

R Bootcamp @UH: Understanding the R environment

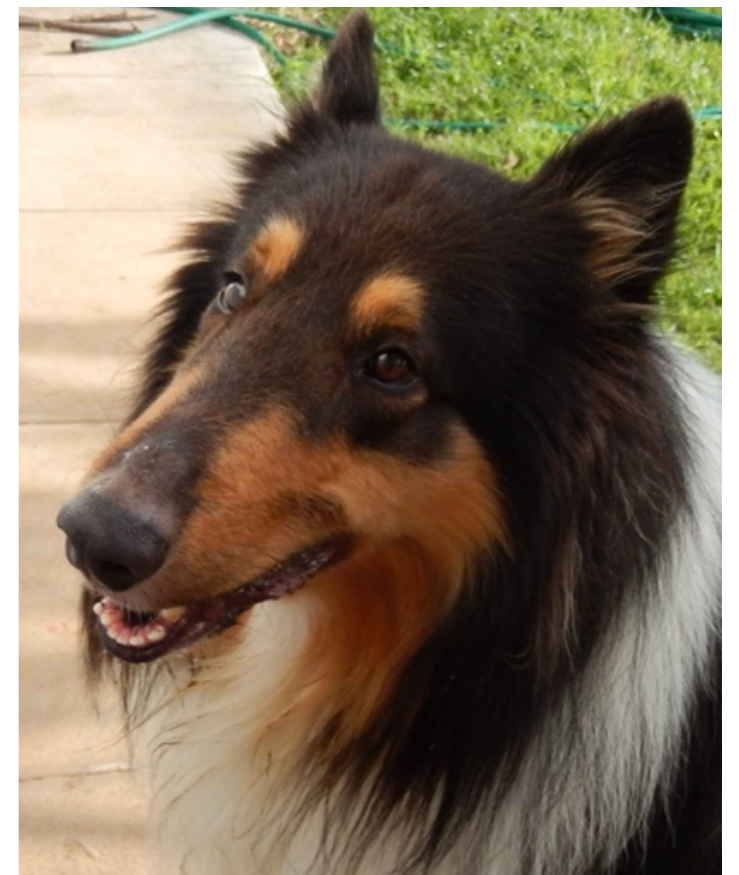


Marguerite Butler
mbutler808@gmail.com
University of Hawaii



Dept. of Biology
University of Hawaii

Tim Tam

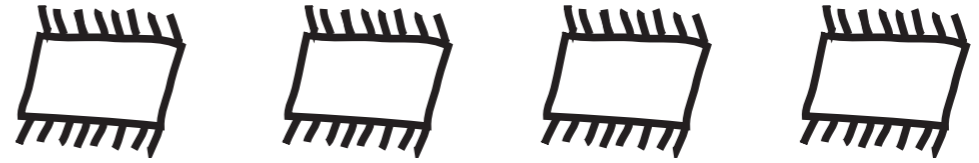


R Environment

- Packages
- Session
- Workspace
