Programming in R

https://compcogscisydney.org/psyr/

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(Intro slides: PSYC 3361)

Hi there!!!

- Your name & area of your internship
- Any previous experience in programming?
- Goals?
  - What skills would you like to acquire?
  - What do you think you might need in your work?
- Anything you would like to share!

Course objectives

- It's partly about R …
  - Be able to read and write basic programs in R
  - Be aware of what you can do with R

- But it's also broader …
  - Be aware of technical options that are available to facilitate psychological research
  - Develop and apply technical skills to tasks relevant to research in psychology

You control this class!

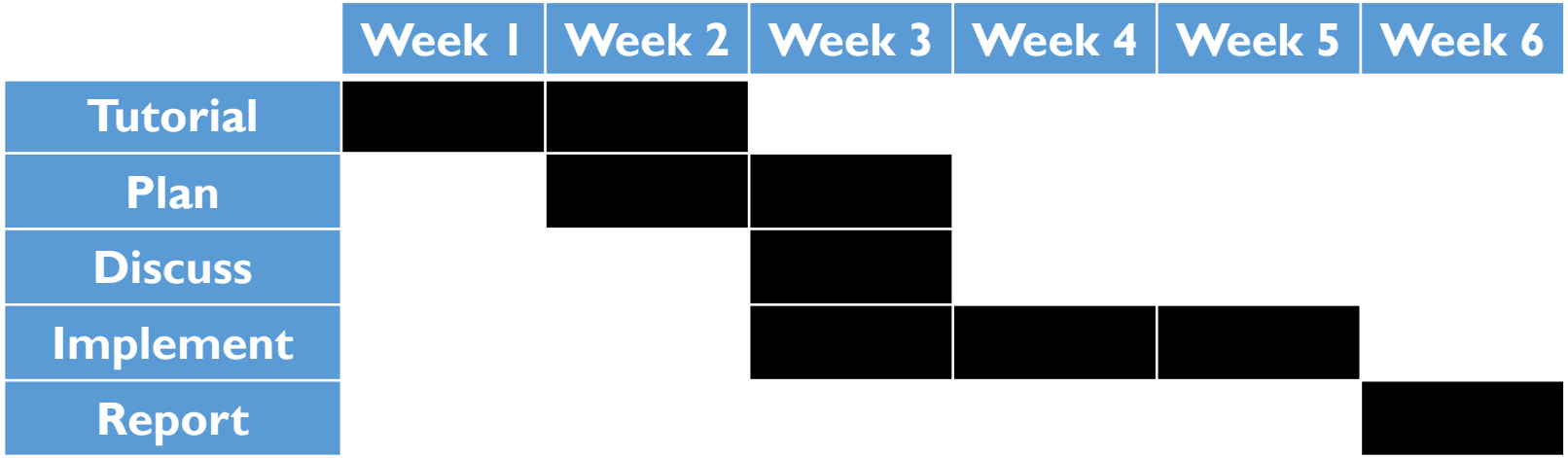
- The class is informal, relaxed & collaborative
- Assessment is minimal:
  - Write a learning log (next slide) each week
  - The idea is for you to do something you like

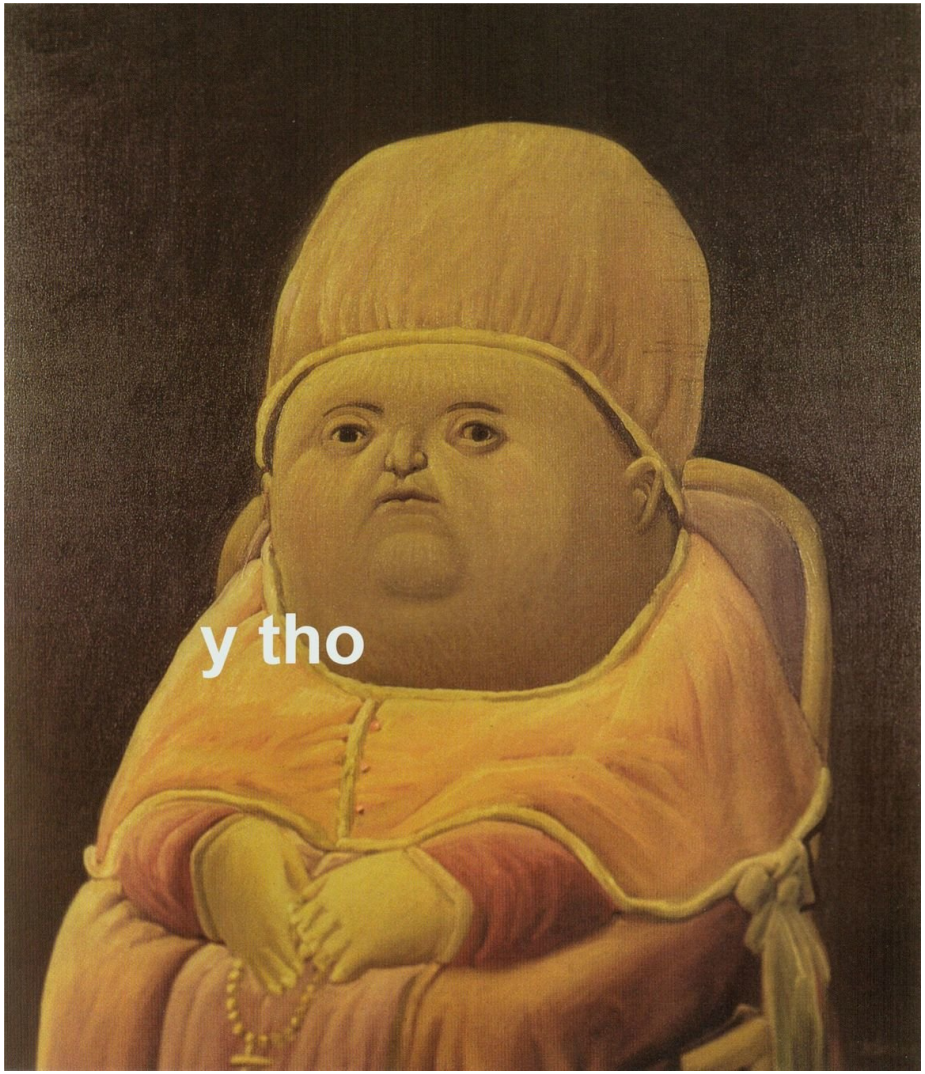
- So what is the instructor even here for?
  - The writer of notes … compcogscisydney.org/psyr
  - Help with debugging … things breaks when you code. They break *a lot*! I'm here to help 😁

