

Packages

Are you struggling?

Plan for today

- Brief recap
- **Packages**

Recap of using variables

- Most of the time, we want to do more than add, subtract, multiply etc.
- We want to act on our variables. We do this with operators & **functions**
 - *Each function* has a unique name
 - *Each function* requires some input, and the function can be modified using arguments
 - *Each function* will produce an output
- Remember:
 - objects are *nouns*
 - functions & operators are *verbs*
 - arguments are *adverbs*

Recap of using variables

Where do you find functions?

- Some exist in R by default
 - `t.test()`
 - `cor()`
 - `scale()`

Lots of people all over the world write their own functions. And they (rightly!) think it's useful to share these functions.

Packages

What is a **package**?

- A collection of functions and datasets
- Open source

Packages are the reason R is so powerful!

- While you can definitely write your own functions, most of what you need to do someone else has already done for you!

| Files Plots Packages Help Viewer | | | | |
|--|---|----------|---|---|
| <div>  Install  Update  Packrat <input type="text"/>  </div> | | | | |
| Name | Description | Ver... | | |
| System Library | | | | |
| <input type="checkbox"/> abind | Combine Multidimensional Arrays | 1.4-5 |  |  |
| <input type="checkbox"/> acepack | ACE and AVAS for Selecting Multiple Regression Transformations | 1.4.1 |  |  |
| <input type="checkbox"/> arm | Data Analysis Using Regression and Multilevel/Hierarchical Models | 1.11-1 |  |  |
| <input type="checkbox"/> AsioHea... | 'Asio' C++ Header Files | 1.12.2-1 |  |  |
| <input type="checkbox"/> askpass | Safe Password Entry for R, Git, and SSH | 1.1 |  |  |
| <input type="checkbox"/> assertthat | Easy Pre and Post Assertions | 0.2.1 |  |  |
| <input type="checkbox"/> backports | Reimplementations of Functions Introduced Since R-3.0.0 | 1.1.6 |  |  |
| <input checked="" type="checkbox"/> base | The R Base Package | 4.0.0 | | |
| <input type="checkbox"/> base64... | Tools for base64 encoding | 0.1-3 |  |  |


Files Plots Packages Help Viewer

Install Update Packrat

| | Name | Description | Ver... | | |
|-------------------------------------|------------|---|---------|--|--|
| System Library | | | | | |
| <input type="checkbox"/> | abind | Combine Multidimensional Arrays | 1.4-5 | | |
| <input type="checkbox"/> | acepack | ACE and AVAS for Selecting Multiple Regression Transformations | 1.4.1 | | |
| <input type="checkbox"/> | arm | Data Analysis Using Regression and Multilevel/Hierarchical Models | 1.11-1 | | |
| <input type="checkbox"/> | AsioHea... | 'Asio' C++ Header Files | 1.12.21 | | |
| <input type="checkbox"/> | askpass | Safe Password Entry for R, Git, and SSH | 1.1 | | |
| <input type="checkbox"/> | assertthat | Easy Pre and Post Assertions | 0.2.1 | | |
| <input type="checkbox"/> | backports | Reimplementations of Functions Introduced Since R-3.0.0 | 1.1.6 | | |
| <input checked="" type="checkbox"/> | base | The R Base Package | 4.0.0 | | |
| <input type="checkbox"/> | base64... | Tools for base64 encoding | 0.1-3 | | |

| Files | Plots | Packages | Help | Viewer | | | |
|---|--|---|-------------------------------|---|---|--|--|
|  Install |  Update |  Packrat | <input type="text" value=""/> | |  | | |
| Name | | Description | Ver... | | | | |
| System Library | | | | | | | |
| <input type="checkbox"/> | abind | Combine Multidimensional Arrays | 1.4-5 |  |  | | |
| <input type="checkbox"/> | acepack | ACE and AVAS for Selecting Multiple Regression Transformations | 1.4.1 |  |  | | |
| <input type="checkbox"/> | arm | Data Analysis Using Regression and Multilevel/Hierarchical Models | 1.11-1 |  |  | | |
| <input type="checkbox"/> | AsioHea... | 'Asio' C++ Header Files | 1.12.2-1 |  |  | | |
| <input type="checkbox"/> | askpass | Safe Password Entry for R, Git, and SSH | 1.1 |  |  | | |
| <input type="checkbox"/> | assertthat | Easy Pre and Post Assertions | 0.2.1 |  |  | | |
| <input type="checkbox"/> | backports | Reimplementations of Functions Introduced Since R-3.0.0 | 1.1.6 |  |  | | |
| <input checked="" type="checkbox"/> | base | The R Base Package | 4.0.0 | | | | |
| <input type="checkbox"/> | base64... | Tools for base64 encoding | 0.1-3 |  |  | | |

