Git(Hub)

A Gentle Introduction for R Users

Dr. Edgar J. Treischl

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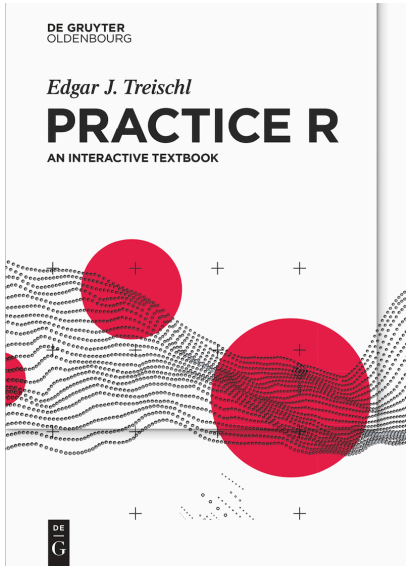
Images: Roman Synkevych

Agenda

1️⃣ Intro Git/GitHub

2️⃣ Getting Started with R Studio

3️⃣ Basics of Git and Workflow



This workshop is based on Practice R.

1️⃣ Git/GitHub ... What?

(01) Git/GitHub ... What?

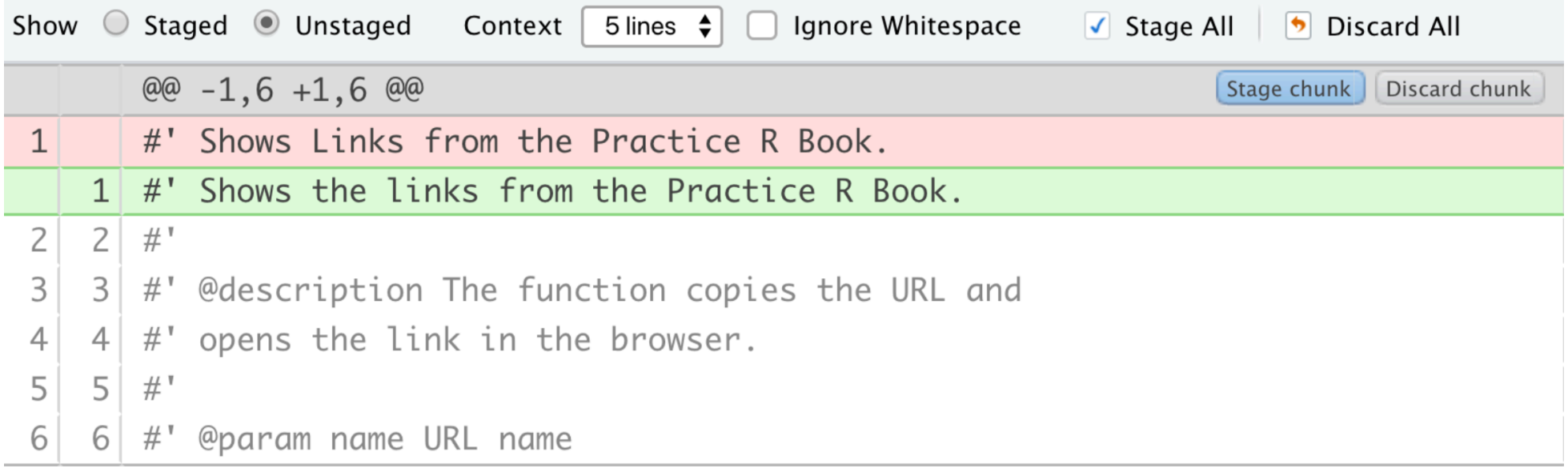
- Git is a version control system to track changes over time
- Continuous integration (CI) and continuous deployment (CD)
- GitHub (GitLab) is an host (website) for Git-based projects
- Each project is stored in a repository (folder with all files)
- A repository can be *public* or *private*

Why Hosts like GitHub?

- Easier to track code changes
- Share work
- Automated workflows
- Websites for projects
- Work together
- ...

(01) Git/GitHub ... What?