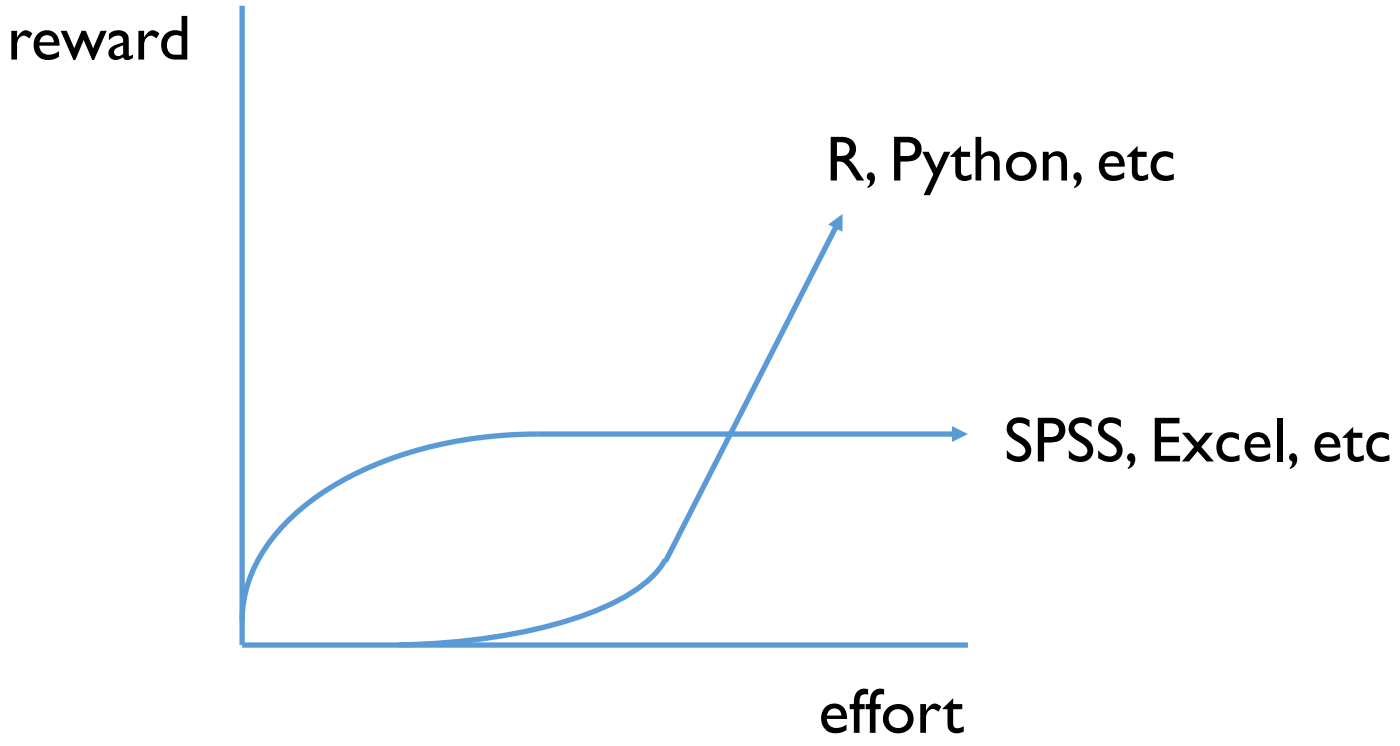
Learning logs

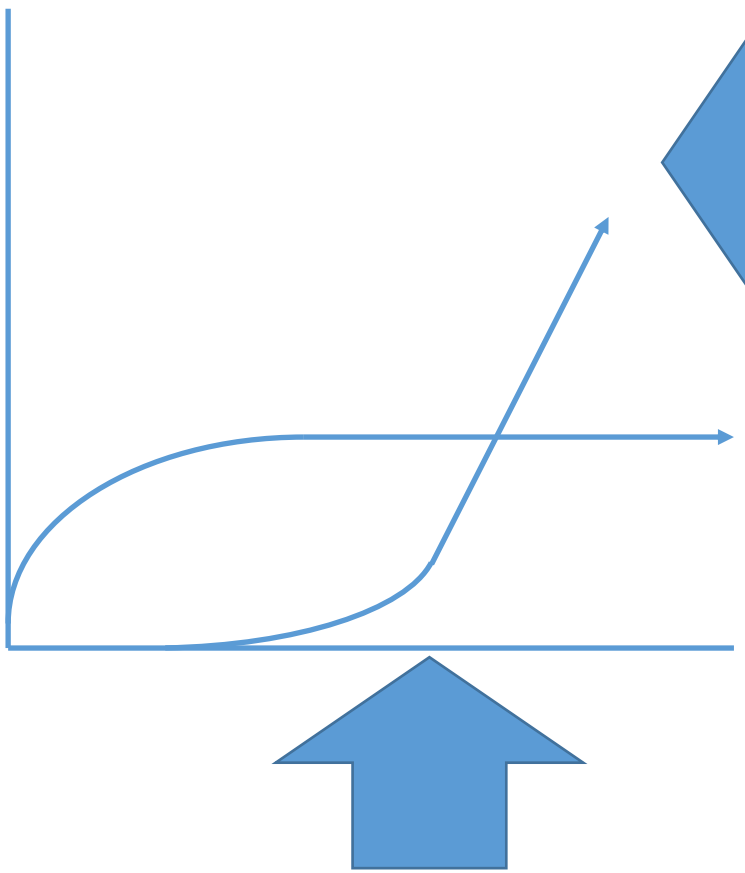
- After each class, create a post on Moodle!
- Something like this:
  - My goal for today's session was …
  - I spent the session …
  - The things that went well were …
  - The things that were challenging were …
  - Next time I want to ...
- I will read and comment on them.
- Classmates can also read and comment

