Jiří Moravec

Escape Excel

A quick introduction to programming, R, git and reproducibility

What is this about?

- Project organization – files, folders and data
- Introduction to script-based analyses
- Introduction to pipelines
- Some R and git

What is this NOT about?

- R workshop
- Robust tutorial to programming
- Extensive tutorial to git
  (most of the time, you are using only 3 commands anyway)

Showing you a direction!

This way!

Showing you a direction!

Program:

1. Motivation
2. Project organization
3. Pipelines and script-based analyses
4. Introduction to programming
5. git

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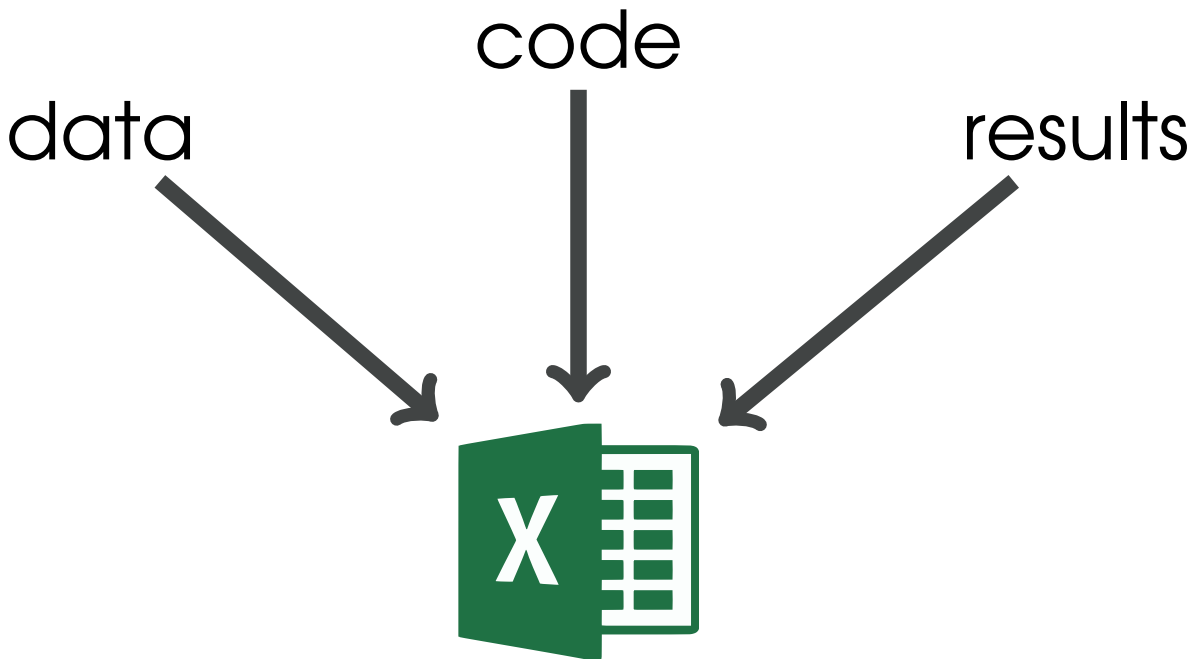
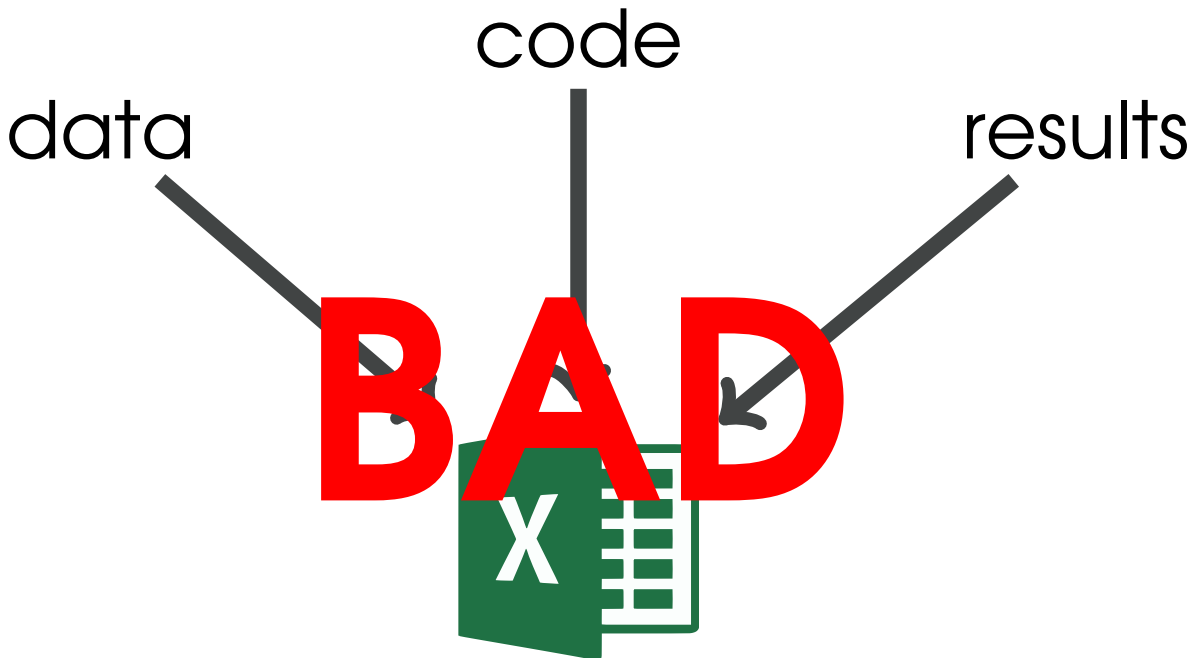
Motivation:



