Session 1:
Introduction to R and RStudio

Please download course materials at:
https://github.com/andrw-jns/r_workshop

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Healthcare Analysts | The Strategy Unit

Our analyses

Questions we receive:

What might happen to travel times if services were moved from X to Y?

Can you describe paediatric services across region Z?

Did this mental health intervention work?

Tools we use in the team:

R, Excel, SQL, QGIS….

Answers:

Presentations and/or reports (MS Powerpoint and Word)

Assumptions

Questions – What kind of questions do you answer?

Tools – Excel, SQL…?

Answers - Form of outputs?

Answers to these will probably shape what you want from the day.

Agenda – Day 1

Intro + Setup

Graphics with ggplot2

Break 15 mins →

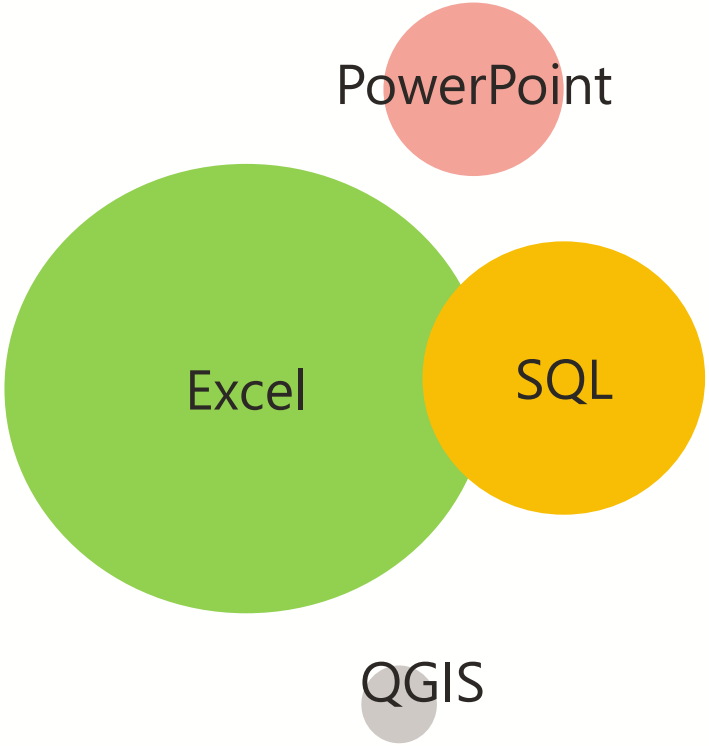
Data wrangling with dplyr

Lunch (13:15 – 14:00)