Course timeline




y tho


reward
R, Python, etc
SPSS, Excel, etc
effort



Goal 1: convince you that the payoff is real

Goal 2: help you get closer to the point where it becomes rewarding

Statistical computing

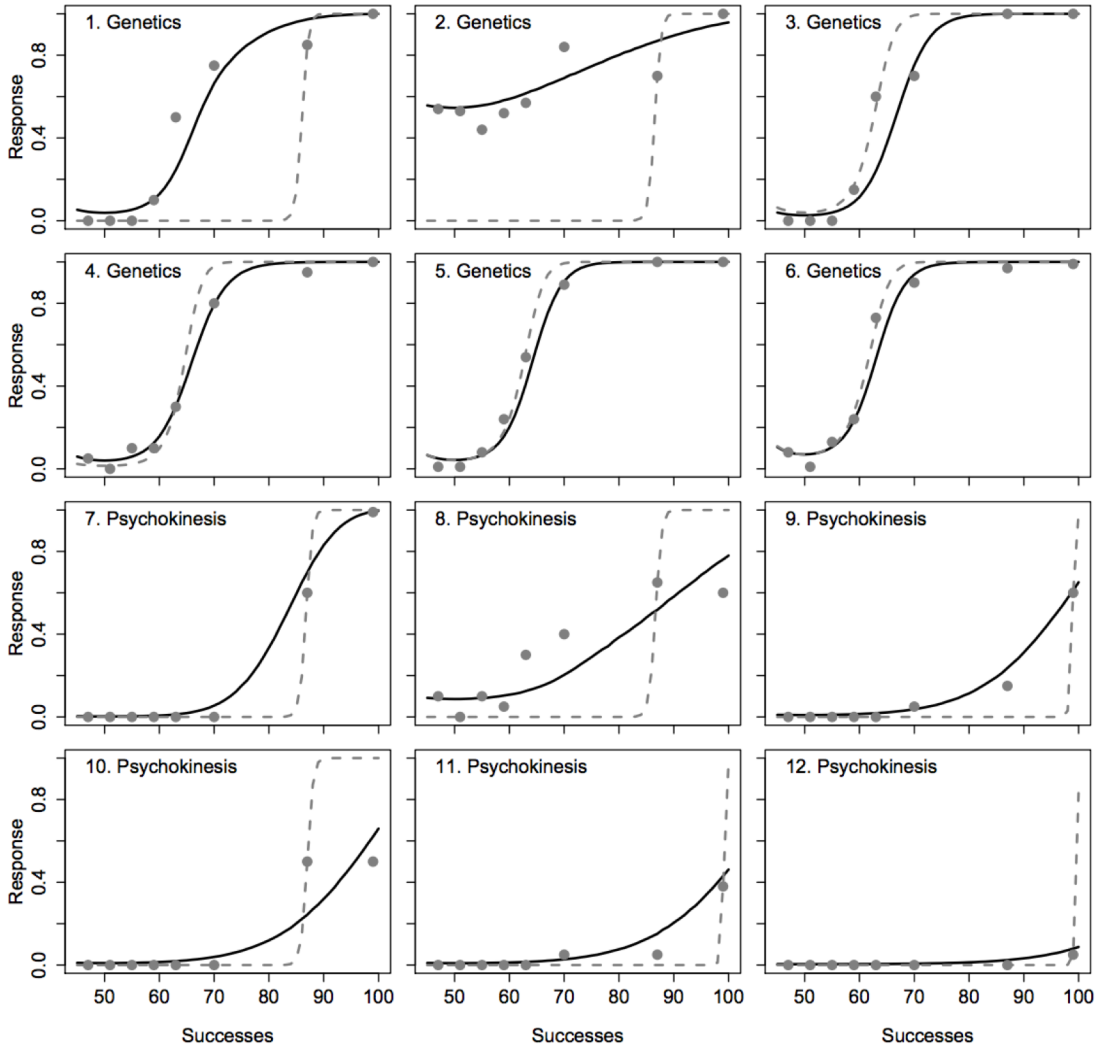
The R Project for Statistical Computing

Getting Started

R is a free software environment for statistical computing and graphics. It compiles and runs on a wide variety of UNIX platforms, Windows and MacOS. To **download R**, please choose your preferred CRAN mirror.

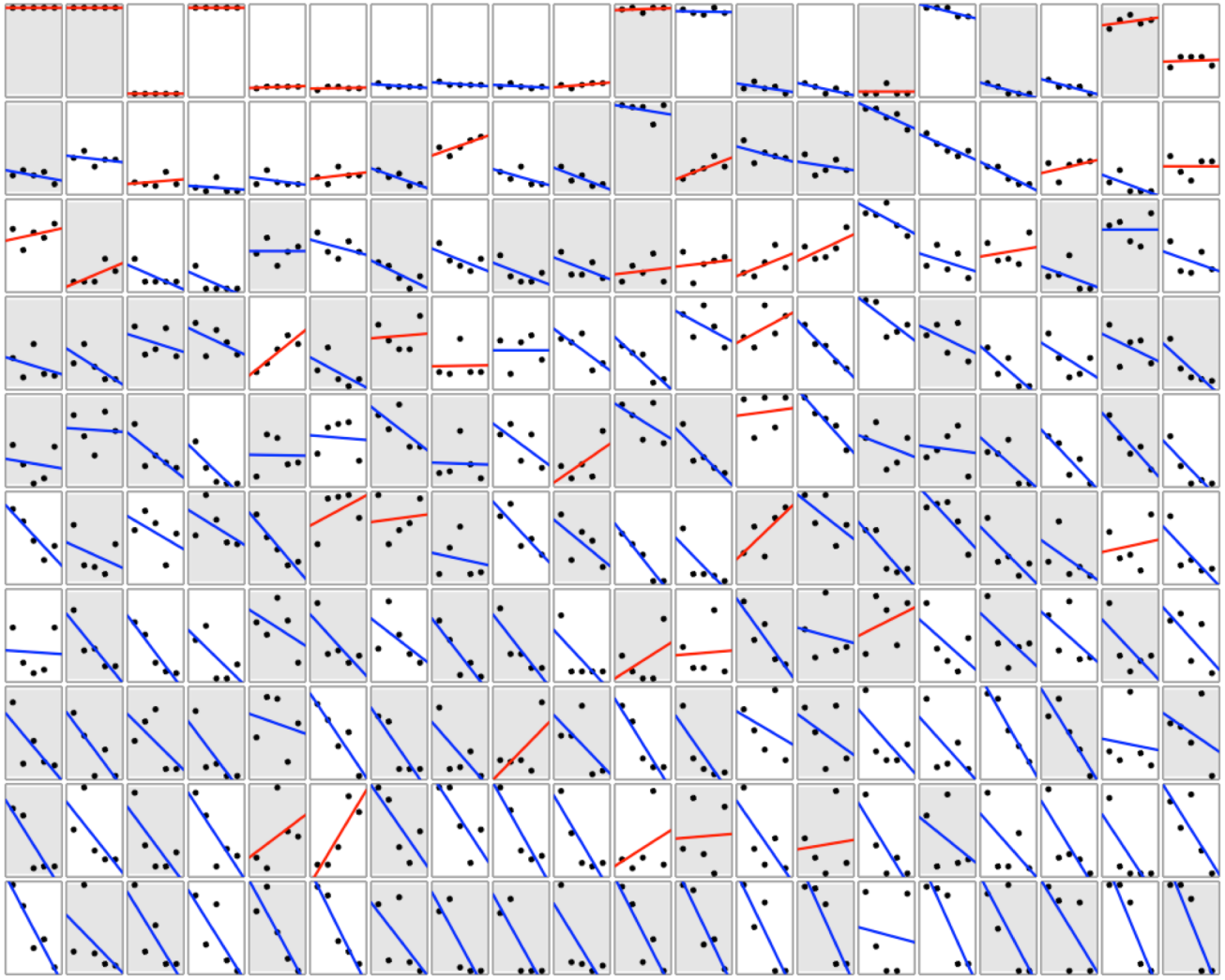
If you have questions about R like how to download and install the software, or what the license terms are, please read our answers to frequently asked questions before you send an email.