Track Code | Share Code | Automate workflows




2 Getting Started
HBOmax

(02) Getting Started

Push and pull 💪 on a regular basis:

1. Install Git:
    - Install on your local machine
    - Introduce *yourself*
    - Learn some *Git*
2. Connect to GitHub
    - Create a *Personal Access Token* (PAT)
    - Create a *Repository*
3. Connect GitHub and R Studio
    - *Clone* the newly created repository
    - *Setup R Studio* and connect to GitHub
    - Get in touch with the R Studio *Git pane*

(02) Install Git on your local machine

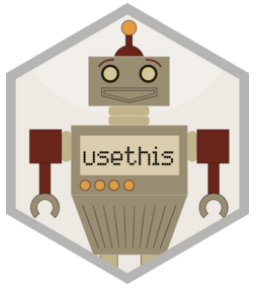
- Windows: https://git-scm.com/download/win
- OS X: https://git-scm.com/download/mac
- Debian/Ubuntu: sudo apt-get install git-core

```
# I am git code to check if git is installed

# Go to the console and type:
git --version
```

```
## git version 2.50.1 (Apple Git-155)
```

- Next, create a free GitHub account

(02) Install Git: Introduce yourself



Via the shell

```
#In the console
git config --global user.name "User Name"
git config --global user.email "email@adress.com"
```

Or with the 🚀 usethis package

```
library(usethis)
use_git_config(user.name = "Jane Doe",
               user.email = "jane@example.org")
```

(02) Install Git: Introduce yourself

Check global configuration settings

```
git config --global --list
```

```
## filter.lfs.clean=git-lfs clean -- %f
## filter.lfs.smudge=git-lfs smudge -- %f
## filter.lfs.process=git-lfs filter-process
## filter.lfs.required=true
## user.name=edgar.treischl
## user.email=edgar.treischl@isb.bayern.de
## core.excludesfile=~/.gitignore
## color.ui=auto
## credential.helper=osxkeychain
```

Git can be scary, but ...

(02) Install Git: New Vocabulary 

Wait, Git is scary because it's full of technical jargon[1]:

- **Repository**: A folder with all project files
- **Push**: Send code (files) to Git
- **Pull**: Get code (files) from a Git repository
- **Commit**: A snapshot of a repository at a certain point in time
- **Branch**: A parallel version within the repository to test new features

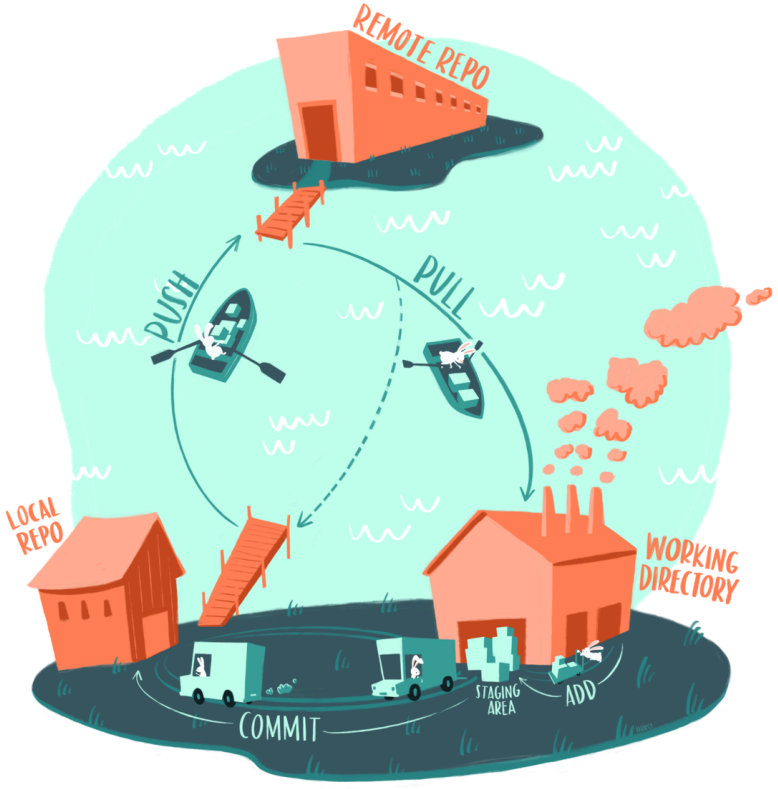
...

'Artwork by @allison_horst'

[1] As often, R Studio helps us to work with Git.

(02) Install Git: New Vocabulary 

- **Merge**: Combine two branches
- **Merge conflicts**: When two branches have changed the same part of a file, Git will not be able to automatically determine what is correct
- **Forks**: Forks are interconnected repositories, for example, to examine a repository from someone else
- **Pull requests**: A way to suggest changes to a repository



'Artwork by @allison_horst'

(02) Connect to GitHub: Create a PAT

Create a PAT in R Studio:

```
# The create_github_token() function will open a browser window to create a token
usethis::create_github_token()

#The set_github_pat() function will store the token in the .Renviron file
credentials::set_github_pat("token")
```

Or manually via:

On the GitHub website, go to:

- Settings > Developer settings > Personal access tokens:
- https://github.com/settings/tokens