Motivation:



Motivation:

analysis.xls

Motivation:

analysis_final.xls

Motivation:

Collaborator_analysis_final.xls

Motivation:

Collaborator_analysis_finalFinal.xls

Motivation:

Motivation:


Data
Scripts
Results
Intermediaries
Documentation


makefile
run.sh
README.md

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Project organization

Make sure you have:

1. a single folder for entire project
2. reasonable naming scheme
3. good folder structure

Project organization

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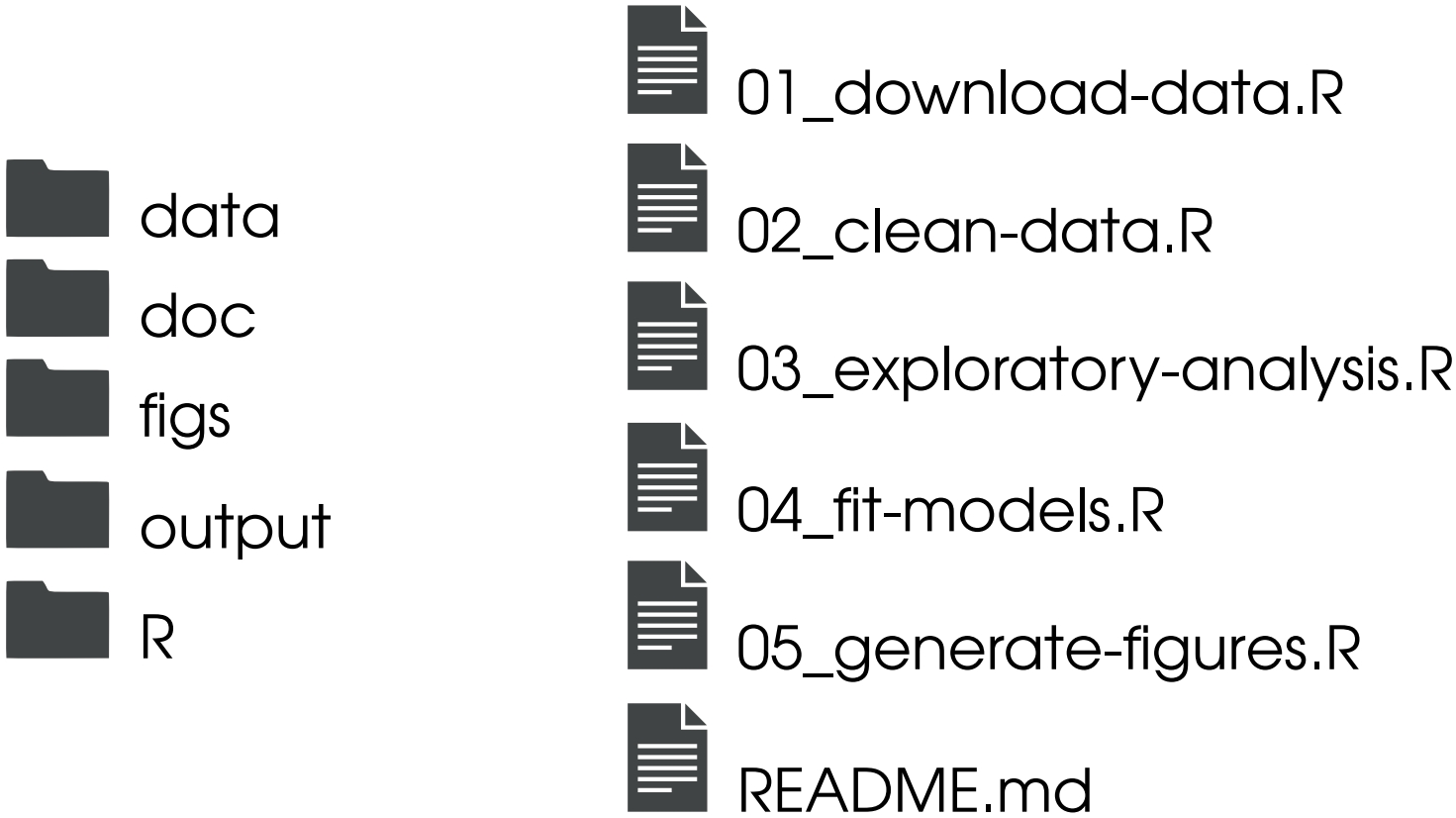
Project organization