So yes, data analysis in R…



hierarchical
Bayesian models
with blah blah blah

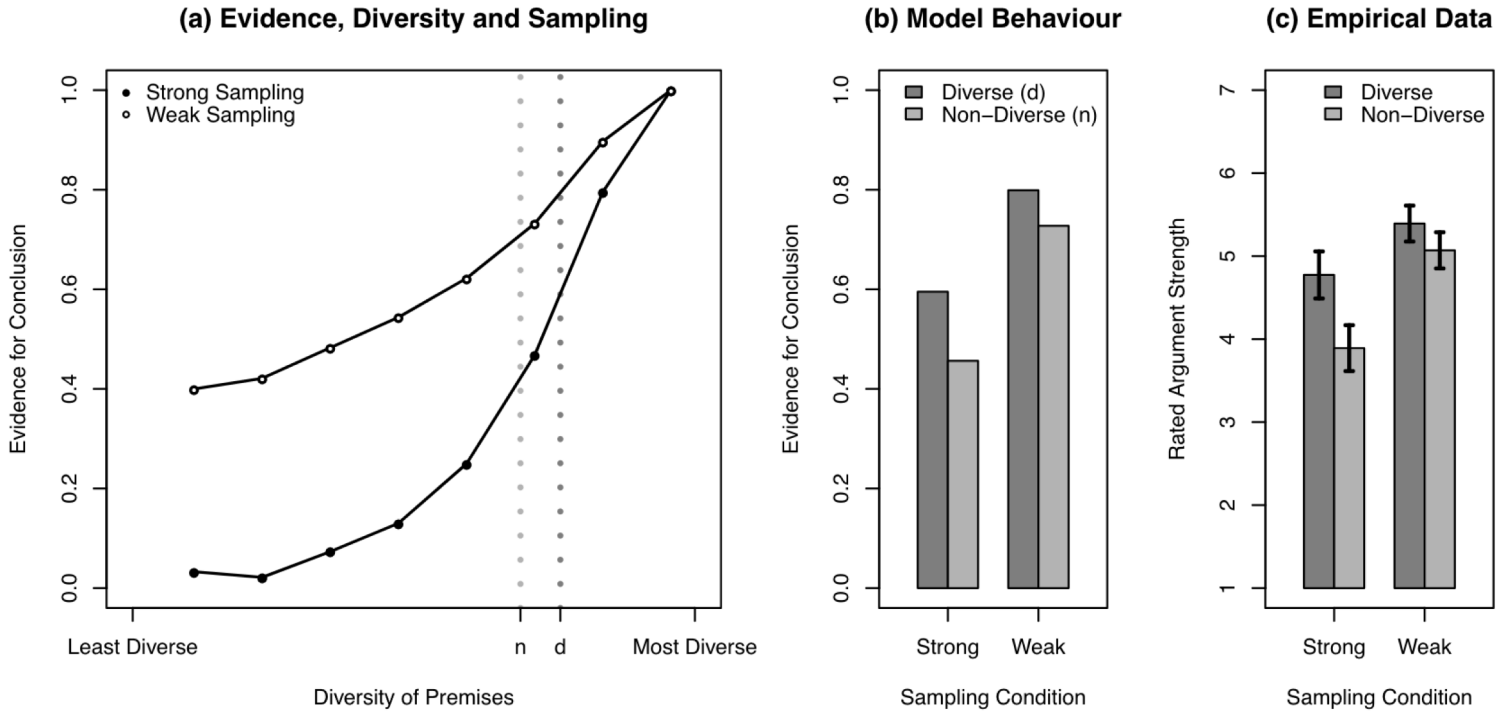
… very pretty data analysis!



visual representation of 200 regression analyses

Useful for <u>designing studies</u>

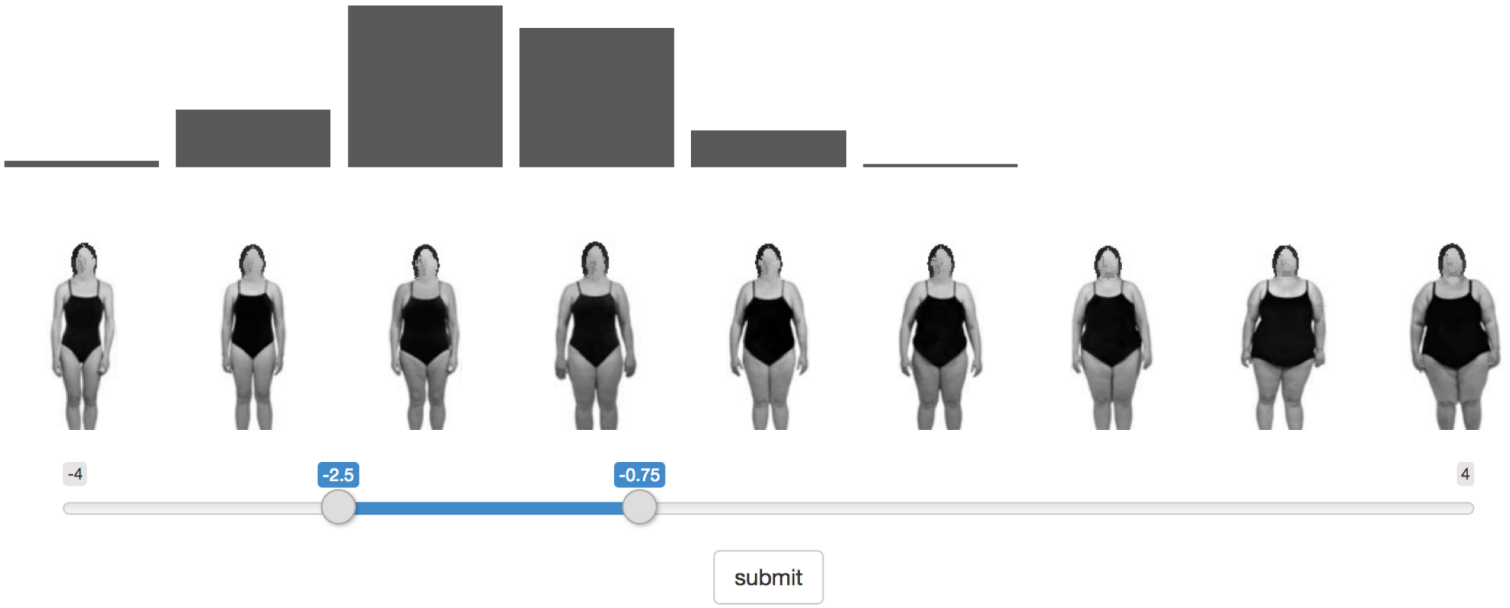
- I knew what the theory was, I knew what I wanted to manipulate…
- But until I ran the simulations, I didn't know whether to expect this to be a diagnostic experiment!