| Files | Plots | Packages | Help | Viewer | | |
|---|--|---|---|---|---|--|
|  Install |  Update |  Packrat | <input type="text"/> | |  | |
| Name | Description | Ver... | | | | |
| System Library | | | | | | |
| <input type="checkbox"/> abind | Combine Multidimensional Arrays | 1.4-5 |  |  | | |
| <input type="checkbox"/> acepack | ACE and AVAS for Selecting Multiple Regression Transformations | 1.4.1 |  |  | | |
| <input type="checkbox"/> arm | Data Analysis Using Regression and Multilevel/Hierarchical Models | 1.11-1 |  |  | | |
| <input type="checkbox"/> AsioHea... | 'Asio' C++ Header Files | 1.12.2-1 |  |  | | |
| <input type="checkbox"/> askpass | Safe Password Entry for R, Git, and SSH | 1.1 |  |  | | |
| <input type="checkbox"/> assertthat | Easy Pre and Post Assertions | 0.2.1 |  |  | | |
| <input type="checkbox"/> backports | Reimplementations of Functions Introduced Since R-3.0.0 | 1.1.6 |  |  | | |
| <input checked="" type="checkbox"/> base | The R Base Package | 4.0.0 | | | | |
| <input type="checkbox"/> base64... | Tools for base64 encoding | 0.1-3 |  |  | | |

| Files | Plots | Packages | Help | Viewer | | | |
|---|--|---|-------------------------------|---|---|---|--|
|  Install |  Update |  Packrat | <input type="text" value=""/> | |  |  | |
| Name | | Description | Ver... | | | | |
| System Library | | | | | | | |
| <input type="checkbox"/> | abind | Combine Multidimensional Arrays | 1.4-5 |  |  | | |
| <input type="checkbox"/> | acepack | ACE and AVAS for Selecting Multiple Regression Transformations | 1.4.1 |  |  | | |
| <input type="checkbox"/> | arm | Data Analysis Using Regression and Multilevel/Hierarchical Models | 1.11-1 |  |  | | |
| <input type="checkbox"/> | AsioHea... | 'Asio' C++ Header Files | 1.12.2-1 |  |  | | |
| <input type="checkbox"/> | askpass | Safe Password Entry for R, Git, and SSH | 1.1 |  |  | | |
| <input type="checkbox"/> | assertthat | Easy Pre and Post Assertions | 0.2.1 |  |  | | |
| <input type="checkbox"/> | backports | Reimplementations of Functions Introduced Since R-3.0.0 | 1.1.6 |  |  | | |
| <input checked="" type="checkbox"/> | base | The R Base Package | 4.0.0 | | | | |
| <input type="checkbox"/> | base64... | Tools for base64 encoding | 0.1-3 |  |  | | |

Files Plots Packages Help Viewer

 Install  Update  Packrat

| | Name | Description | Ver... | | |
|-------------------------------------|----------------------------|---|----------|---|---|
| System Library | | | | | |
| <input type="checkbox"/> | abind | Combine Multidimensional Arrays | 1.4-5 |  |  |
| <input type="checkbox"/> | acepack | ACE and AVAS for Selecting Multiple Regression Transformations | 1.4.1 |  |  |
| <input type="checkbox"/> | arm | Data Analysis Using Regression and Multilevel/Hierarchical Models | 1.11-1 |  |  |
| <input type="checkbox"/> | AsioHea... | 'Asio' C++ Header Files | 1.12.2-1 |  |  |
| <input type="checkbox"/> | askpass | Safe Password Entry for R, Git, and SSH | 1.1 |  |  |
| <input type="checkbox"/> | assertthat | Easy Pre and Post Assertions | 0.2.1 |  |  |
| <input type="checkbox"/> | backports | Reimplementations of Functions Introduced Since R-3.0.0 | 1.1.6 |  |  |
| <input checked="" type="checkbox"/> | base | The R Base Package | 4.0.0 | | |
| <input type="checkbox"/> | base64... | Tools for base64 encoding | 0.1-3 |  |  |

| Files | Plots | Packages | Help | Viewer | | |
|---|--|---|----------------------|---|---|--|
|  Install |  Update |  Packrat | <input type="text"/> | |  | |
| Name | | Description | Ver... | | | |
| System Library | | | | | | |
| <input type="checkbox"/> | abind | Combine Multidimensional Arrays | 1.4-5 |  |  | |
| <input type="checkbox"/> | acepack | ACE and AVAS for Selecting Multiple Regression Transformations | 1.4.1 |  |  | |
| <input type="checkbox"/> | arm | Data Analysis Using Regression and Multilevel/Hierarchical Models | 1.11-1 |  |  | |
| <input type="checkbox"/> | AsioHea... | 'Asio' C++ Header Files | 1.12.2-1 |  |  | |
| <input type="checkbox"/> | askpass | Safe Password Entry for R, Git, and SSH | 1.1 |  |  | |
| <input type="checkbox"/> | assertthat | Easy Pre and Post Assertions | 0.2.1 |  |  | |
| <input type="checkbox"/> | backports | Reimplementations of Functions Introduced Since R-3.0.0 | 1.1.6 |  |  | |
| <input checked="" type="checkbox"/> | base | The R Base Package | 4.0.0 | | | |
| <input type="checkbox"/> | base64... | Tools for base64 encoding | 0.1-3 |  |  | |