From *A Guide to Reproducible Code in Ecology and Evolution*



Project organization

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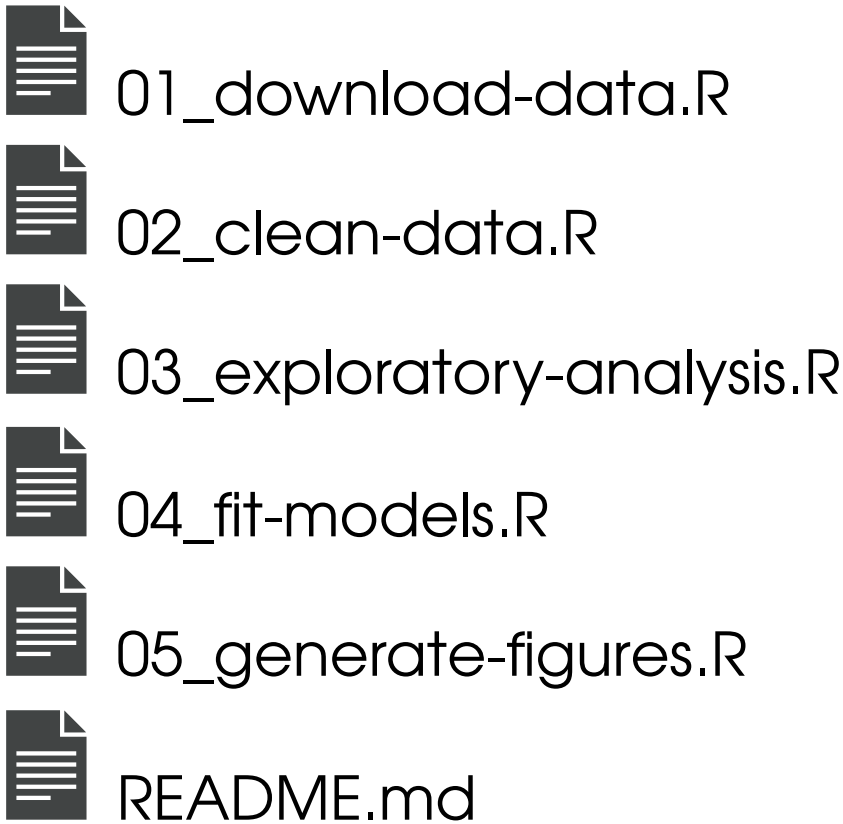
Notice the names!



