor, create an R file called `MakeSweave.R` in the in the LyX bin directory. It should contain the following lines:

```
library(tools)
args <- commandArgs()
filename <- args[length(args)]
basename <- sub("\\.(Rnw|Rtex|nw)$", "", filename)
Sweave(filename)
Stangle(paste(basename, ".nw", sep=""))
texi2dvi(paste(basename, ".tex", sep=""), pdf=TRUE)
```

This is essentially the same contents as given on Murat's blog except that I added the `Stangle()` command to extract all of the R code from the Noweb document and put it into a file with the `.R` extension.

8. In LyX, go to Tools -> Preferences -> File Handling -> Converters. Below the box of current Converter Definitions, choose "NoWeb" from the dropdown box for "From format:". Then choose "PDF (pdflatex)" from the dropdown box for "To format:". In the Converter box, delete what's there and type

```
Rweave $$i
```

Delete any Extra flags in the next box down (if present), then click the "Add" button at the top right and then the "Save" button at the bottom.

9. You should be all set to start Sweaving with R through LyX. You can do a basic test by opening [Paul Johnson's Gamma distribution LyX file](#) and choosing "PDF (pdflatex)" from the View menu on the menu bar (or, more commonly, the View PDF icon on the View/Update toolbar). If you get an output PDF file with code chunks and R plots in it, everything is working. (BUT before you do anything else, read the Tips below.)

If you get an error message that says there is no converter to create a PDF, then you messed up with Step 8. If you get an error message that says "An error occurred whilst running Rweave 'Gamma.nw'", then something is amiss with Step 6. If LyX hangs up at "Executing command Rweave 'Gamma.nw'", that is also an indication that something went wrong with Step 6. This is what happened to me with XP when I used the batch script instruction from Murat's blog. When I switched to the second form shown in Step 6, it worked. If LyX hangs up while showing "Waiting for Latex Run 1" in the bottom left corner, this means that it did the Sweave command but is failing at the `texi2dvi`

function in R that runs the MiKTeX executable `texi2dvi.exe`. I had this happen and I debugged into the `texi2dvi` function in R and found that it turns off error messages. That is unfortunate. As it turns out, the error resulted from missing the L<sup>A</sup>T<sub>E</sub>X package `ragged2e` which Paul uses in the Gamma distribution document. I had you install this package as part of the larger `ms` package above. Also, this may not happen to you if you have MiKTeX configured to install packages on-the-fly.

## Tips

1. It is important to know where all of the files that are created during the Sweaving process are stored. These will be under your user account in Documents and Settings on XP and Users on Vista. For example, on Vista for me it is:

```
C:\Users\Jeff Laake\AppData\Local\Temp\lyx_tmpdir.Hp4980\lyx_tmpbuf0
```

On XP it might be something like this:

```
C:\Documents and Settings\jlaake\Local Settings\Temp\lyx_tmpdir.Hp4980\lyx_tmpbuf0
```

The directory like `lyx_tmpdir.Hp4980` will vary with each session.

If something goes wrong during the Sweaving process, it may be helpful to look at the files in this directory. It is also where your PDF and `.R` files (from Stangle) will be located.

2. One of the ways you can learn about the location of the files mentioned in Tip 1 is to run L<sup>Y</sup>X from a Command Prompt. I suggest that you always do this when using L<sup>Y</sup>X for a Sweaved document. To start L<sup>Y</sup>X from a Command Prompt, open a prompt window and type `lyx` at the prompt. If you set up the system path correctly in Step 1 above, L<sup>Y</sup>X should launch and the command prompt window should remain open. Don't close the command prompt window or you'll kill L<sup>Y</sup>X.

Now open the Gamma distribution L<sup>Y</sup>X Noweb file you downloaded earlier and start the PDF production process. In the L<sup>Y</sup>X window there will be a message like `Executing command Rweave "Gamma.nw"` in the bottom left corner. You can also switch to the Command Prompt window to watch what's happening. You'll see the commands being executed and the log of what has happened during the Sweaving and R code execution. The first command at the top of the log (the command from the batch script) will show the first path as the path for the temporary directory where the files are stored. Errors will also show up in the log, and if you aren't running L<sup>Y</sup>X with a Command Prompt window open you'll be in the dark about any errors.

Just for grins, you can screw up one of the R commands in the Gamma distribution L<sup>Y</sup>X file and see how errors are reported. You'll see an error in the Command Prompt window and also an error as a message box in L<sup>Y</sup>X ("An error occurred whilst running Rweave "Gamma.nw"). The error reported in the Command Prompt window is important for helping you debug your R code. A note of warning that on one of three XP machines I've worked with the messages do not appear in the Command Prompt window, and I'm not sure why. If you are new to L<sup>Y</sup>X, as I am, I recommend doing the PDF conversion frequently (even if the document isn't a Noweb document) in case something fails. That way you'll be able to track down the error based on what you changed recently.

3. To learn more about how to properly include R code in LyX documents, see Section 6.3 (Literate Programming) of the Additional Features help manual in LyX (from the Help menu).