- Working Directory

CRAN environment

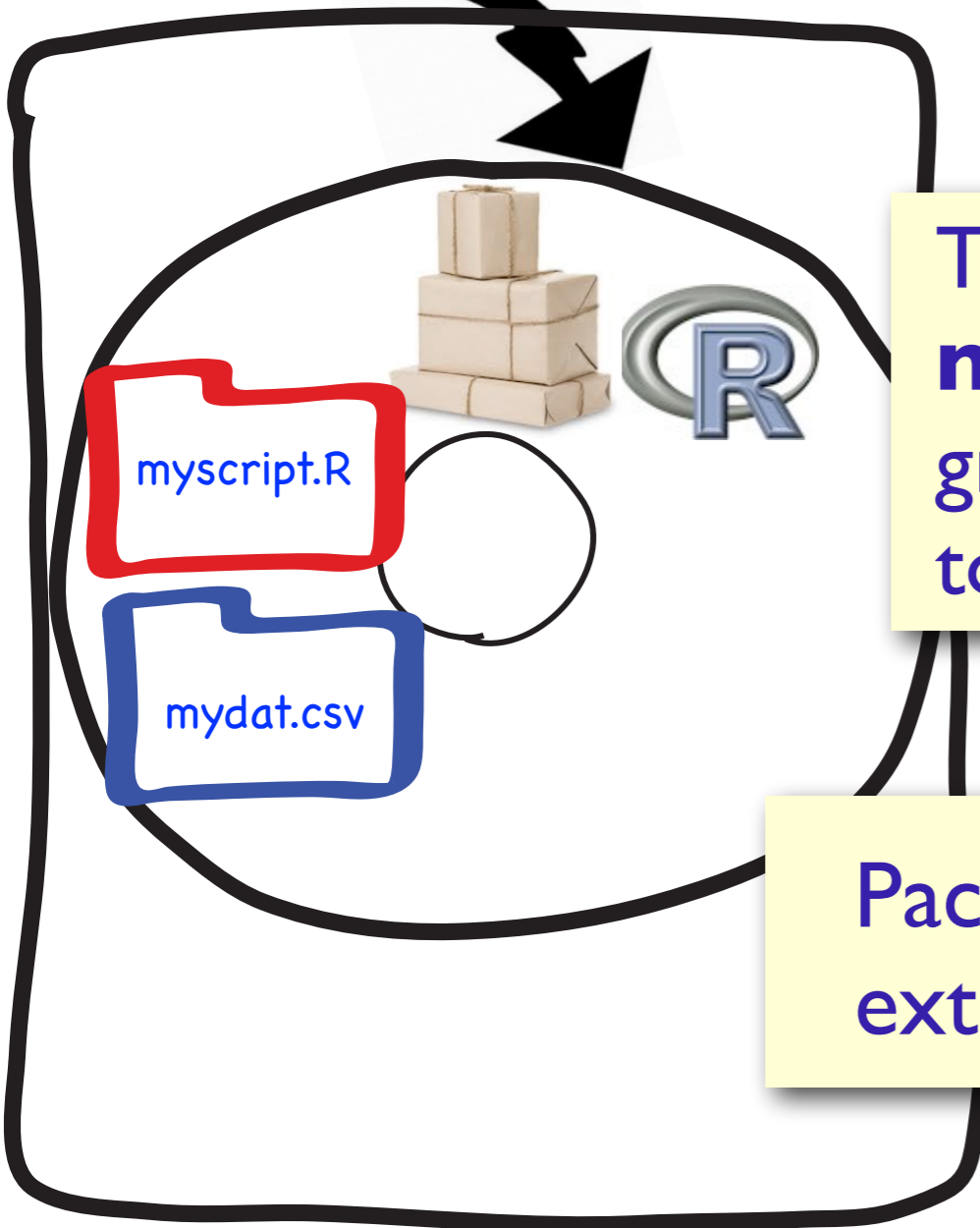
RAM



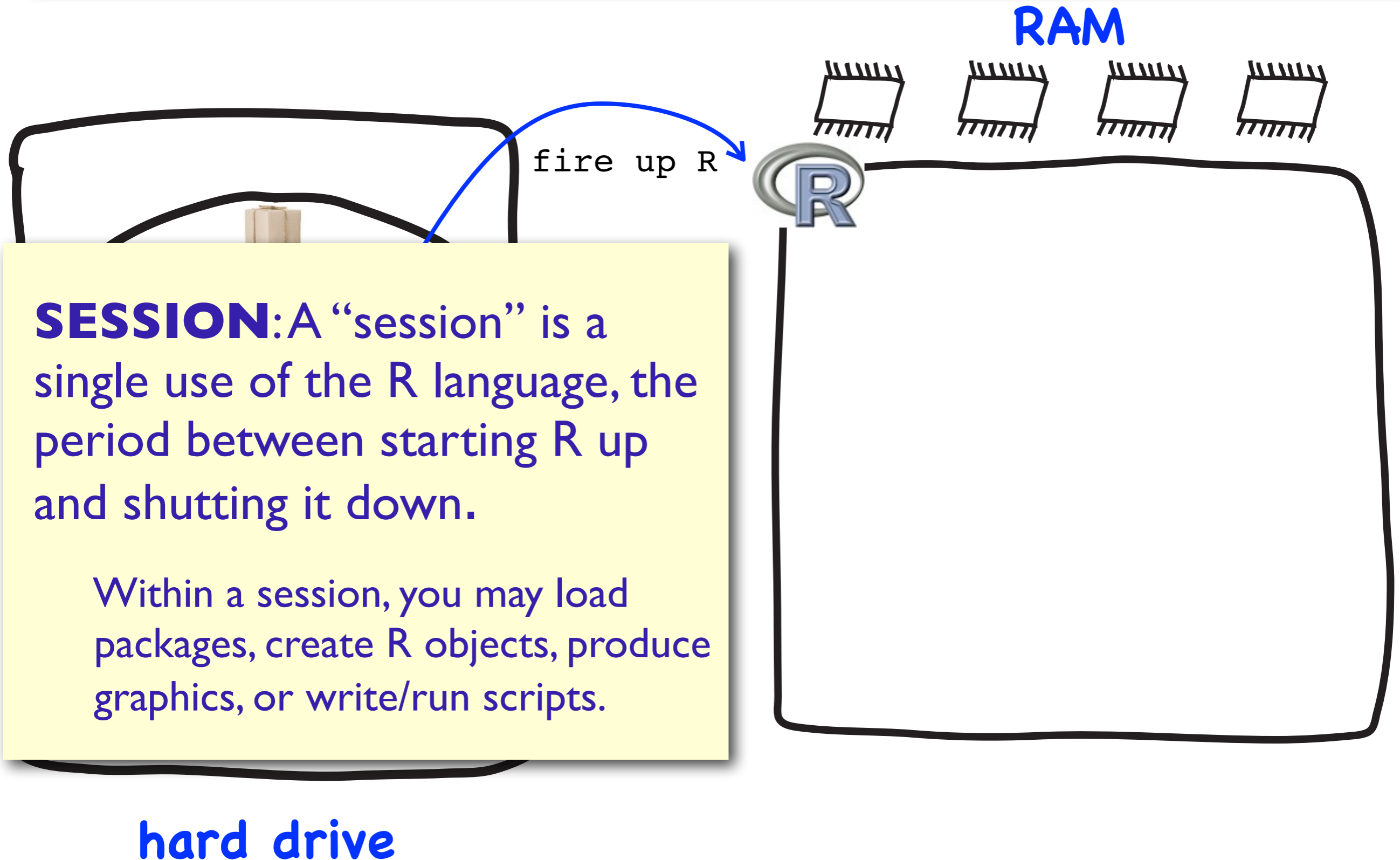
The R programming language is written in **modules** called **packages**, which are groups of related functions organized together in a bundle and stored on your HD.