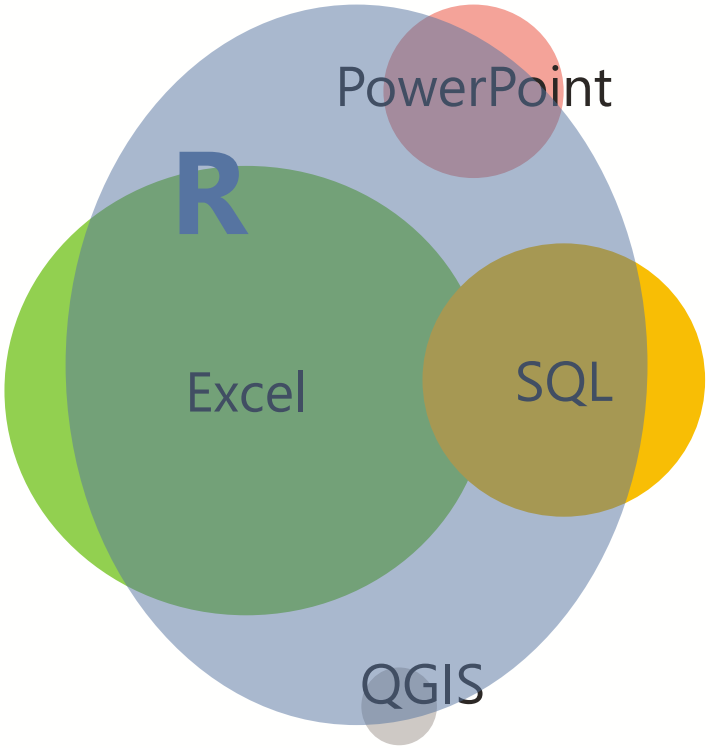
Objects in R | Import data

Exercise and questions

Many tools



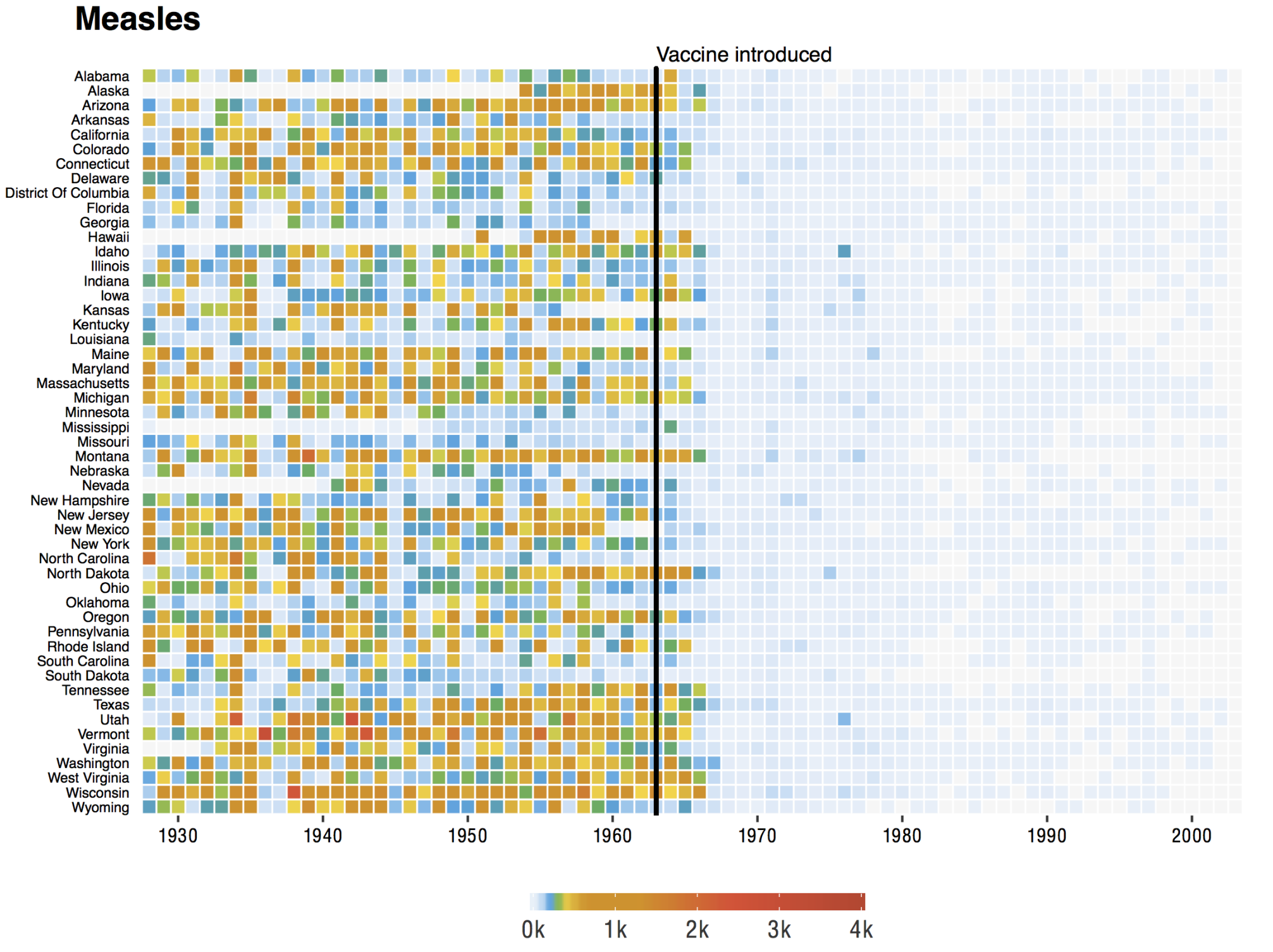
Many tools

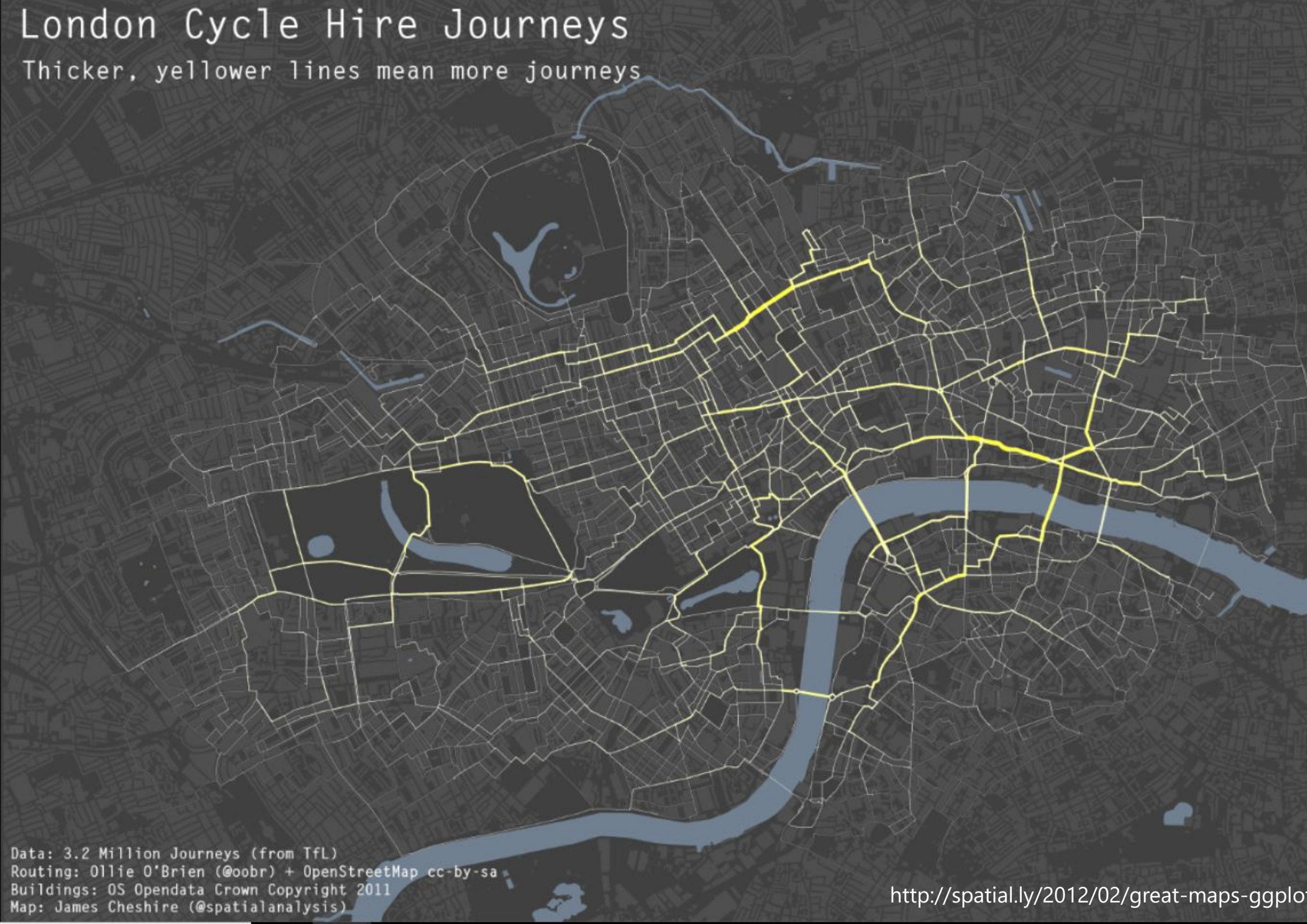


Course Aims

1. We can show you some of the possibilities:

Graphics


Measles
Vaccine introduced
Alabama
Alaska
Arizona
Arkansas
California
Colorado
Connecticut
Delaware
District Of Columbia
Florida
Georgia
Hawaii
Idaho
Illinois
Indiana
Iowa
Kansas
Kentucky
Louisiana
Maine
Maryland
Massachusetts
Michigan
Minnesota
Mississippi
Missouri
Montana
Nebraska
Nevada
New Hampshire
New Jersey
New Mexico
New York
North Carolina
North Dakota
Ohio
Oklahoma
Oregon
Pennsylvania
Rhode Island
South Carolina
South Dakota
Tennessee
Texas
Utah
Vermont
Virginia
Washington
West Virginia
Wisconsin
Wyoming
1930
1940
1950
1960
1970
1980
1990
2000
0k
1k
2k
3k
4k
https://benjaminlmoore.wordpress.com/tag/ggplot2/


London Cycle Hire Journeys
Thicker, yellower lines mean more journeys
Data: 3.2 Million Journeys (from TfL)
Routing: Ollie O'Brien (@oobr) + OpenStreetMap cc-by-sa
Buildings: OS Opendata Crown Copyright 2011
Map: James Cheshire (@spatialanalysis)
http://spatial.ly/2012/02/great-maps-ggplo