Useful for data collection

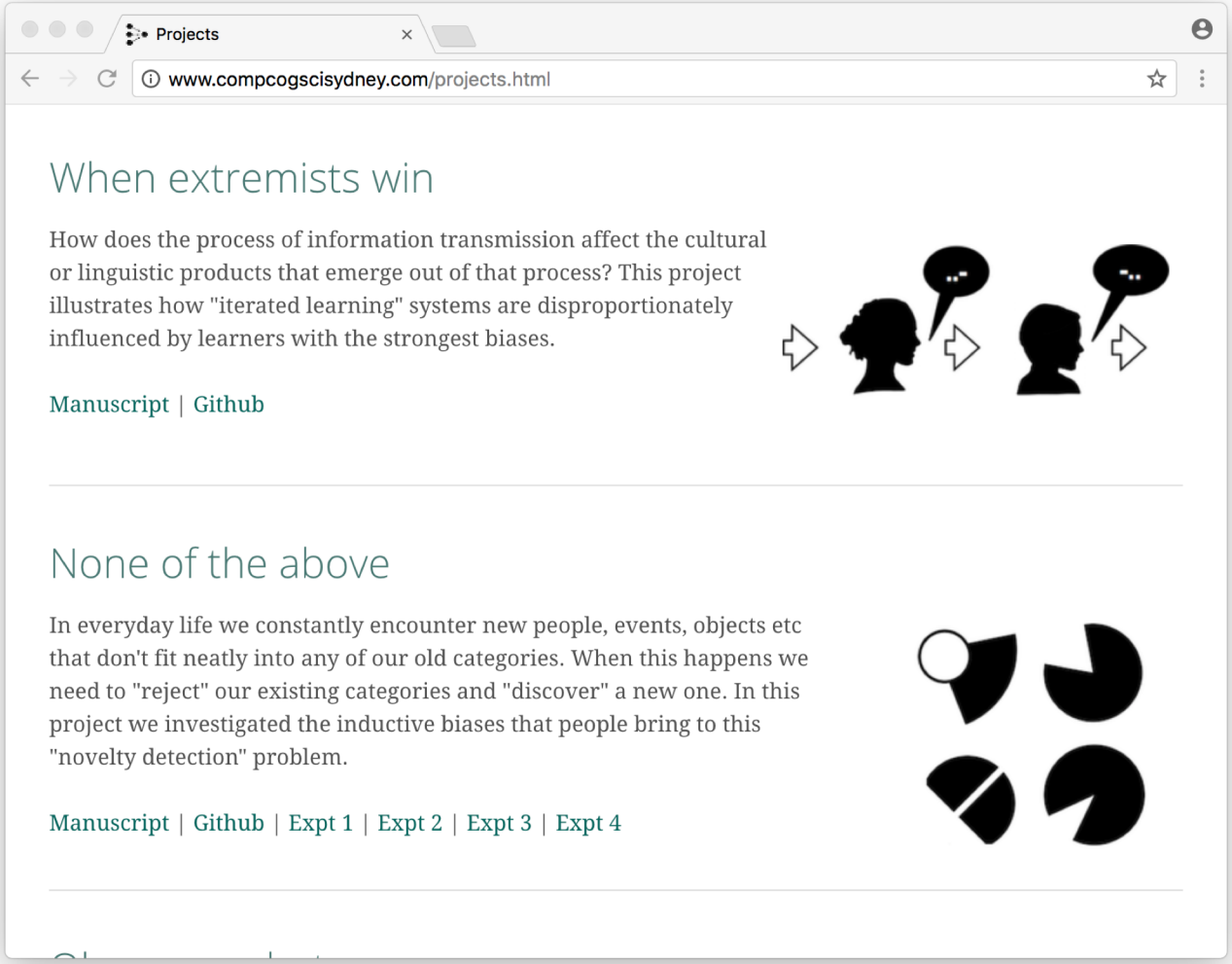
https://djnavarro.shinyapps.io/elicit/

(you can do a quick and easy text based version too, btw…)



Useful for reproducible methods

links to working versions of the experiment code, and live demos of the experiment itself



… lots of serious stuff

Structural equations models? With Bayes?

Social network analysis? With beautiful pictures?

Flexible experiments with Shiny apps?

Better tools for reproducible research?

Hey, I've been learning new things!

Danielle Navarro
@djnavarro

Okay, this will probably end in tears, but what the heck... I'm going to try this #100DaysOfCode thing. The plan is to try out a new #Rstats package each day and write about it. 😟😀

A random walk on CRAN | #
One of my goals this year was to broaden my horizons, programming-wise. So far, I've been really happy with my progress! At the start of the year I taught myself t...
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11:18 PM - 27 Apr 2018

47 Retweets **186** Likes

8 47 186

Danielle Navarro @djnavarro · Apr 27
Day 1: I tried #blogdown and ... yaaaaay, I'm still technically alive! 💃 #100DaysOfCode

Day 1: Getting started with blogdown | #
On the one hand I feel pretty foolish choosing the blogdown package as the place to start. As awesome as it sounds to have an R package that lets me write...
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1 3 26

Danielle Navarro @djnavarro · Apr 28
Day 2: Taking myself very seriously with the emo #Rstats package 😔. After all what's the point of human language without the expressive power to say 💁‍♀️👄🙅‍♀️🎉 #100DaysOfCode