Packages are the means by which R is extended by the open-source community

hard drive



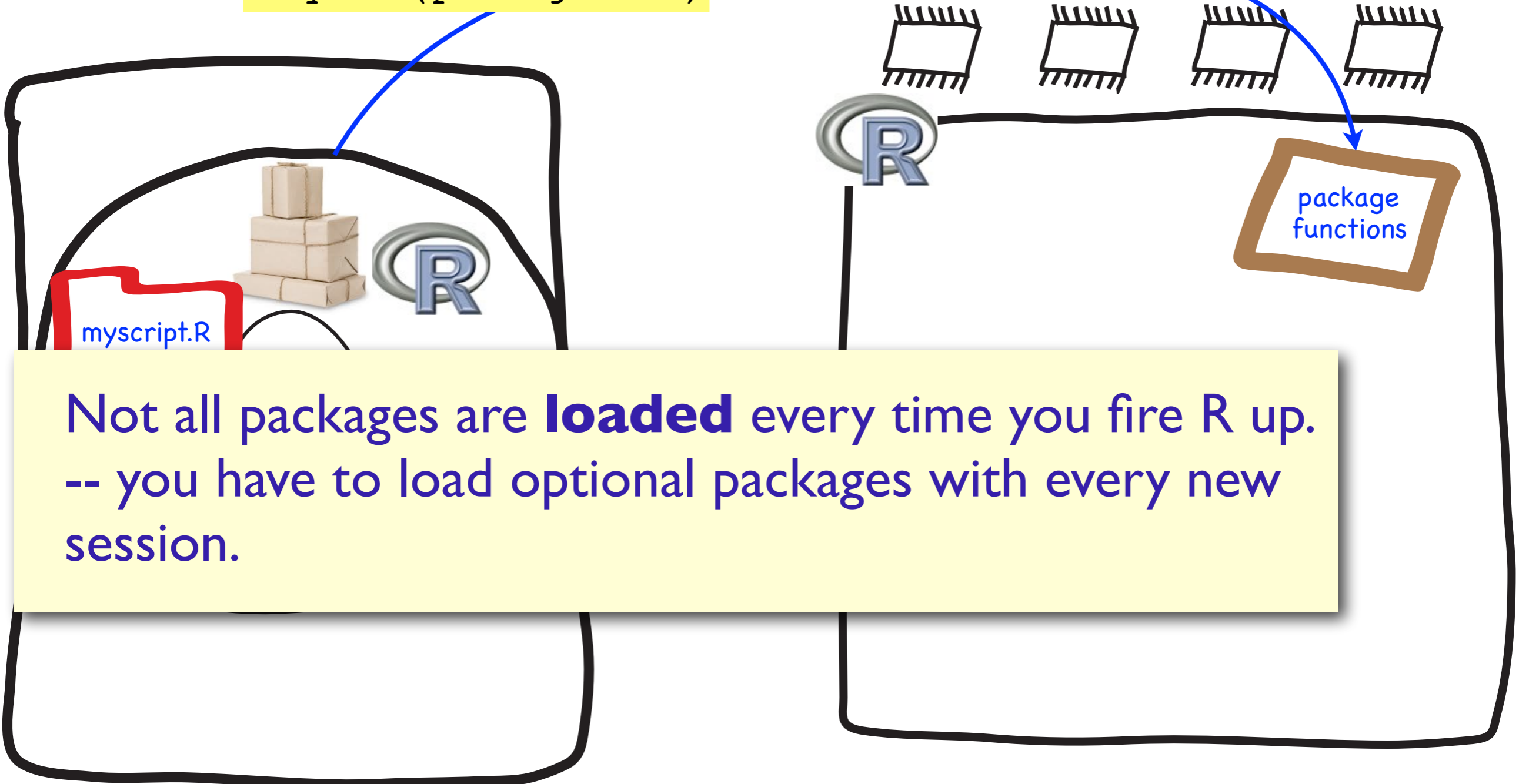
the R environment: Session



the R environment : Session

```
require(packagename)
```

RAM

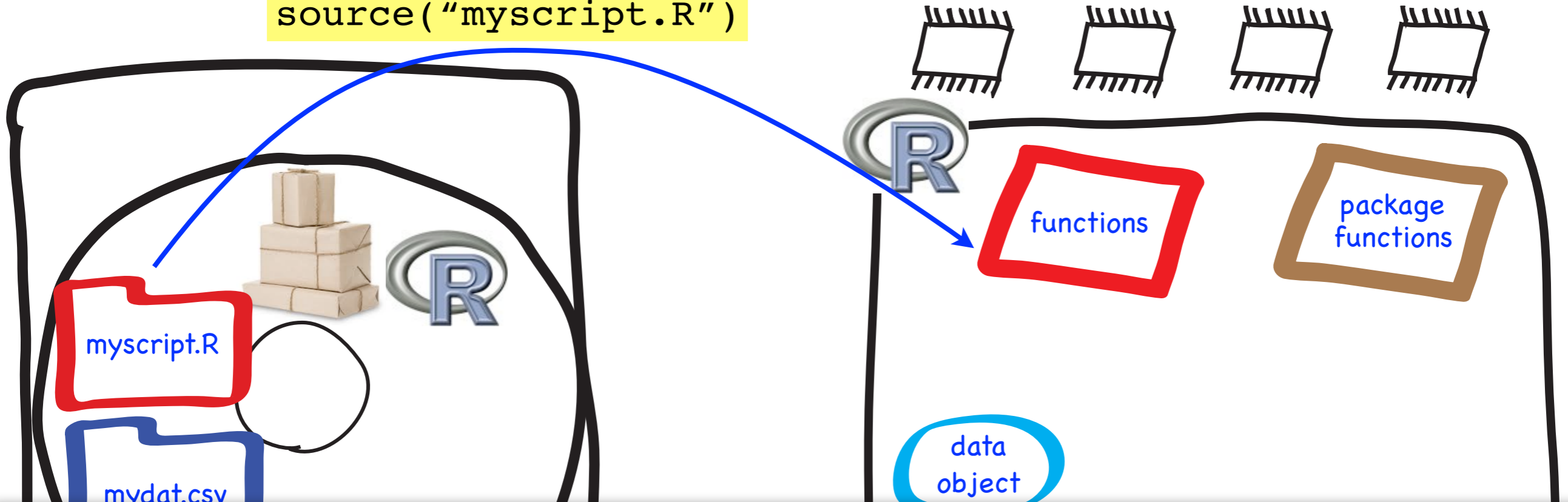


Not all packages are **loaded** every time you fire R up.
-- you have to load optional packages with every new session.