Automated reports

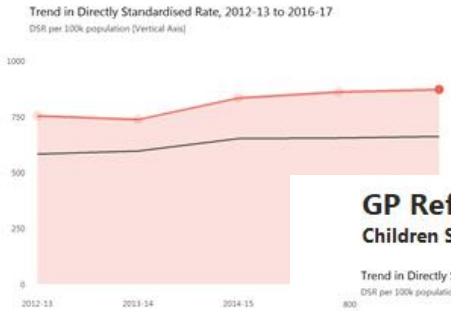
Inpatient Summary

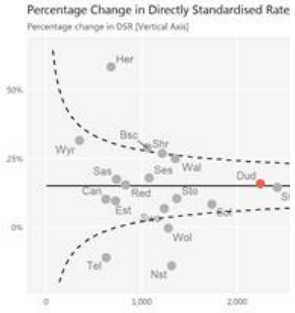
Opportunity	Admissions	2016-17 Spend (000s)	Rate	Rate of Change
ACS Acute	2,750	£3,445	High	High
ACS Chronic	2,680	£4,856	Low	-
ACS Vaccine	1,770	£5,085	High	-
Alcohol (wholly)	1,220	£1,724	High	High
Alcohol (partially - chronic)	4,970	£7,775	High	Low
Alcohol (partially - acute)	1,930	£2,506	High	High
End of Life Care (3-14 days)	320	£1,030	High	-
End of Life Care (0-2 days)	200	£305	High	-
Falls	3,620	£8,873	High	-
Frail Elderly (occasional)	1,090	£2,349	High	-
Frail Elderly (usual)				
Medically Unexplained				
Medicines - Explicit				
Medicines - Implicit AntiDiab				
Medicines - Implicit Benzo				
Medicines - Implicit Diuretics				
Medicines - Implicit NSAIDs				
Obesity (largely)				
Obesity (marginal)				
Obesity (somewhat)				
PLCV Cosmetic				
PLCV Alternative				
PLCV Ineffective				
PLCV Risks				
Mental Health Admissions from ED				
Self-harm				
Smoking (large)				
Smoking (somewhat)				
Zero Length of Stay (adult)				
Zero Length of Stay (child)				

Notes: Rate and rate of change comp

Frail Elderly Admissions

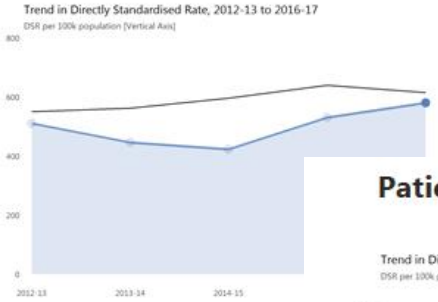
Could Usually be Managed in a Non-Acute Setting



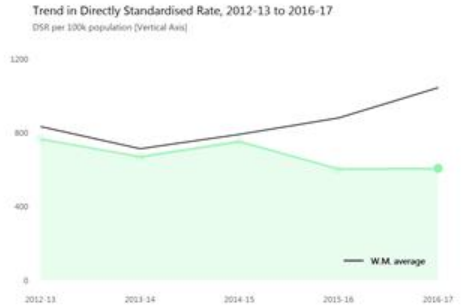


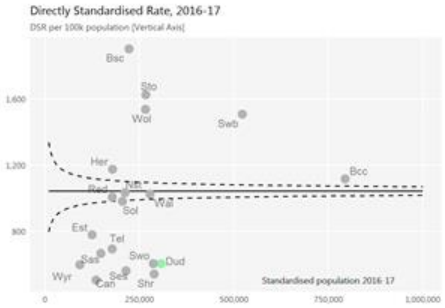
GP Referred First Outpatient Attendances