| Files | Plots | Packages | Help | Viewer | | |
|---|--|---|-------------------------------|---|---|--|
|  Install |  Update |  Packrat | <input type="text" value=""/> | |  | |
| | Name | Description | Ver... | | | |
| System Library | | | | | | |
| <input type="checkbox"/> | abind | Combine Multidimensional Arrays | 1.4-5 |  |  | |
| <input type="checkbox"/> | acepack | ACE and AVAS for Selecting Multiple Regression Transformations | 1.4.1 |  |  | |
| <input type="checkbox"/> | arm | Data Analysis Using Regression and Multilevel/Hierarchical Models | 1.11-1 |  |  | |
| <input type="checkbox"/> | AsioHea... | 'Asio' C++ Header Files | 1.12.21 |  |  | |
| <input type="checkbox"/> | askpass | Safe Password Entry for R, Git, and SSH | 1.1 |  |  | |
| <input type="checkbox"/> | assertthat | Easy Pre and Post Assertions | 0.2.1 |  |  | |
| <input type="checkbox"/> | backports | Reimplementations of Functions Introduced Since R-3.0.0 | 1.1.6 |  |  | |
| <input checked="" type="checkbox"/> | base | The R Base Package | 4.0.0 | | | |
| <input type="checkbox"/> | base64... | Tools for base64 encoding | 0.1-3 |  |  | |

How do I get packages?

Packages can be downloaded from the *CRAN* (Comprehensive *R* Archive Network)

You will do this from inside *R*

Need to be connected to the internet!

2 ways to install packages

1. Install button in the Packages tab
2. R Code

Either way, you need to know the name of the package

Install Button

Install Packages

Install from: [? Configuring Repositories](#)

Repository (CRAN)

Packages (separate multiple with space or comma):

Install to Library:

/Library/Frameworks/R.framework/Versions/3.6/Resources/library [C]

☒ Install dependencies

Install Cancel

Install Button

Install Packages

Install from: [? Configuring Repositories](#)

Repository (CRAN)

Packages (separate multiple with space or comma):

Install to Library:

/Library/Frameworks/R.framework/Versions/3.6/Resources/library [C]

☒ Install dependencies

Install Cancel

Install Button



The image shows the 'Install Packages' dialog box in RStudio. It has a title bar 'Install Packages'. Below the title bar, there are three main sections. The first section is 'Install from:', which includes a help icon and a link 'Configuring Repositories', and a dropdown menu currently showing 'Repository (CRAN)'. The second section is 'Packages (separate multiple with space or comma):', followed by an empty text input field. The third section is 'Install to Library:', followed by a text field showing the default R library path. At the bottom of the dialog, there is a checkbox labeled 'Install dependencies' which is checked, and two buttons: 'Install' and 'Cancel'. Two blue rectangular boxes are drawn over the image: one around the empty 'Packages' text input field, and another around the 'Install dependencies' checkbox and its label.

Install Packages

Install from: [? Configuring Repositories](#)

Repository (CRAN)

Packages (separate multiple with space or comma):

Install to Library:

/Library/Frameworks/R.framework/Versions/3.6/Resources/library [C]

☒ Install dependencies

Install Cancel

R code to install packages

```
install.packages("psych")
```

Packages

INSTALLING

- Downloading the package and saving it to your computer
- Like installing Microsoft Word on your computer
- Do this **ONCE**

LOADING

- Like opening Microsoft Word to write a paper
- Once a package is loaded, you can use all of it's functions and datasets are ready to use
- You need to do this **EVERY TIME** you open a new **R** session

2 ways to load packages

1. Checkbox in the packages tab (not recommended)
2. R code

Either way, you need to know the name of the package

R code to load packages

```
library(psych)
```

Dependencies

```
> library(lme4)  
Loading required package: Matrix  
Loading required package: Rcpp
```

Uses functions from other packages

Installed automatically

Loaded automatically

Help! (again)

Ways to find documentation:

`?psych` -- opens documentation specific to that package or function

`??psych` -- searches for this in all documentation (that you have installed and loaded)

To find a package that does what you need: **Google**