hard drive

the R environment : Workspace

```
source("myscript.R")
```



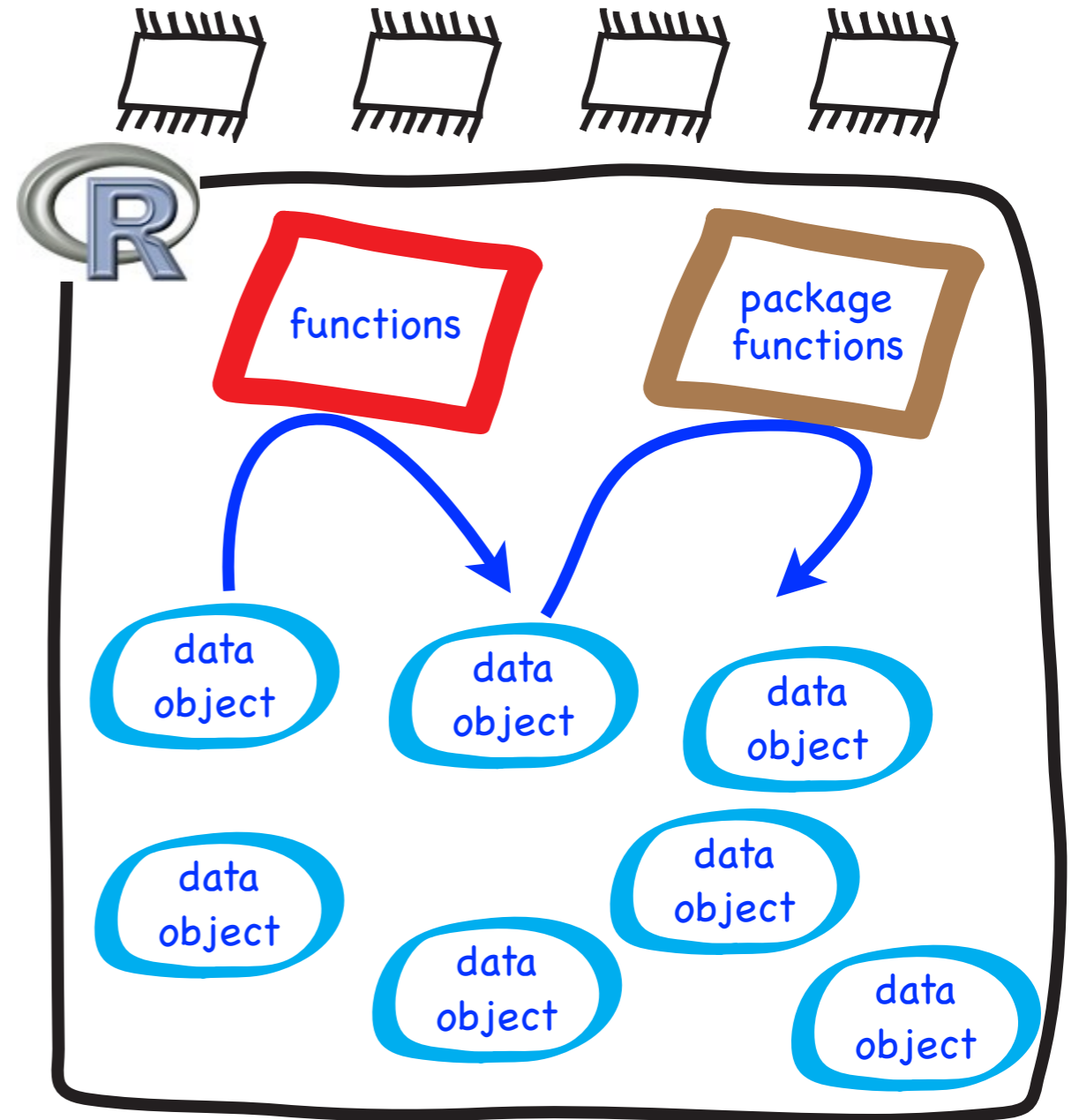
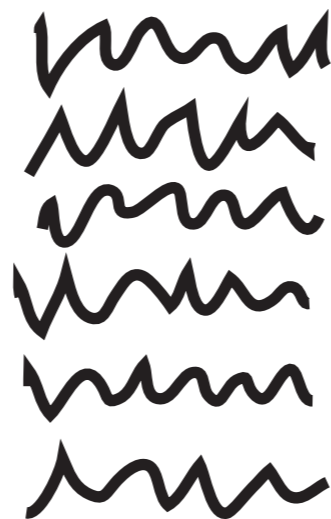
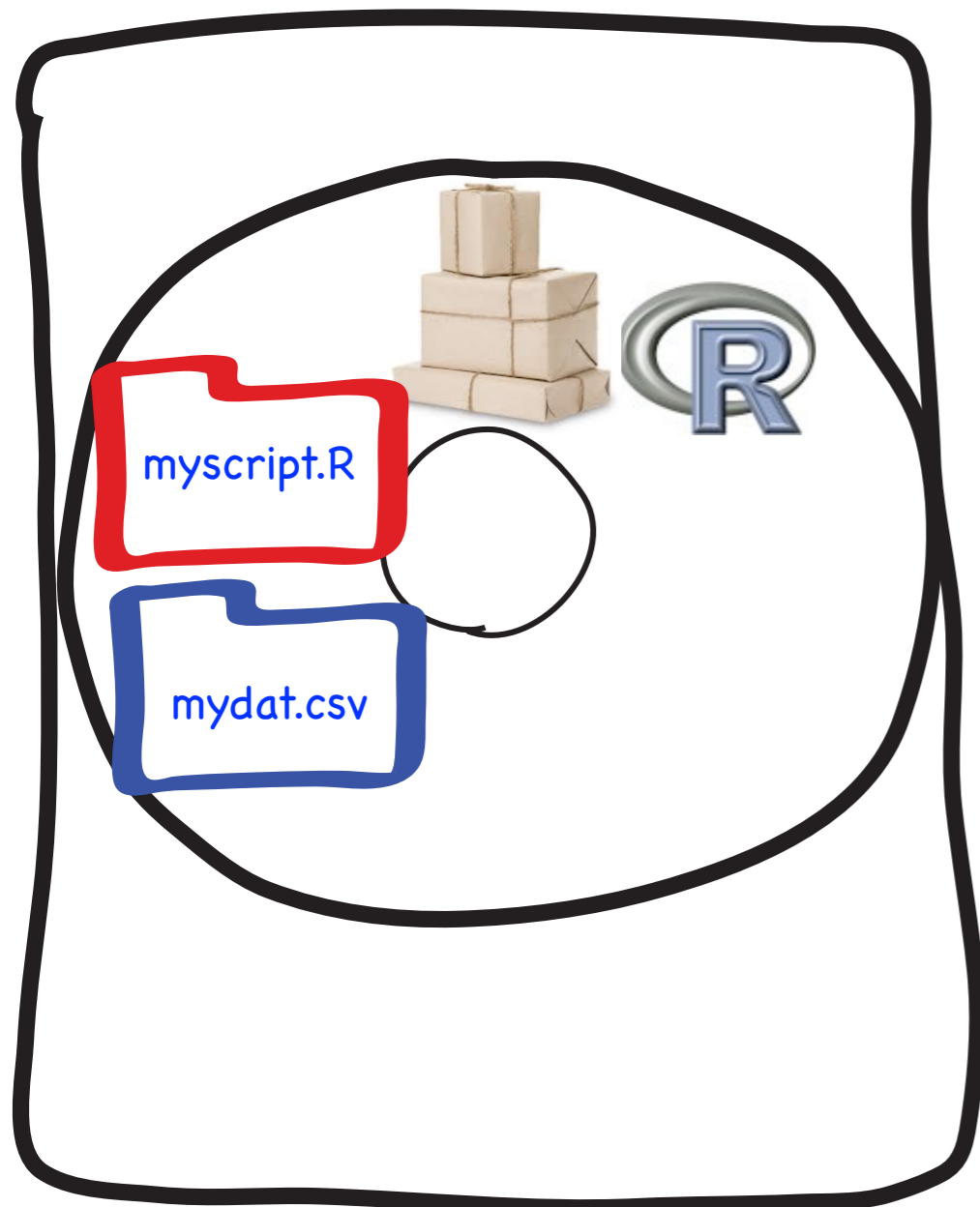
WORKSPACE: The collection of objects currently in RAM

```
> ls() # display the names of objects in workspace  
> rm(list=ls()) # deletes all objects from workspace
```

```
read.csv("mydat.csv")
```