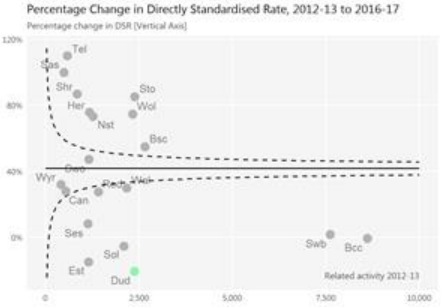
Children Surgical Specialties



Patients Leaving ED Before Being Seen



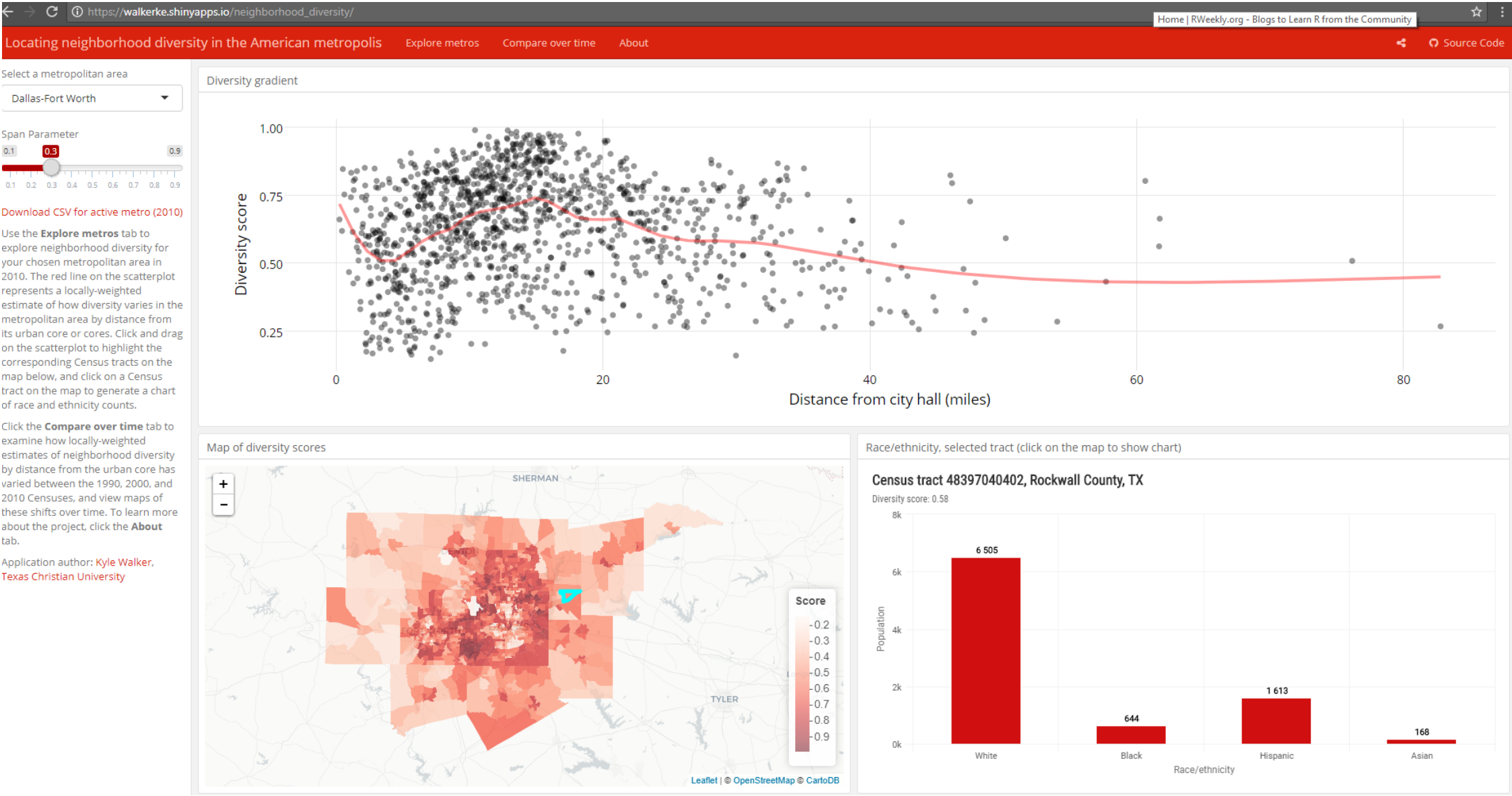




1,860 attendances	**£0.1M** spent
2.1% of all attendances	**£70** per unit activity

1800 unique graphics
100 unique tables
built into a
PowerPoint
from R

(Interactive) Dashboards



https://walkerke.shinyapps.io/neighborhood_diversity/

Stats
& Machine Learning

OPEN ACCESS

Changes in admission thresholds in English emergency departments

Steven Wyatt,[1] Kieran Child,[1] Andrew Hood,[1] Matthew Cooke,[2] Mohammed A Mohammed[3]

► Additional material is published online only. To view please visit the journal online (http://dx.doi.org/10.1136/emermed-2016-206213).

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ABSTRACT

Background The most common route to a hospital bed in an emergency is via an Emergency Department (ED). Many recent initiatives and interventions have the objective of reducing the number of unnecessary emergency admissions. We aimed to assess whether ED admission thresholds had changed over time taking account of the casemix of patients arriving at ED.