Day 2: This is serious, mum - the emo package | #
Yesterday's effort with blogdown has worn me down. I cannot handle another one of those. Plus, my five year old daughter wants to play a game with me. Time to ...
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Danielle Navarro @djnavarro · Apr 29
Day 3: I wanted to play around with deep learning using the h2o 🌊 package but instead spent all of my allotted time working out how to load the thing. 💁‍♀️#100DaysOfCode #amlearning #thekrakenwakes #h2o #rstats

Day 3: Watery deep learning (H2O) | #
Maybe I should try playing around with deep learning? All the cool kids are doing it. A few moments on google turns up this R-bloggers post comparing several tool...
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1 2 14

Danielle Navarro @djnavarro · Apr 30
Day 4: Idle thoughts on pipes, laundry 👖👗👚🎩 and gang signs 🤙... it turns out that reading the docs for #magrittr is a worthwhile exercise! I probably should have done that ages ago? Oops! 😳 #100DaysOfCode #rstats

Day 4: A series of tubes (magrittr) | #
Yesterday was supposed to be laundry day. I had a massive backlog of clothes that needed to be washed, another pile that needed folding, and several free hour...
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1 1 12

Danielle Navarro @djnavarro · May 1
Day 5: I have always envied those people producing beautiful interactive maps using #rstats, so I tried out the #leaflet package. It is lovely! #100DaysOfCode

Day 5: Leaflet | #
The leaflet package lets you draw awesome interactive maps (using leaflet.js, I presume!), and it's nicely documented on the RStudio website here. So I think ...
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1 4 18

Danielle Navarro @djnavarro · Jun 18
Day 53-54: I really did want to write a post about the #Rcade package, but I spent the evening playing Pacman instead. Not sure how that happened? ¯_(ツ)_/¯ #rstats #100DaysOfCode

Day 53-54: Rcade | #
So, I was going to write a post about the Rcade package, but then I got sidetracked playing Pacman for some reason 😬.... Anyway, seeing as now Rstudio is a
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2 5 13

Danielle Navarro @djnavarro · Jun 26
Day 55-62: Okay I admit that I've been too busy to try out a new #rstats package! Instead I've started thinking about how I want to organise my "intro to R" teaching material 🎓

Day 55-62: R: The Boring Bits | #
It's been a little longer than usual between posts. I've been extremely busy with work, and if you'll excuse me taking a moment to celebrate achievements I'm really...
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3 5

Danielle Navarro @djnavarro · Jun 30
Day 63-66: Having fun with #skimr package, slightly less fun with #pdftools, and no fun at all with data on gender representation on corporate boards. #rstats #100DaysOfCode .

Day 63-66: Learning to skim | #
The pace of these posts is definitely slowing! I had this one half-written two days ago, but then life got in the way. Partly prompted by external events, I took a day ...
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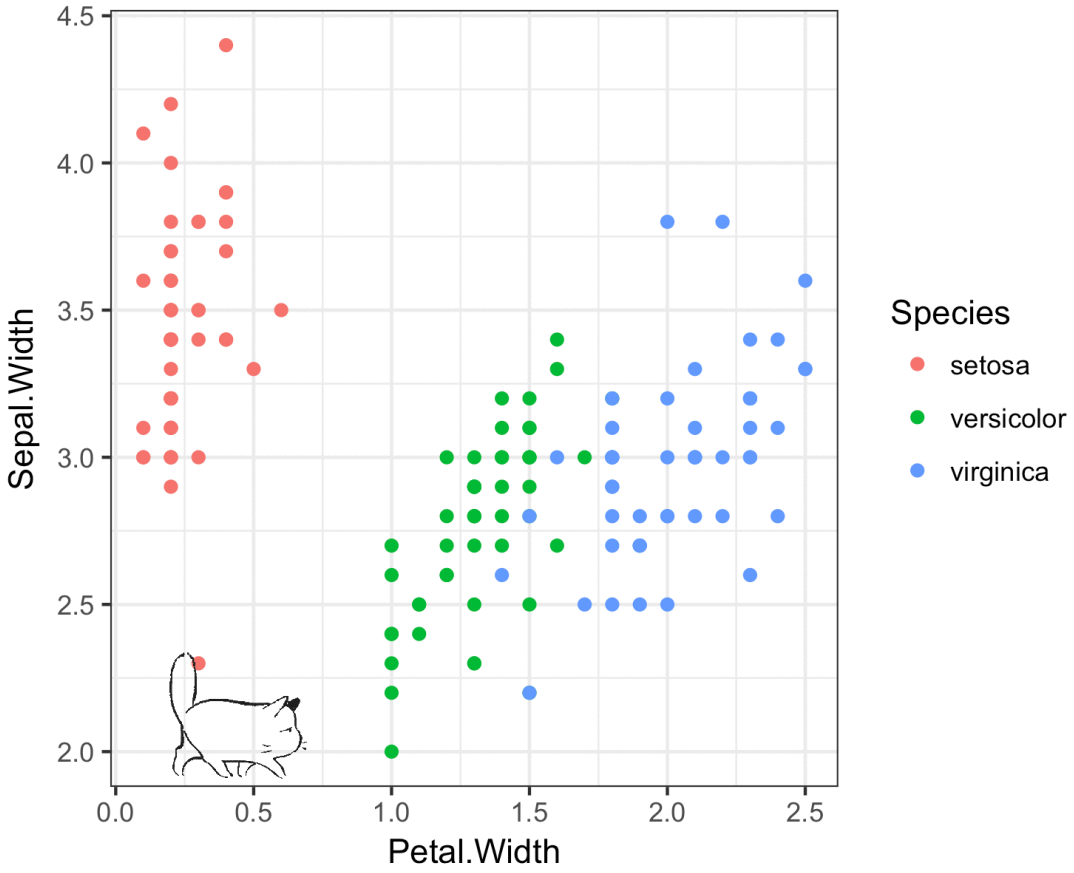
2 13 19