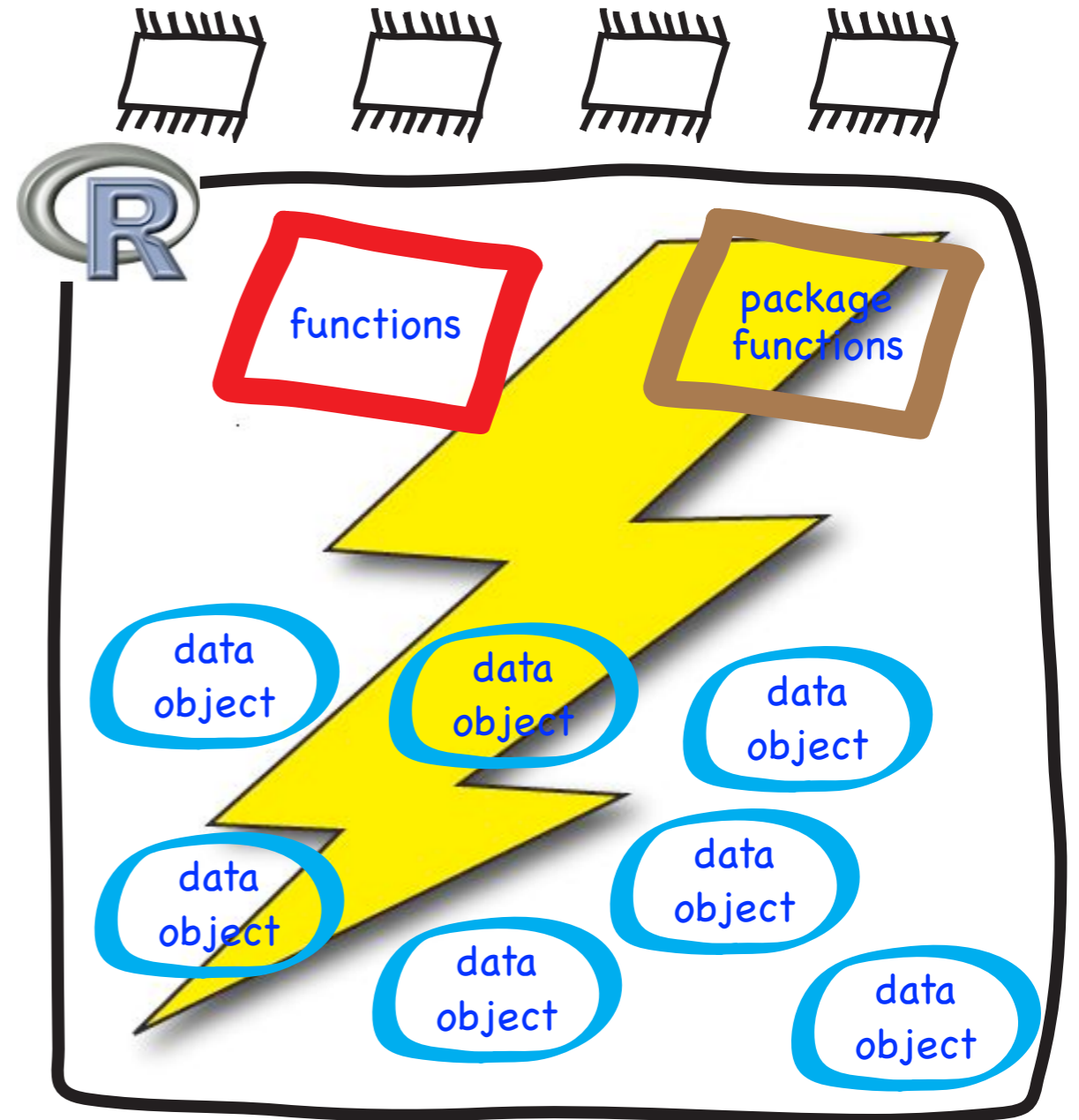
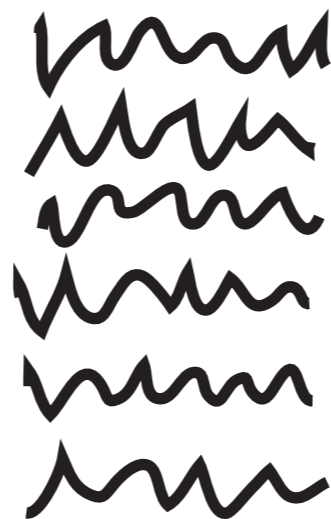
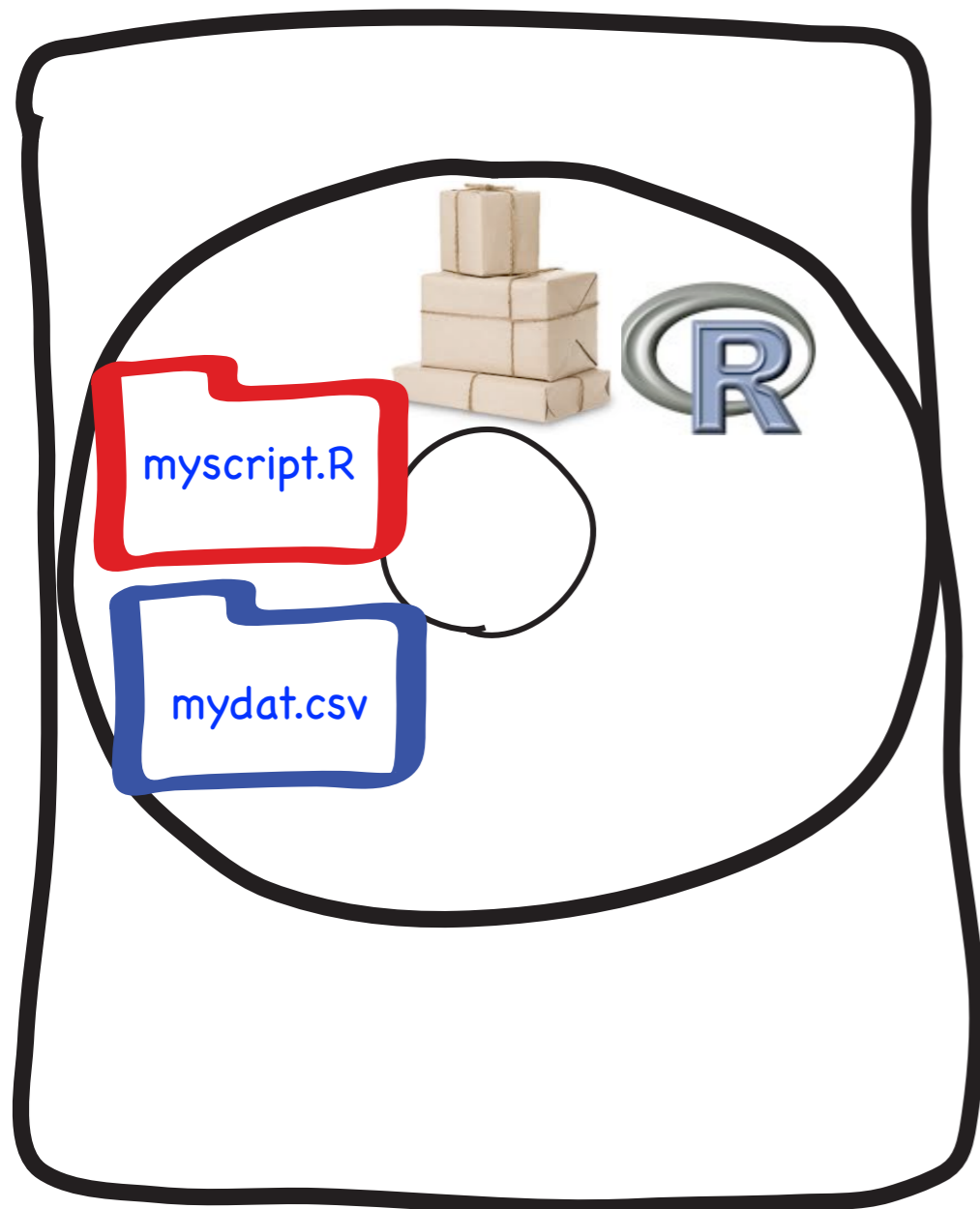
workspace