Methods We conducted a retrospective cross-sectional analysis of more than 20 million attendances at 47 consultant-led EDs in England between April 2010 and March 2015. We used mixed-effects logistic regression to estimate the odds of a patient being admitted to hospital and the impact of a range of potential explanatory variables. Models were developed and validated for four attendance subgroups: ambulance-conveyed children, walk-in children, ambulance-conveyed adults and walk-in adults.

Results 23.8% of attendances were for children aged under 18 years, 49.7% were female and 30.0% were conveyed by ambulance. The number of ED attendances increased by 1.8% per annum between April 2010–March 2011 (year 1) and April 2014–March 2015 (year 5). The proportion of these attendances that

Key messages

What is already known on this subject?
- The most common route to a hospital bed in an emergency is via an ED.
- Many recent initiatives and interventions have the objective of reducing the number of unnecessary emergency admissions.
- Several studies have identified patient and attendance characteristics that are associated with increased risk of admission.

What this study adds?
- The casemix-adjusted odds of admission via ED to NHS hospitals in England have decreased since April 2010.
- The number of attendances that have a low probability of admission has reduced since April 2010.

Many recent NHS policy initiatives and commissioning interventions have been designed to avoid

Statistical methods

We used mixed-effects logistic regression to estimate the association between the odds of a patient being admitted to hospital and the impact of each of the potential explanatory variables. Initial univariate analysis indicated markedly different unadjusted odds of admission for children and adults and between patients conveyed by ambulance and those who arrived by some other means (henceforth referred to as walk-ins). These differences remained substantial having adjusted for other covariates. Given that the records available to build models were plentiful, to minimise the reliance on interaction terms and to increase the model accuracy, we developed four separate models for ambulance-conveyed children, walk-in children, ambulance-conveyed adults and walk-in adults.

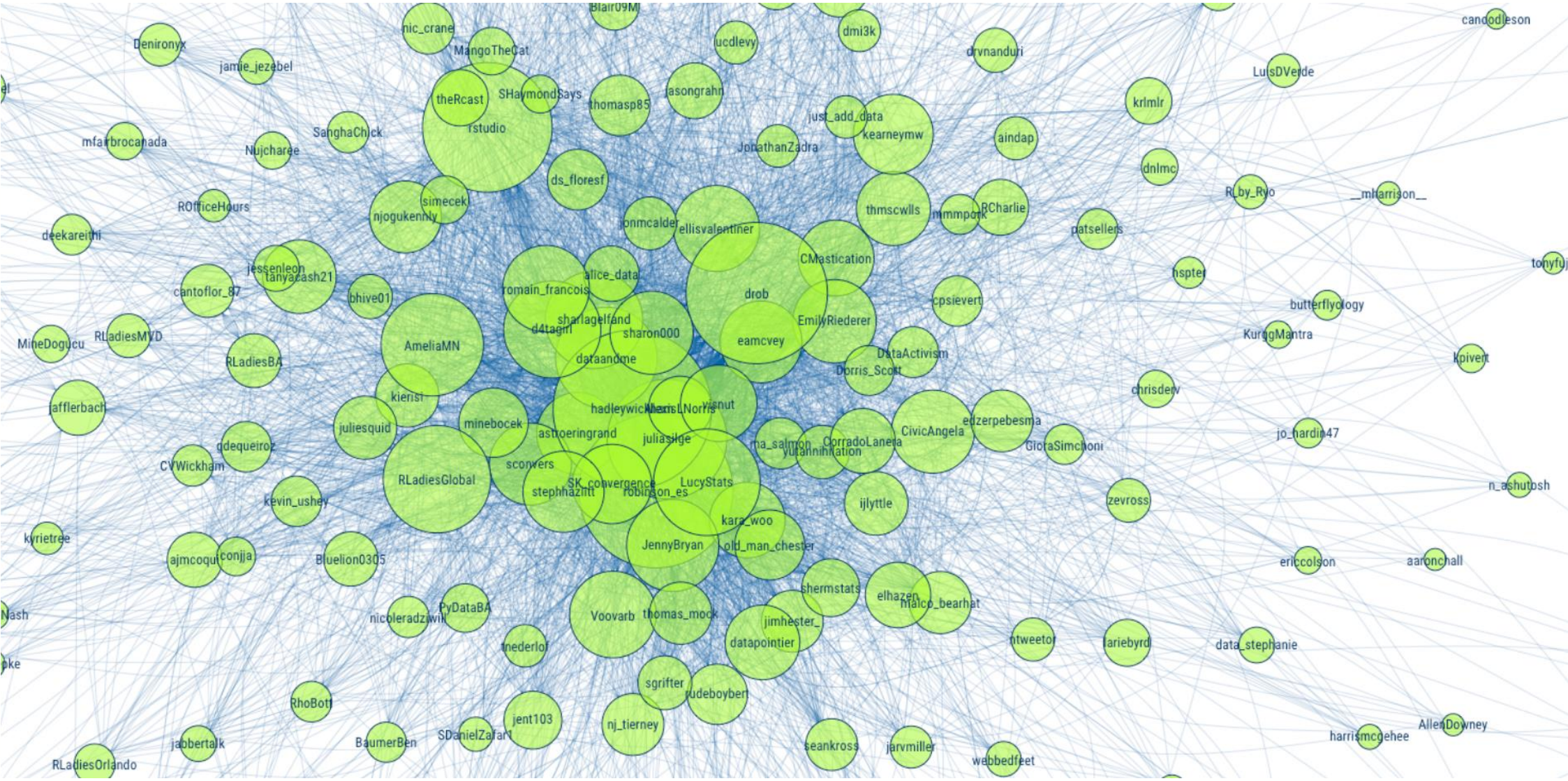
All candidate predictor variables were included in the model on the basis of adequately strong univariate association with the outcome variable or because inclusion improved the fit of the multivariate model. The hospital trust (provider) of the ED was included as a random effect to reflect clustering of attendances within hospital trusts. Final model fit was measured using the C-statistic (area under the receiver operating characteristic curve), calibration plots and the Hosmer-Lemeshow goodness-of-fit test.