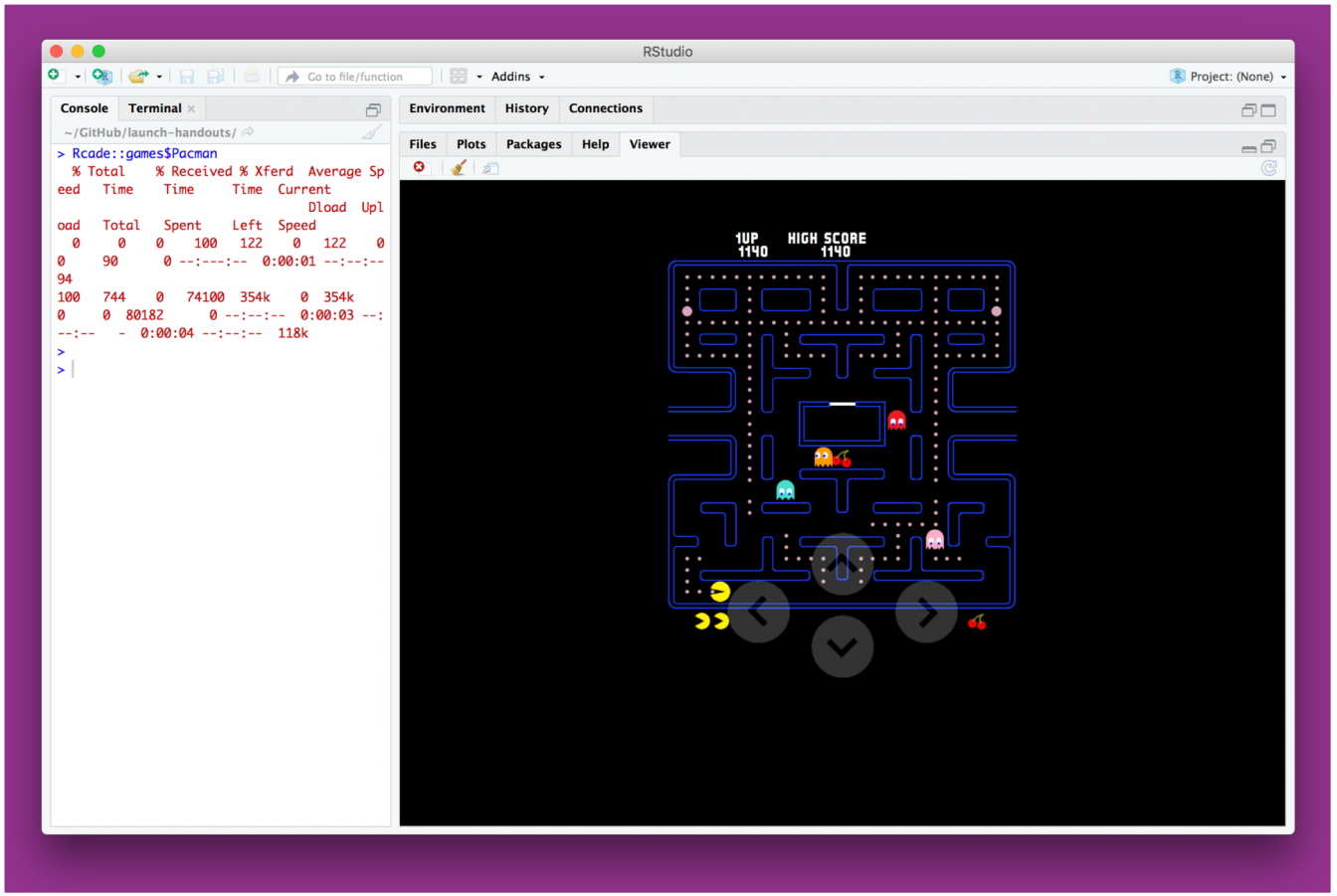
It can be fun!

http://djnavarro.net/post/2018-05-17-cat-gif-iris-magic/



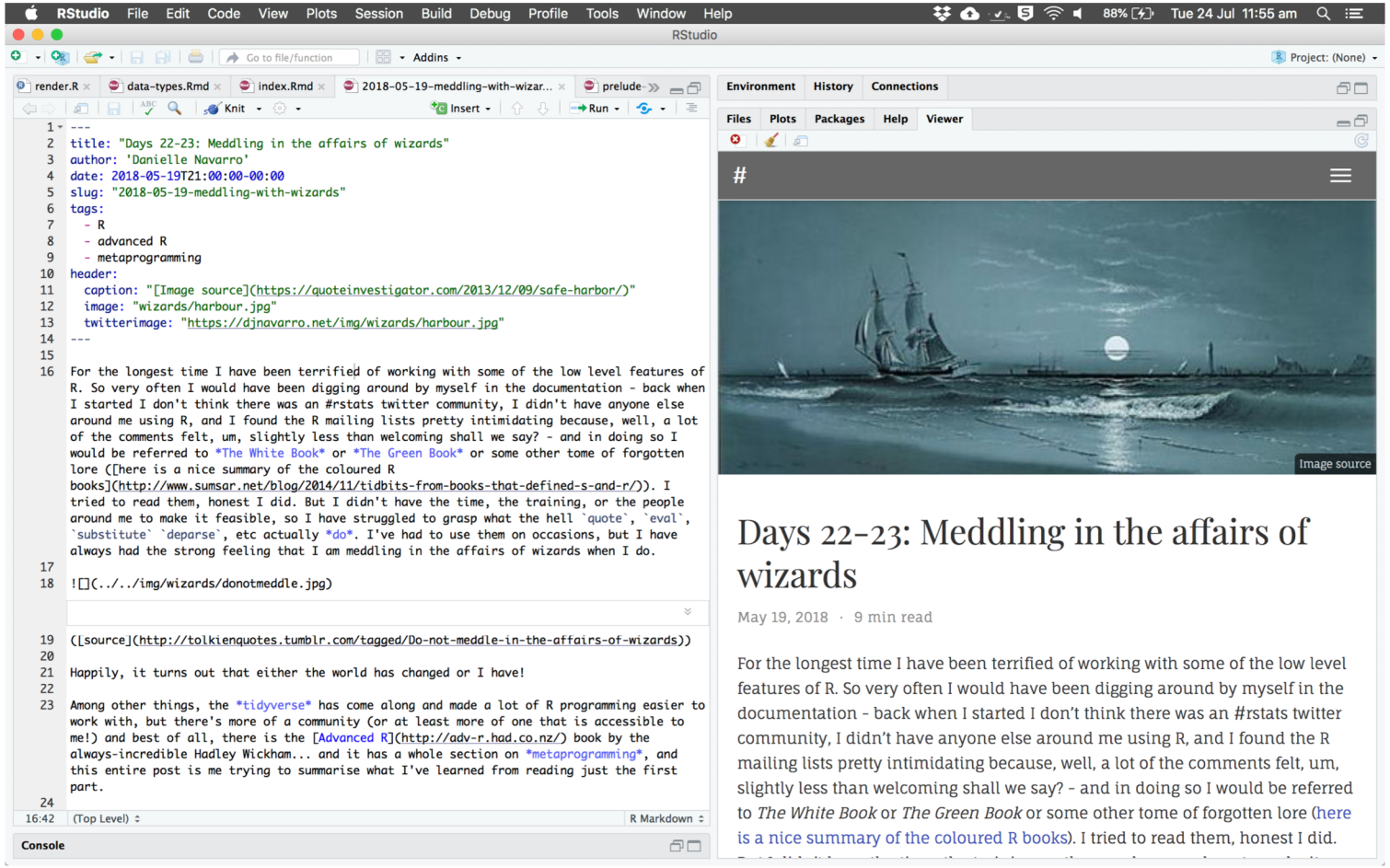
You can play pacman if you want…

http://djnavarro.net/post/2018-06-18-rcade/



You can blog with R if you want!