the R environment : Workspace



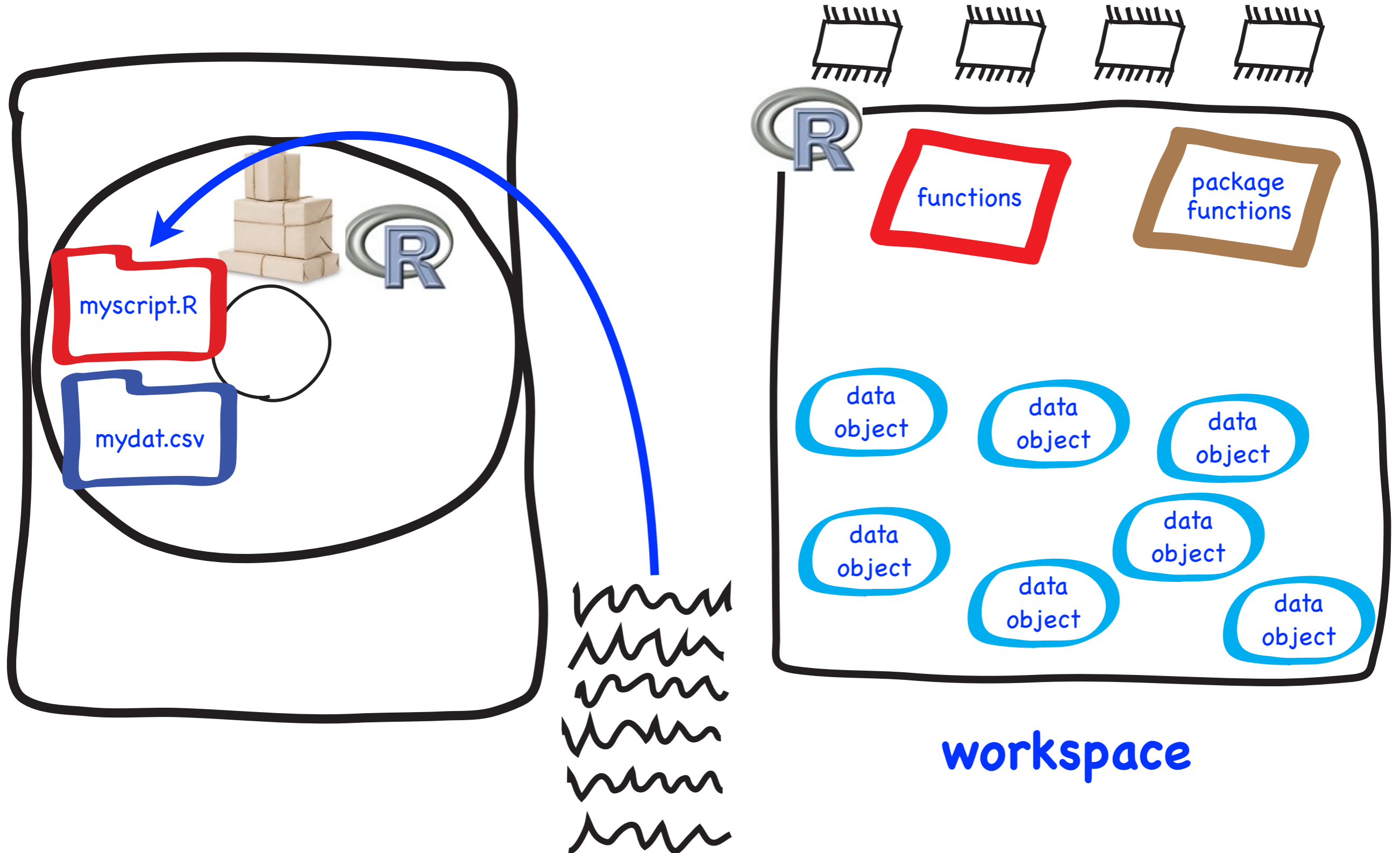
workspace

the R environment : Workspace



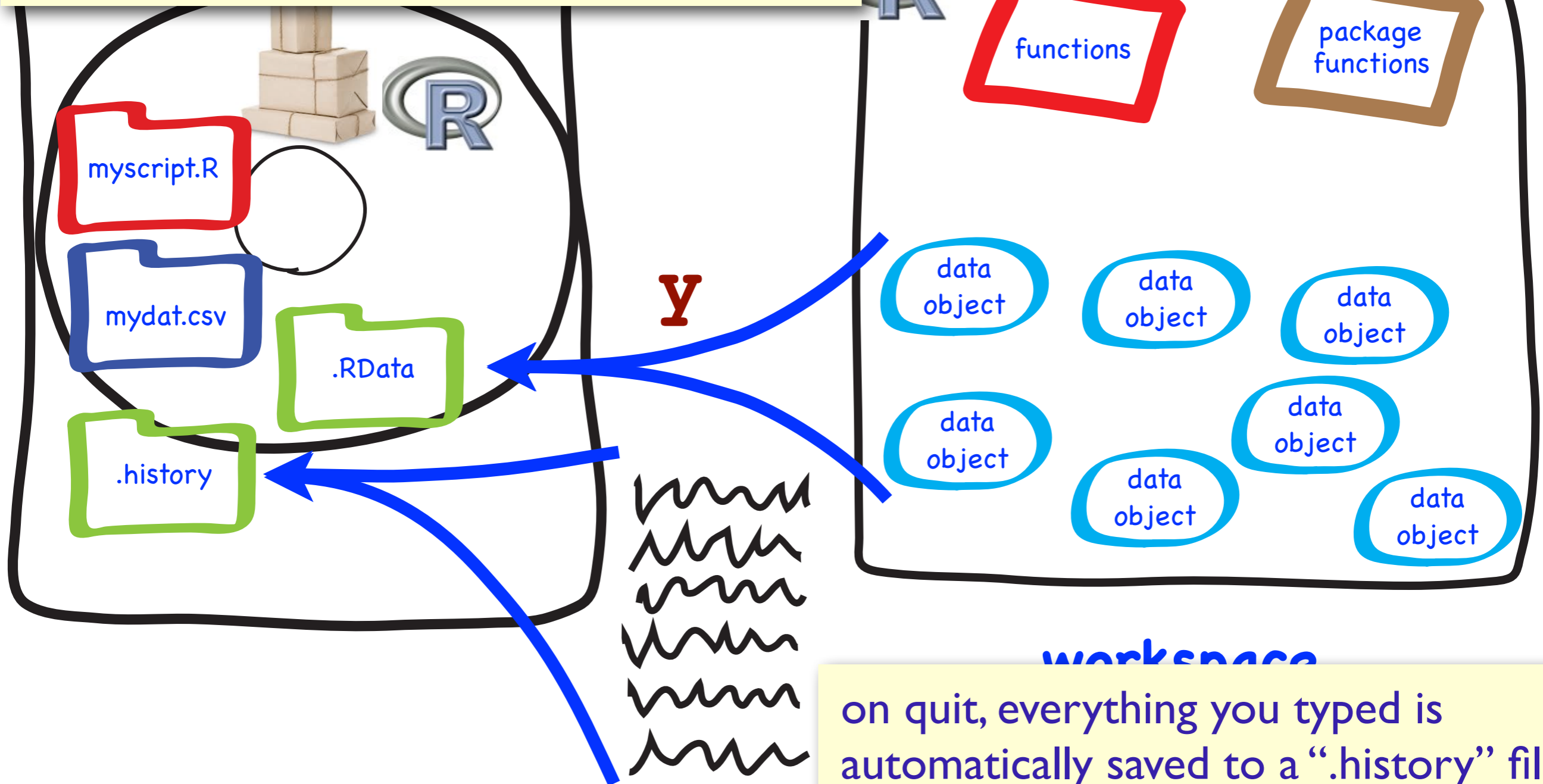
workspace

the R environment : Workspace



the R environment : Workspace

“.RData” and “.history” are files in the current directory, automatically reloaded the next time you start R in that directory