The impact of adding interaction terms was tested as a sensitivity analysis. All two-way interaction terms between the fixed effects (other than arrival year) were tested individually and in combination, for their impact on the coefficients for the arrival year variable. In addition, the coefficients of interaction terms between arrival year and each of the other fixed effects were assessed.

To further explore changes in admission thresholds over time, we applied the casemix-adjusted odds of admission from year 1 to attendances in years 2–5.

Data processing was conducted in Microsoft SQL Server 2012 and analysis in R V.3.2.3 statistical software package.

R to SQL connection



Community

https://github.com/mkearney/rstudioconf_tweets

stackoverflow Questions Developer Jobs Tags Users Search...

I have a data.frame (df) with 17 rows and 40 columns. I would like to plot all those columns like this:

0

```
windows()
plot(NULL,xlim=c(0,17),ylim=c(5000,90000),xaxt='n',xlab="", ylab="")
points(df$c1,type="b",pch=15,col="gold3")
points(df$c2,type="b",pch=15,col="gold3")
.
.
points(df$c40,type="b",pch=15,col="gold3")
```

I would like to create a loop inside the plot to not have to write all the lines for the 40 columns. I tried different things without success. Thanks in advance!

1 Answer

active oldest votes

Here is an example using standard `plot` and `points` as well as a `ggplot2` example.

This answer is useful

```
ta.frame(x=1:10,
       y1=rnorm(10),
       y2=rnorm(10),
       y3=rnorm(10))
plot(df$x, df$y1)
# points(df$x, df$y2)
# points(df$x, df$y3)
for(i in 3:4) {
  points(df$x, df[[i]])
}


library(reshape2)
library(ggplot2)
melt_df <- melt(df, 'x')
ggplot(melt_df, aes(x, value)) +
  geom_point()
```

share improve this answer

answered 1 hour ago

drmariod

3 503 ● 19 ● 53

Diversity

Home Moments Search Twitter

Tweets 3,551 | Following 2,410 | Followers 4,957 | Likes 4,959 | Lists 3

R-Ladies Global
@RLadiesGlobal

Promoting gender diversity in the #rstats community via meetups, mentorship & global collaboration! 60+ groups worldwide. #RLadies

The World
rladies.org
Joined August 2016
237 Photos and videos

Tweets | Tweets & replies | Media

Pinned Tweet

R-Ladies Global @RLadiesGlobal · 30 Aug 2016
Interested in starting an #RLadies meetup in your city? We'd love to help! Send us an email at info@rladies.org to get in touch. #rstats

17 80 117

R-Ladies Global Retweeted

Forwards @R_Forwards · 3h
Our advice to a black woman who has told her mentor "the tech industry is not for people like me" - what would you say?