(02) Connect to GitHub

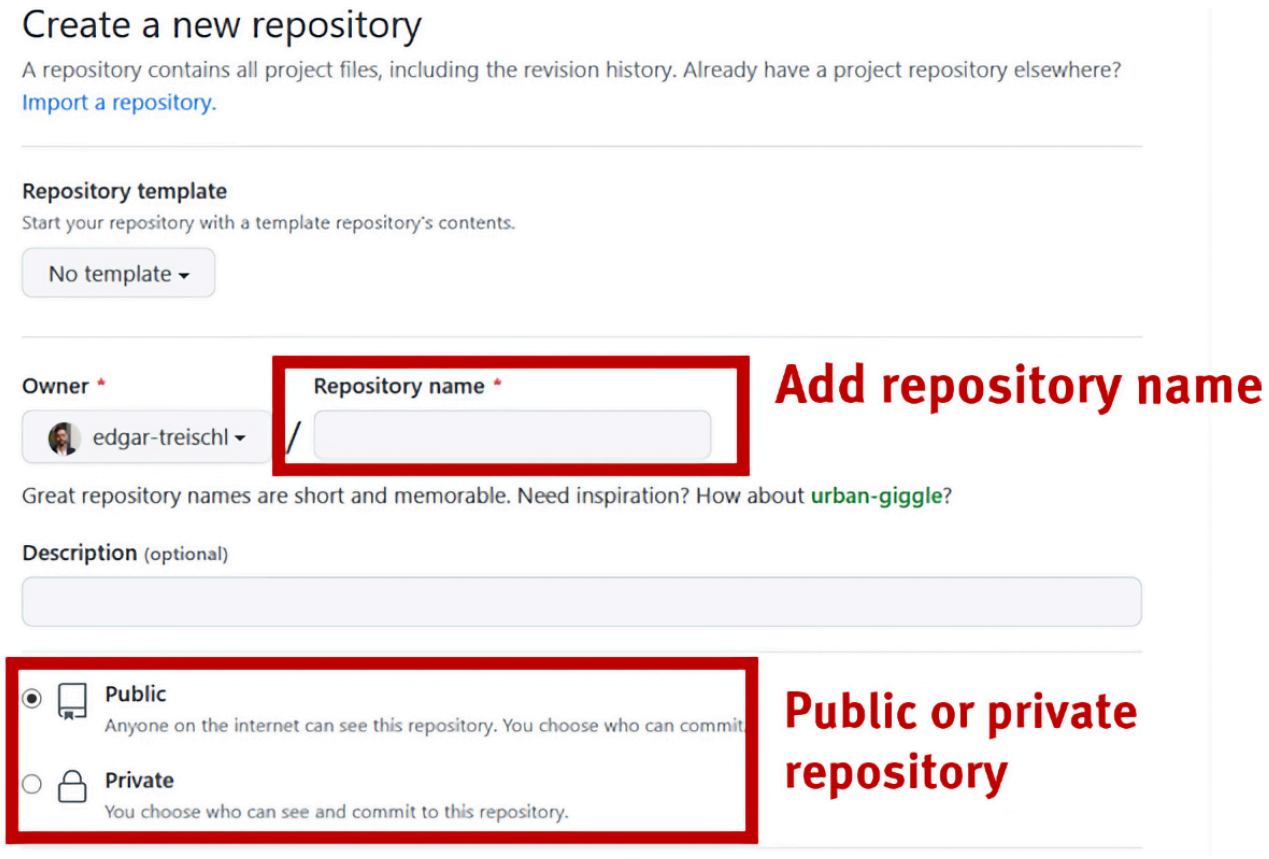
Check if R Studio is connected to GitHub:

```
# Actually, whoami will show you who you are on GitHub ...
gh::gh_whoami()
```