on quit, everything you typed is automatically saved to a “.history” file

the R environment : Best Practices

At end of SESSION:
Save workspace image

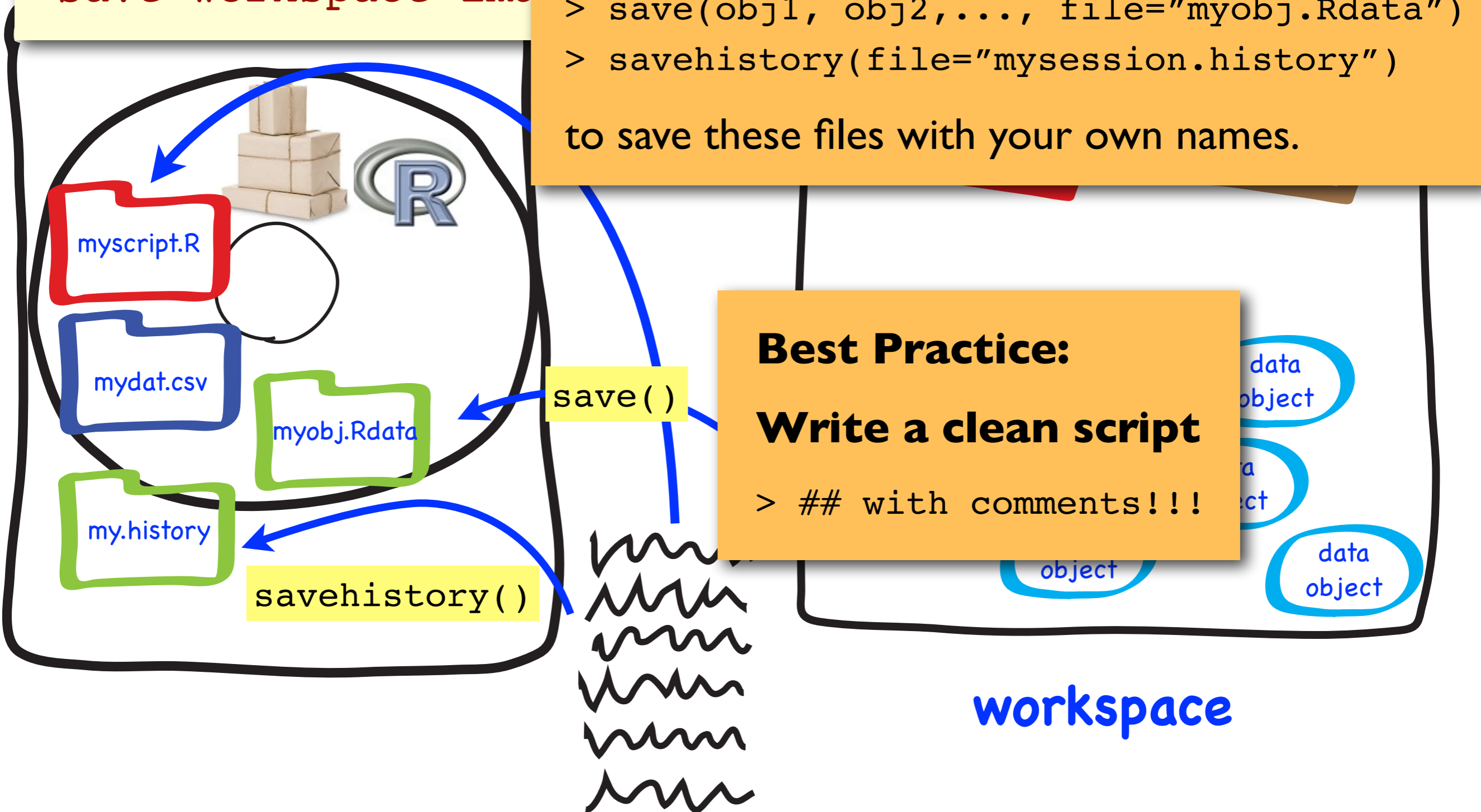
Best Practice: Just say **no!**

use

```
> save(obj1, obj2, ..., file="myobj.Rdata")
```

```
> savehistory(file="mysession.history")
```

to save these files with your own names.



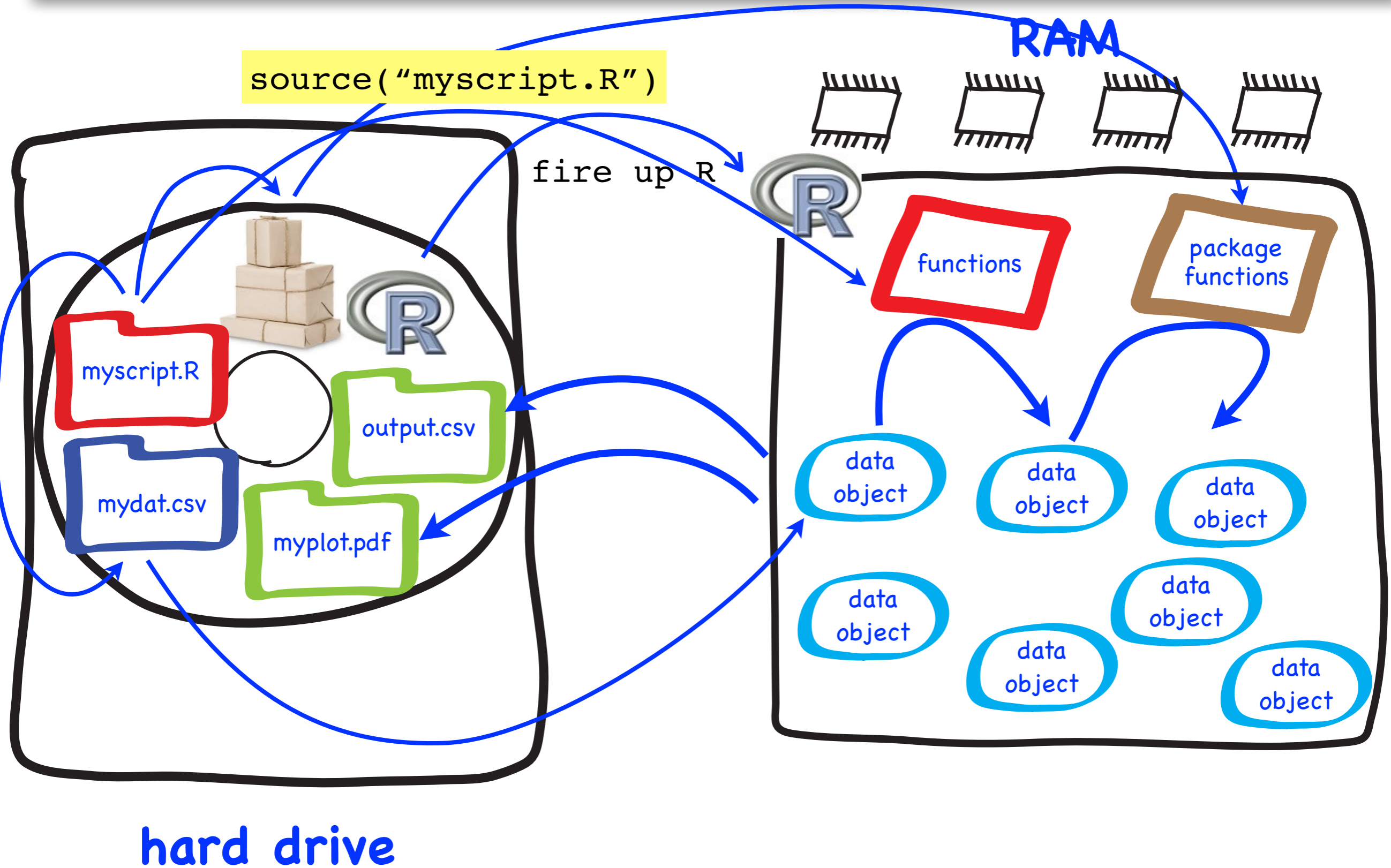
Best Practice:

Write a clean script

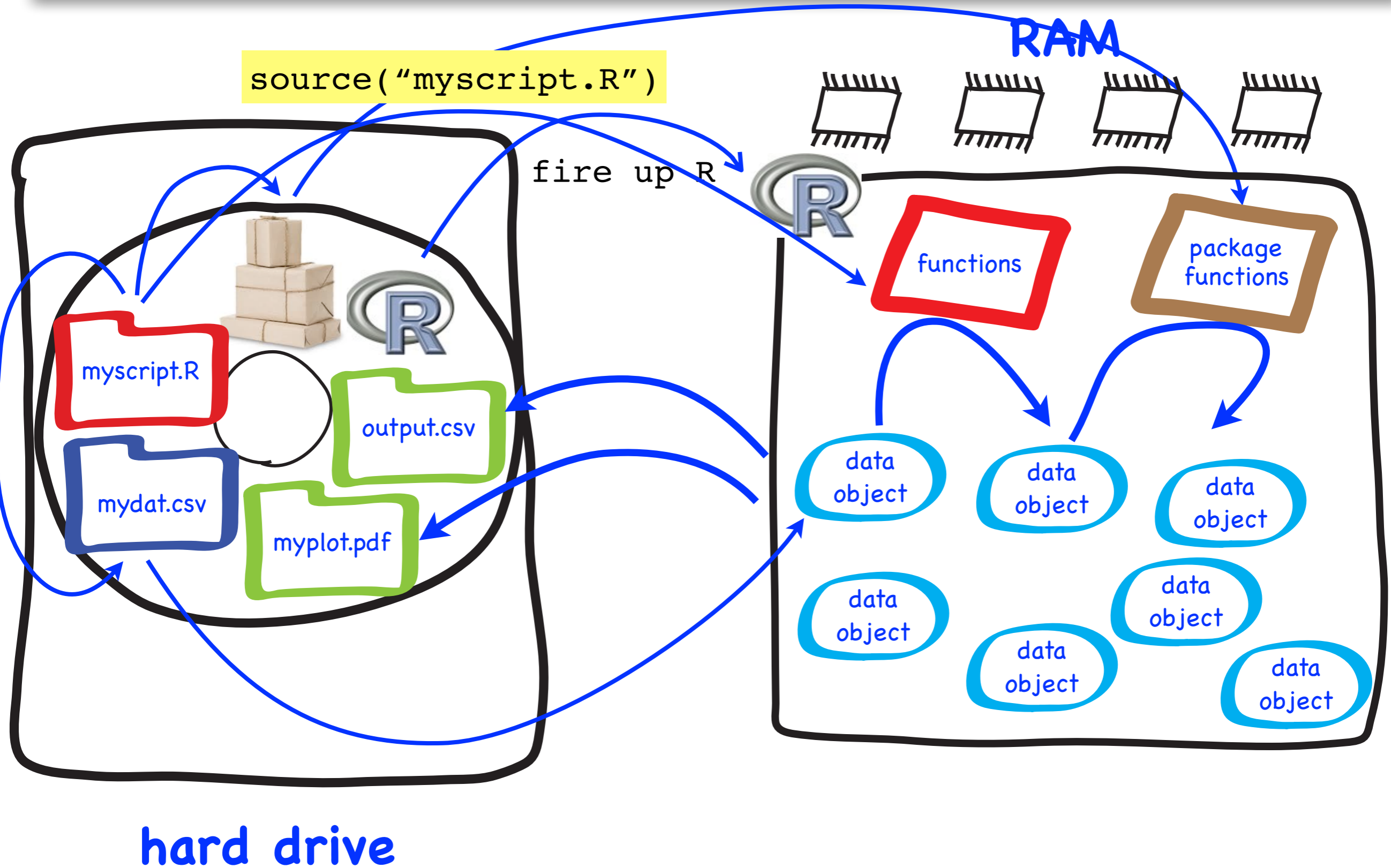
```
> ## with comments!!!
```

workspace

the R environment : Best Practices



the R environment : Best Practices



the R environment : Working Directory

Be especially careful on PCs!!!

```
> getwd() # gets the current working directory  
[1] "C:/Program Files/R/R-3.0.2"
```

Don't save files here! -- it will dump junk into your R (program file) directory and potentially interfere with running R!!

```
> setwd("~/Rclass")
```

Create one instead (first you have to make a new folder called “Rclass” in your home directory, and any other sub-folders you want), then use `setwd()` to point R to your preferred working directory

NOTE: Most new users to R make a lot of mistakes with the working directory. When in doubt, double check with `getwd()`

the R environment : Working Directory

R program software is stored in a “safe” location on your computer. (usually you never want to touch this. In fact, you may not even know where this is – that's OK).

R working directory is the location where you keep your own R scripts, input files, and output files.

 **BEST PRACTICES:** Keep your software directories pristine!

Keep data directories separate.

This simplifies maintenance, prevents corruption of important software, and simplifies backup.

the R environment : Packages

default packages at startup are **base** & a few others.

```
> search() # gives search path for R objects
```

When you type a command or object name in R, it “searches” through the “search path” for a match and then takes appropriate action (be it the name of a data object, function, operator, etc.).

NOTE: Don't create objects with the same name as R commands! (e.g., t, T, F, c all are special characters) Results are unpredictable

the R environment : Packages

```
> searchpaths() # gives path to package source code on your #
computer's file system
[1] ".GlobalEnv"
[2] "tools:RGUI"
[3] "/Library/Frameworks/R.framework/Versions/2.4/Resources/library/methods"
[4] "/Library/Frameworks/R.framework/Versions/2.4/Resources/library/stats"
[5] "/Library/Frameworks/R.framework/Versions/2.4/Resources/library/graphics"
[6] "/Library/Frameworks/R.framework/Versions/2.4/Resources/library/grDevices"
[7] "/Library/Frameworks/R.framework/Versions/2.4/Resources/library/utils"
[8] "/Library/Frameworks/R.framework/Versions/2.4/Resources/library/datasets"
[9] "Autoloads"
[10] "/Library/Frameworks/R.framework/Versions/2.4/Resources/library/base"
```

INSTALLING Packages: saves the package source code to the appropriate place in your computer's file directory (usually a place that users don't mess with)

LOADING Packages: attaches the package from your computer's R library to your search path (adds it to your session).

```
> library("packagename")
```

the R environment : Packages

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# computer's file system
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INSTALLING Packages: saves the package source code to the appropriate place in your computer's file directory (usually a place that users don't mess with)

LOADING Packages: attaches the package from your computer's R library to your search path (adds it to your session).

```
> library("packagename")  
> require("packagename") # designed for use inside other functions
```

the R environment : attach()

ATTACH: Attach Set of R Objects to Search Path

The dataframe is attached to the R search path. This means that the dataframe is searched by R when evaluating a variable, so objects in the dataframe can be accessed by simply giving their names.

```
> data.frame(xx=1:10,yy=runif(10)) -> ddata
> attach(ddata)
> search()
[1] ".GlobalEnv" "ddata" "tools:RGUI" "package:methods"
[5] "package:stats" "package:graphics" "package:grDevices"
"package:utils"
[9] "package:datasets" "Autoloads" "package:base"
```

Now ddata is in the search path, so R knows what you mean when you specify “xx” or “yy” without the data.frame.

the R environment : Session

At end of SESSION:

Save workspace image? [y/n/c]:

If you say “y”, the objects are written to a file called “.RData” in the current directory, and the command lines used in the session are saved to a file called “.Rhistory”.

NOTE: Generally, files that start with a “.” are hidden in the directory.

IF you restart R from the same directory, it will reload the default (.Rhistory, .Rdata) history and workspace files.

use `save()`, `save.image()`, `savehistory()` to save these files with your own names specified within the parentheses.

References

- Jonathan Barron's 1pg Cheat Sheet! <https://cran.r-project.org/doc/contrib/refcard.pdf>
- 4pg cheat sheet, Tom Short <https://cran.r-project.org/doc/contrib/Short-refcard.pdf>
- An Introduction to R <http://cran.r-project.org/doc/manuals/R-intro.pdf>
- "An Introduction to R: Software for Statistical Modelling & Computing" by Petra Kuhnert and Bill Venables http://cran.r-project.org/doc/contrib/Kuhnert+Venables-R_Course_Notes.zip
- Programming in R (a great web page!) by Vincent Zoonekynd http://zoonek2.free.fr/UNIX/48_R/02.html
- Programming in R (with R & BioConductor) by Thomas Girke http://faculty.ucr.edu/~tgirke/Documents/R_BioCond/R_Programming.html
- (Generally, see the R manuals at <http://cran.r-project.org/manuals.html>)
- The JAVA tutorials:What is an object? <http://java.sun.com/docs/books/tutorial/java/concepts/object.html>