http://djnavarro.net/post/2018-04-27-starting-blogdown/

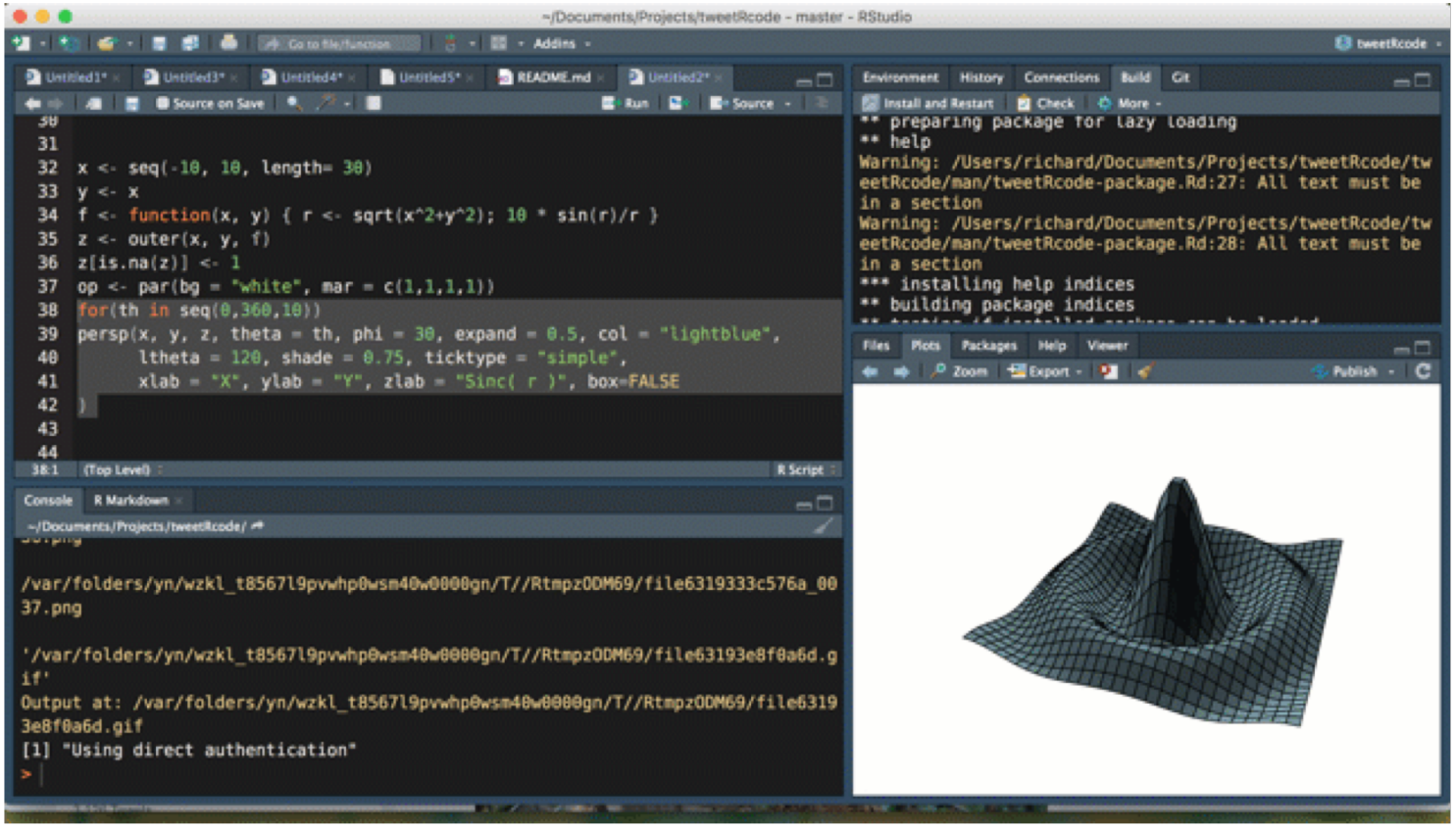


You can draw interactive maps!

http://djnavarro.net/post/2018-05-01-leaflet/

You can tweet from R

https://github.com/richarddmorey/tweetRcode



Discussion:

What do you want to do???

Why program?

- A typical answer…
  - Develop problem-solving and algorithmic thinking
  - Automate repetitive tasks
  - Run experiments
  - Analyse data
  - Facilitate sound, reproducible, shareable research practices

- Class poll:
  - What are some others?

Why program?

- Flexibility & novelty?
  - Research often involves doing something that has never been done before.
  - You will have to invent the tool!
  - These technical skills give you the power to use your computer in ways that go far beyond what can be offered by any general or specialist application

- Reproducibility?
  - Facilitates the creation of an accurate and comprehensive record of precisely what was involved in your research

Why program?

- Algorithmic thinking
  - Successful application of technical skills requires an algorithmic approach and a problem-solving mindset. Programming, in particular, is very unforgiving of mistakes or imprecision—hunting down the cause of coding errors ('bugs') is in itself an excellent way of honing problem-solving skills and strategies

Discussion:

Disadvantages?

(are they worth pushing through?)
(how can we make it easier?)

Disadvantages?

- Time better spent on other things?
  - Programming can facilitate the learning of other things—statistics and experiments become easier.
- Not relevant for my particular area?
  - Every area could benefit in some way, even if just for data management and analysis
- I can just hire someone to do it for me?
  - Very difficult to communicate requirements if don't have programming understanding—plus, how would you know if it is done correctly?
  - Oh, and programmers are *expensive*!

Not a computer person?

- Well maybe.
  - But for a lot people it's just that they haven't really had a chance to learn the skill. It's just a trick.
  - Technical skills we will cover are uncorrelated with everyday notion of 'computing'.
  - No need to learn complicated interfaces or abstract 'clicking sequences'
  - More like knitting than computer games

Be a team!!!!


knowing
all the R
BayesFactor
lavaan
car
Shiny
git
lme
tidyverse
R markdown
It can be hard to find a team
within a single applied field...

Reminder:

https://compcogscisydney.org/psyr/

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