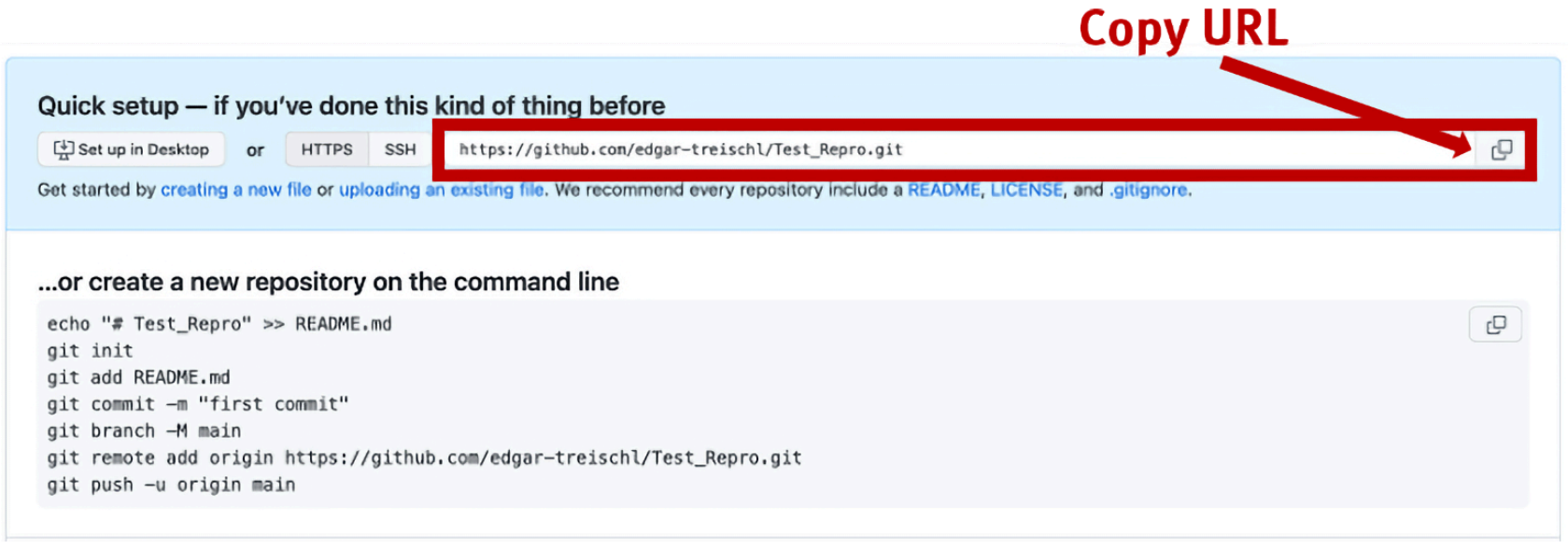
```
## {
##   "name": "Edgar Treischl",
##   "login": "edgar-treischl",
##   "html_url": "https://github.com/edgar-treischl",
##   "scopes": "gist, read:org, repo, workflow",
##   "token": "gho_...P1X2"
## }
```