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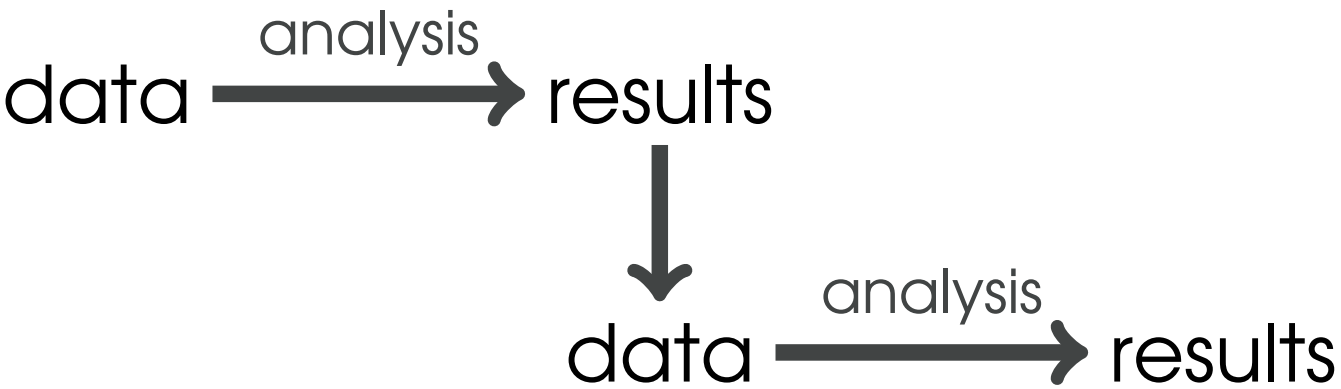
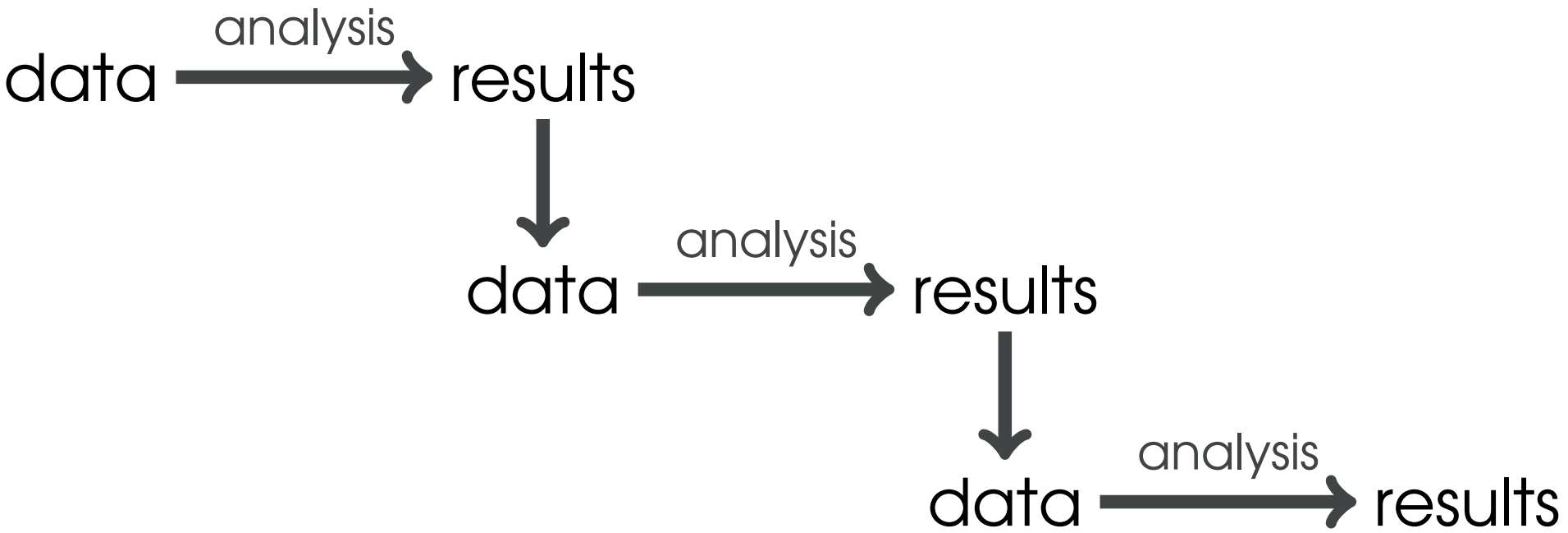
Pipelines