 **... you're connected!**

(02) Connect to GitHub: Create a repository



(02) Connect to GitHub: Create a repository



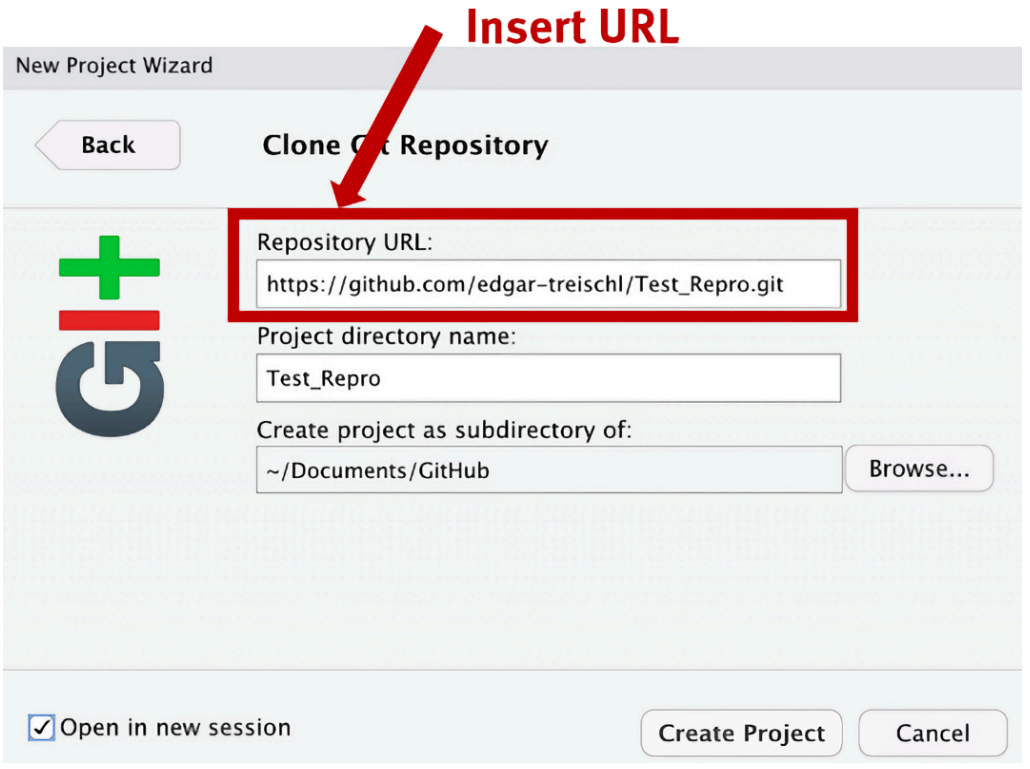
(02) Connect GitHub and R Studio

1. Create a new project in R Studio and click next.

2. Pick Version Control and cick next.

3. Pick Git and click next.

4. Paste the repository URL:

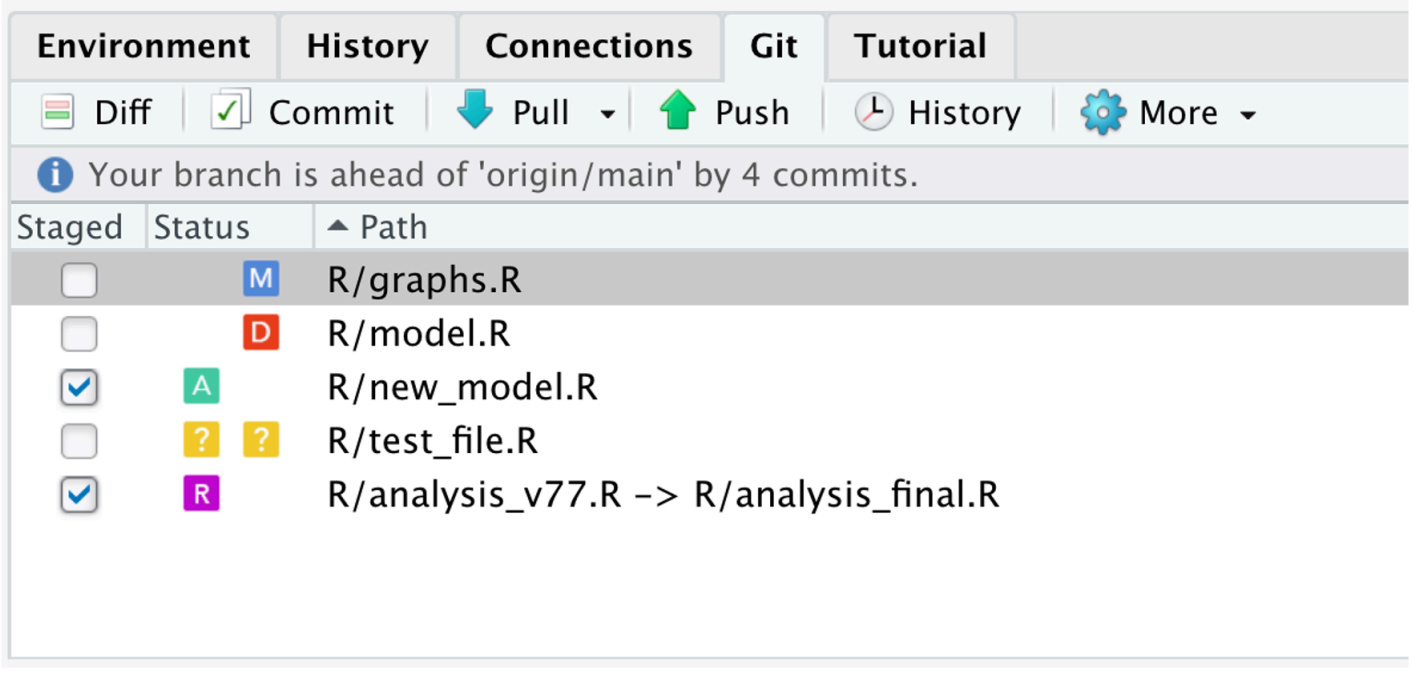


(02) Connect GitHub and R Studio: Git Pane

Once R Studio is connected, search for the Git pane:

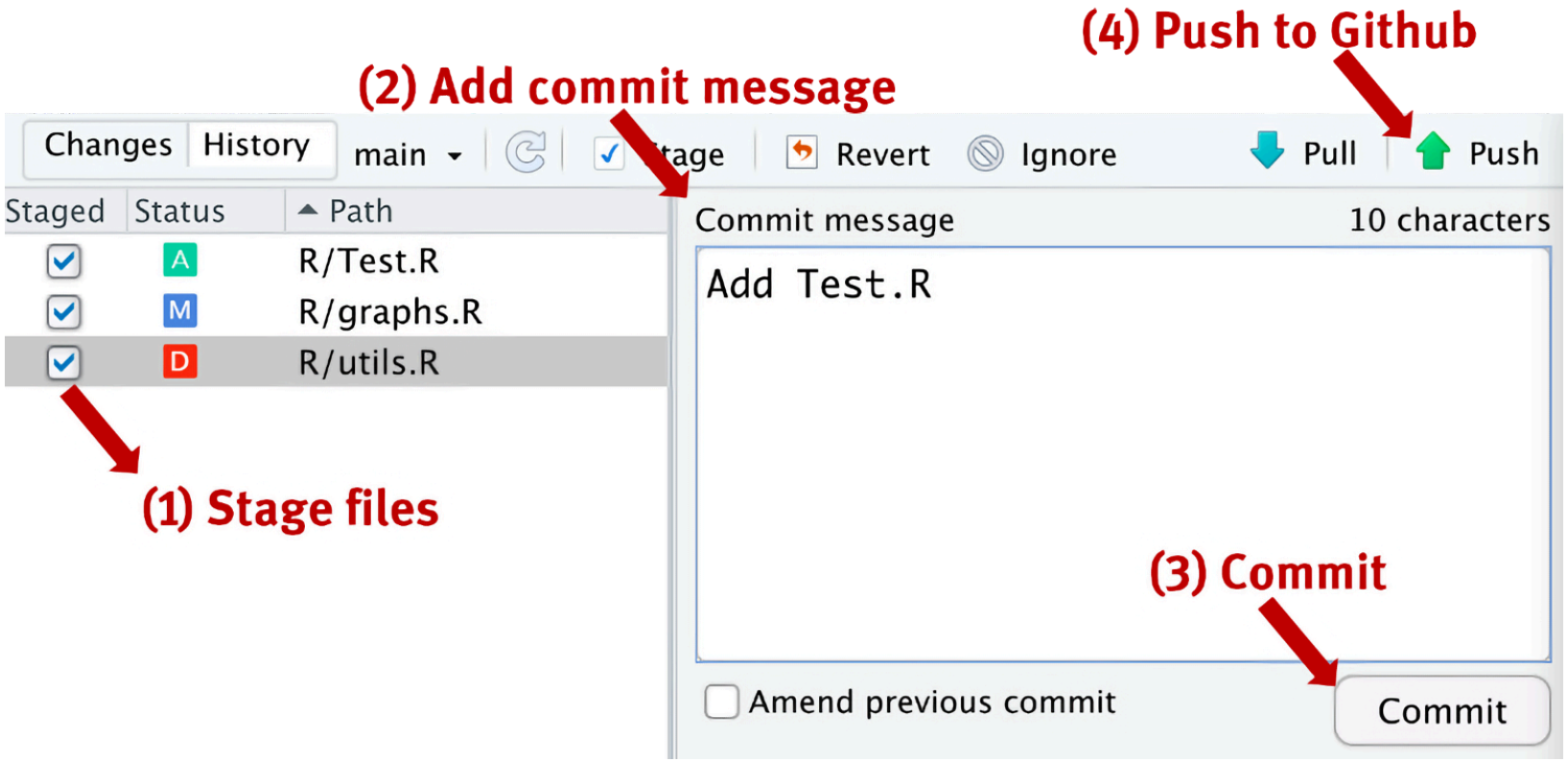
Files:

- **Modified**
- **Deleted**
- **Added**
- **Untracked**
- **Renamed**



(02) Connect GitHub and R Studio: Git Pane

You gonna stage, commit, push, and let it all out 🤷‍♀️



Practice Makes Perfect

Practice Makes Perfect

➕ Create a new repository on GitHub

💻 Clone the repository on your local machine

📂 Add a new repository file

🆘 Commit the changes

📪 Push the changes to the remote repository

3️⃣ Basics of Git

(03) Git basics

```
# Initialize a new repository
git init <your repository name>

# Clone a repository
git clone <git-repo-url>

# Create a new branch
git branch <branch-name>

# List all branches
git branch --list

# Delete a branch
git branch -d <branch-name>

# Switch to a branch
git checkout <branch-name>
```

(03) Git for the daily workflow

```
# Add a file to the staging area
git add <file-name-1>

# Add all files to the staging area
git add -A

# Commit changes
git commit -am <commit-message>

# Push changes to the remote rep
git push <remote> <branch-name>

# Pull changes from the remote rep
git pull

# Merge two branches
git merge <branch-name>
```

'Artwork by @allison_horst'

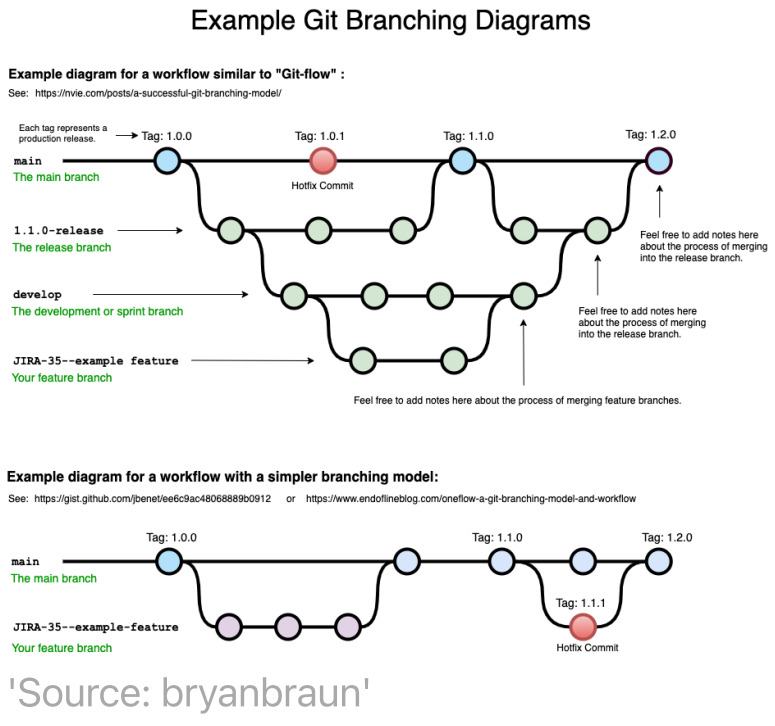
(03) Feature Branches

Work on new ideas and experiment without worrying about breaking the code or interrupting your teammates' flow

```
# Create a new branch and switch to it
git checkout -b feature/shiny_map

> Switched to a new branch
'feature/shiny_map'
```

- Push your branch to the shared repository:

```
# Push your branch to the remote repository
git push origin feature/shiny_map
```



'Source: bryanbraun'

=> Next step: creating a pull (GitHub) or merge (GitLab) request

(03) Merge Request

- MR are key checkpoint for collaboration, feedback, and maintaining high-quality code (Code Review)
- MR description:
    - A summary of what you changed and why
    - Mentions of any relevant people using @username
    - Links to related *issues*, tickets, or discussions


```
# Create a new branch for the MR and push it
git checkout -b 42-add-shiny-map
git push origin 42-add-shiny-map
```

Closing Keyword for *Issues*:

- Closes #42
- Fixes #42
- Resolves #42

(03) Even more Git? 🤯

Do I need all the code if I am happy with the Git Pane?

- The Pane simplifies common Git operations, but Git Code gives you more control, flexibility, and the ability to handle complex operations
- **Common example**: Merge conflicts can occur when two branches have changed the same part of a file and Git will not be able to automatically determine what is correct
- Git commands give you a more detailed understanding of where the conflicts are happening. This is particularly useful when the conflict isn't straightforward to resolve.
- Of course, we don't have to remember in detail 😉

Merge Conflict:

```
# <<<<<<< HEAD
# print("This is my feature branch.")
# =======
# print("This is my master branch.")
# >>>>>>> master
```

Typical workflow to solve the merge conflict:

- Manually resolve the conflict in the file(s) and run:

```
git add script.R
git commit -m "Resolved merge conflict"
```

(03) Commit history in R Studio

Commits

Subject	Author	Date (UTC)	SHA
HEAD -> refs/heads/master origin/master origin/HEAD del emoji 1	edgar-treischl <edgar.treischl@fau.de>	2022-09-09	56c57ba2
V1	edgar-treischl <edgar.treischl@.de>	2022-04-24	0f021914
add description	edgar-treischl <edgar.treischl@.de>	2022-04-23	2fd9ac3f
add description	edgar-treischl <edgar.treischl@.de>	2022-04-23	723c89fe
add description fun	edgar-treischl <edgar.treischl@.de>	2022-04-14	f1421857
addin readme text adjusted	edgar-treischl <edgar.treischl@.de>	2022-03-28	fafaf714

Commits 1-79 of 79

SHA 2fd9ac3f494da64d30224f1dead3d3f78810562b
Author edgar-treischl <edgar.treischl@.de>
Date (UTC) 2022-04-23 08:01
Subject **add description**
Parent 723c89fef03d9bc4a889b37f74adf9815b5f1d57