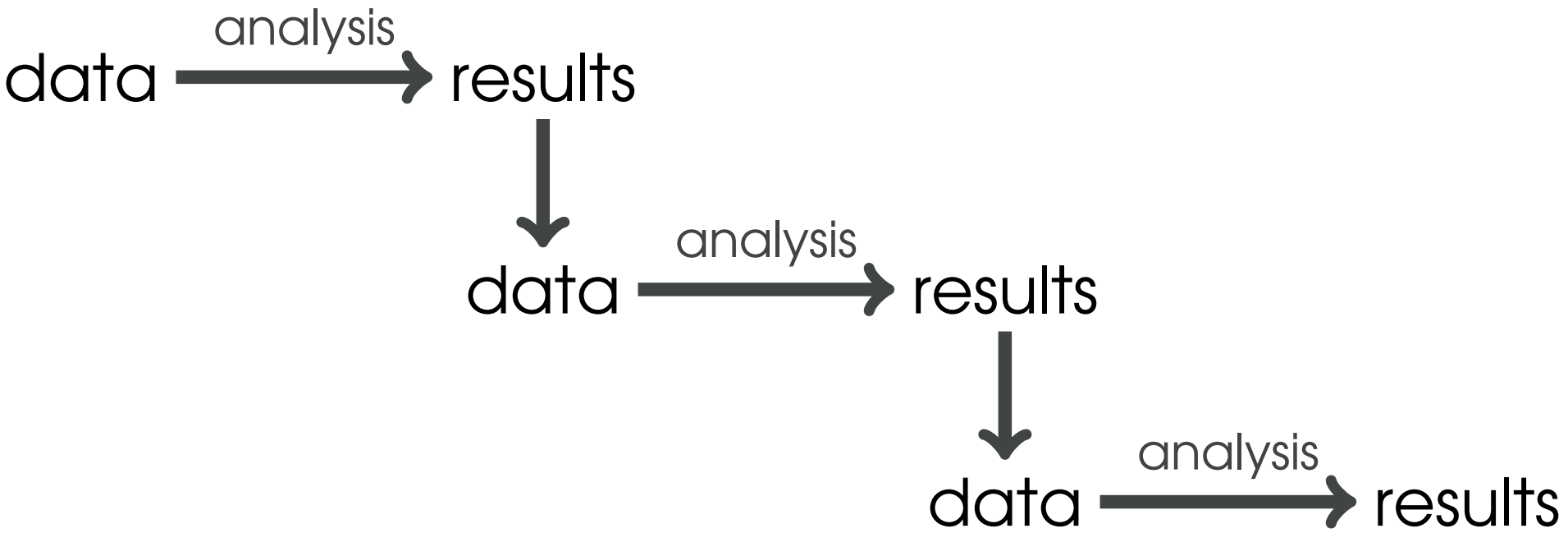
Pipelines



Pipelines

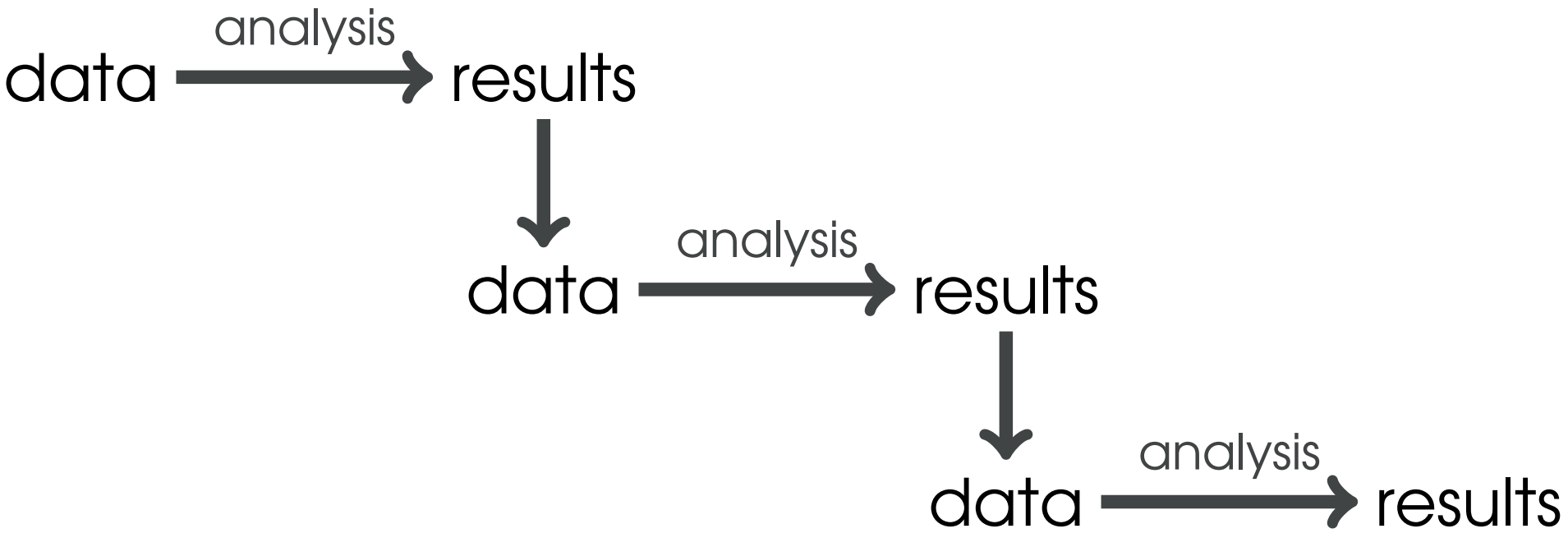

data
analysis
results
data
analysis
results
data
analysis
results

Pipelines



Functions, Scripts, smaller or bigger analyses

Pipelines



Functions, Scripts, smaller or bigger analyses

Script-based analyses

- repeatability
- documented process
- (including any data modification and filtering)
- smaller effort to modify
- can be repeated by just running the run script

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Introduction to programming

Why R?

- easy to get data into R
- closer to statistics than other programming languages
- graphical capabilities
- huge library of packages for essentially anything
- FREE and OPEN SOURCE

Introduction to programming

Helpful tips:

- Scripts:
  - self-contained
  - doing one thing well rather than many things badly
- Functions:
  - self-contained
  - small
  - use them instead of repeating code
  - use them for a well-defined tasks and concepts
  - documentation and comments
- Data:
  - text human readable files
  - not binary proprietary formats
  - modify with scripts
  - never overwrite

Helpful tips (cont):

- Paths:
  - use relative rather than absolute
  - relative `data\my_data.csv`
  - absolute: `c:\my_projects\data\my_data.csv`
- Figures:
  - generate with scripts
  - easier to modify
  - easier to change once data or analysis changes

Live coding excercise!

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Git is:

- version control system
- track all changes in text files (data, code)
- tracks where the changes were done
- FREE and OPEN-SOURCE

Git commands:

- `git init`
- `git clone <path or url>`
- `git add file1 file2` or `git add -A`
- `git commit -m "Information about commit"`
- `git push remote_repository branch`
- `git pull remote_repository branch`
- `git status`

Sources and guides

R

- Start with: `http://tryr.codeschool.com`
- Continue with: `http://tryr.codeschool.com`
- Advanced R: `http://adv-r.had.co.nz/`

git

- Start with: `https://guides.github.com/introduction/git-handbook/`
- Documentation: `https://git-scm.com/docs`
- Book: `https://git-scm.com/book/en/v2`

A Guide to Reproducible Code in Ecology and Evolution

- `https://tinyurl.com/reproducibleCode`
- original link

I want your feedback!