R/copycat_addin.R

View file

R/copycat_addin.R View file @ 2fd9ac3

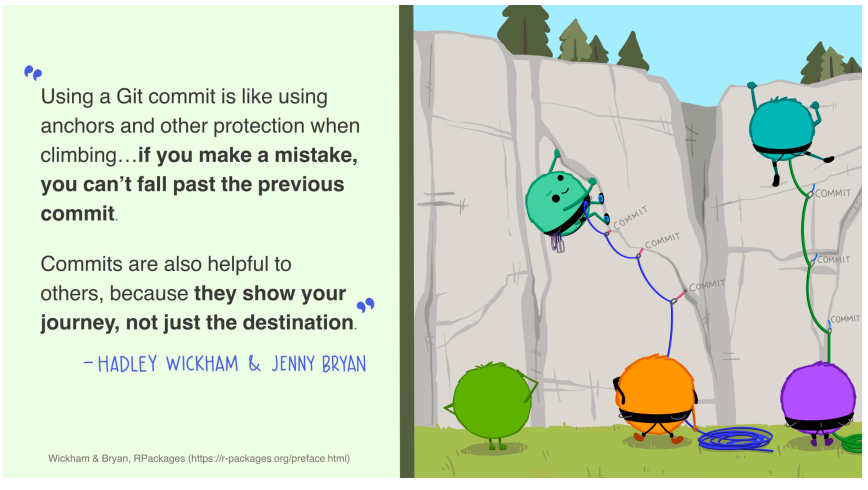
```
@@ -1,7 +1,7 @@
#' Manage code snippets via the `copycat_addin()`.
#'
#' @description The `copycat_addin()` starts a small app in the viewer
#' that shows the copycat or any data frame for Copycat. Just select an R package
#' @description The `copycat_addin()` opens a gadget shiny app
#' that shows the copycat or your data for Copycat. Just select an R package
#' and the corresponding code snippet. Then press
#' the button and the code will be insert into the current document at the
#' location of the cursor. The `copycat_addin()` is inspired by parsnip addin,
```

Commit Messages

Commit messages help to:

- Understand the evolution of the code
- Debug effectively
- Collaborate with others
- Use GitLab issues to track development
- Improve CI/CD troubleshooting
- Start with a verb in the imperative mood: “Add”, “Fix”, “Modify”, “Delete”
- Keep the subject line short and focused (ideally under 50 characters)

- Optional: Include a short body if the change is complex and needs context



'Allison Horst'

An Example:

```
#> Fix plot alignment in create_pdf
#> It prevents overflow when long axis labels are used.
```

Commit Messages: Pitfalls

***Vague commit messages*: "Fix bug"**

***Omitting context for complex changes*: "Refactor function"**

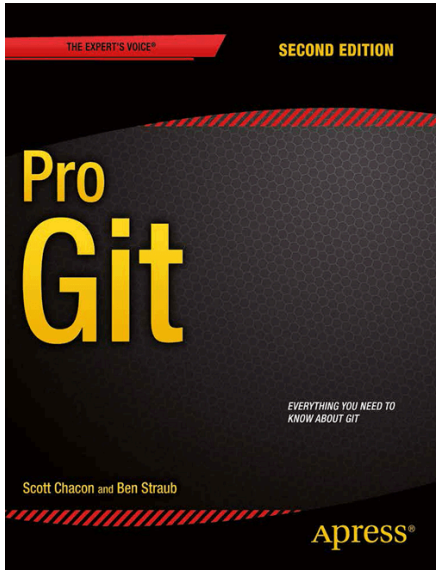
***Committing unrelated changes together in one commit*: "Update complex_function and fix bug several data processing steps"**

It's helpful to integrate changes (1) early, (2) often, and (3) safely.

- (1): Push code as soon as it becomes functional, even if it's not polished yet. Holding onto work increases the risk of merge conflicts.
- (2): Commit changes regularly and keep them small. Frequent, incremental updates are easier to understand and quicker to review.
- (3): Every change that lands on the main branch must be ready for deployment. (pre-commit hooks, linting, and secret detection, integration tests).

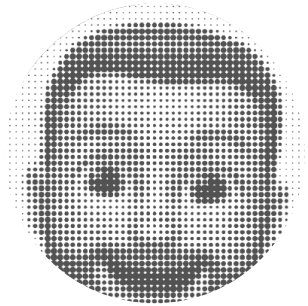
(03) Git for troubleshooting 💀

```
# Show who changed what and when
git blame file.txt

# Shows the working tree status
git status

# Shows changes between commits
git diff

#💀💀💀 DANGER
# Revert some existing commits
git revert SHA

# Reset the repository to a previous commit
# Take care: This will discard any local
changes
git reset

#Ultima ratio ;-)
# A "hard reset": forcefully discard any
local changes
```



'Pro Git by Chacon and Straub'

Thank you for your attention!



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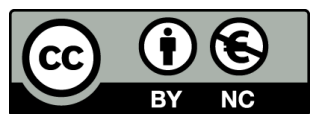

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