And more

Course Aims

1. We can show you possibilities.
2. We can give you a feel for how R works.

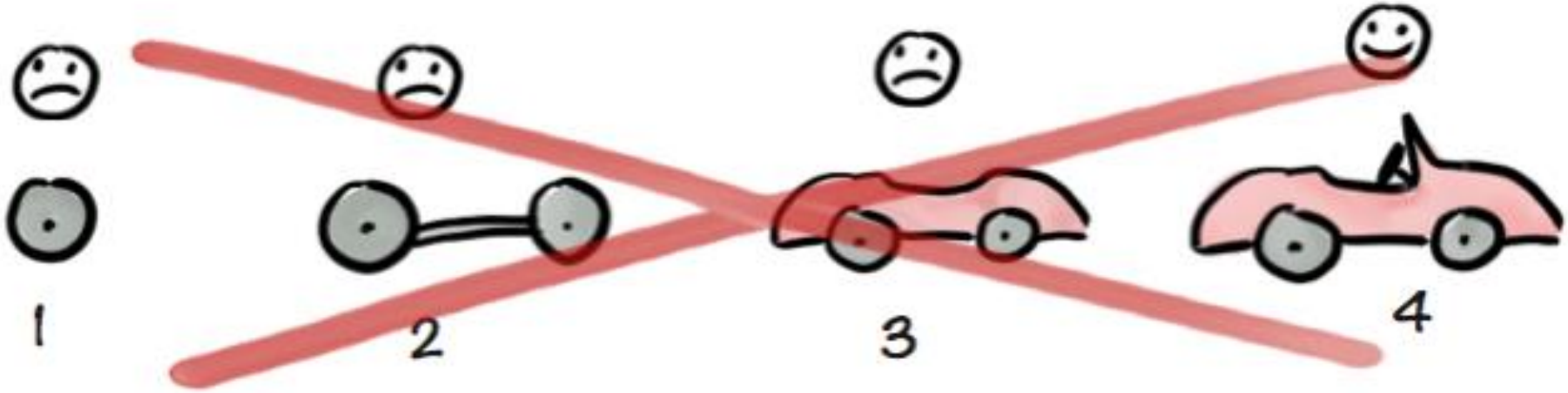
Course Aims

1. We can show you possibilities.
2. We can give you a feel for how R works.
3. We can show enough for you to begin teaching yourself

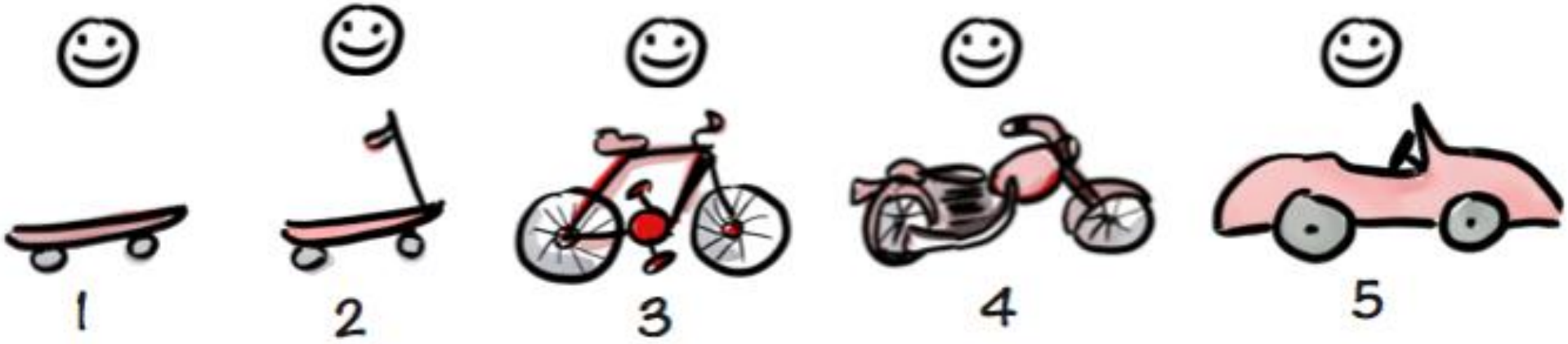
(excellent free resources available)

Course philosophy

Not like this....



Like this!



Henrik Kniberg

https://blog.crisp.se/2016/01/25/henrikkniberg/making-sense-of-mvp

Course philosophy

The truth (but it can’t be the whole truth…

too much to cover in a day).

Relaxed.

Slides and code are available.

Let's begin...

R *vs.* RStudio

R is a programming language

RStudio is an IDE

a software application with tools to improve your programming experience

Credit: http://www.rollcentre.com/project--onuk-sazan-

R


RStudio
Photo by Roberto Nickson (@g) on Unsplash

RStudio

The dashboard (and appealing interior)

Many excellent features to help you with your analyses.

Never again have to think about R and RStudio as separate: Opening R-Studio opens an R session.

Analogy from the book Modern Dive: www.moderndive.com

Open RStudio

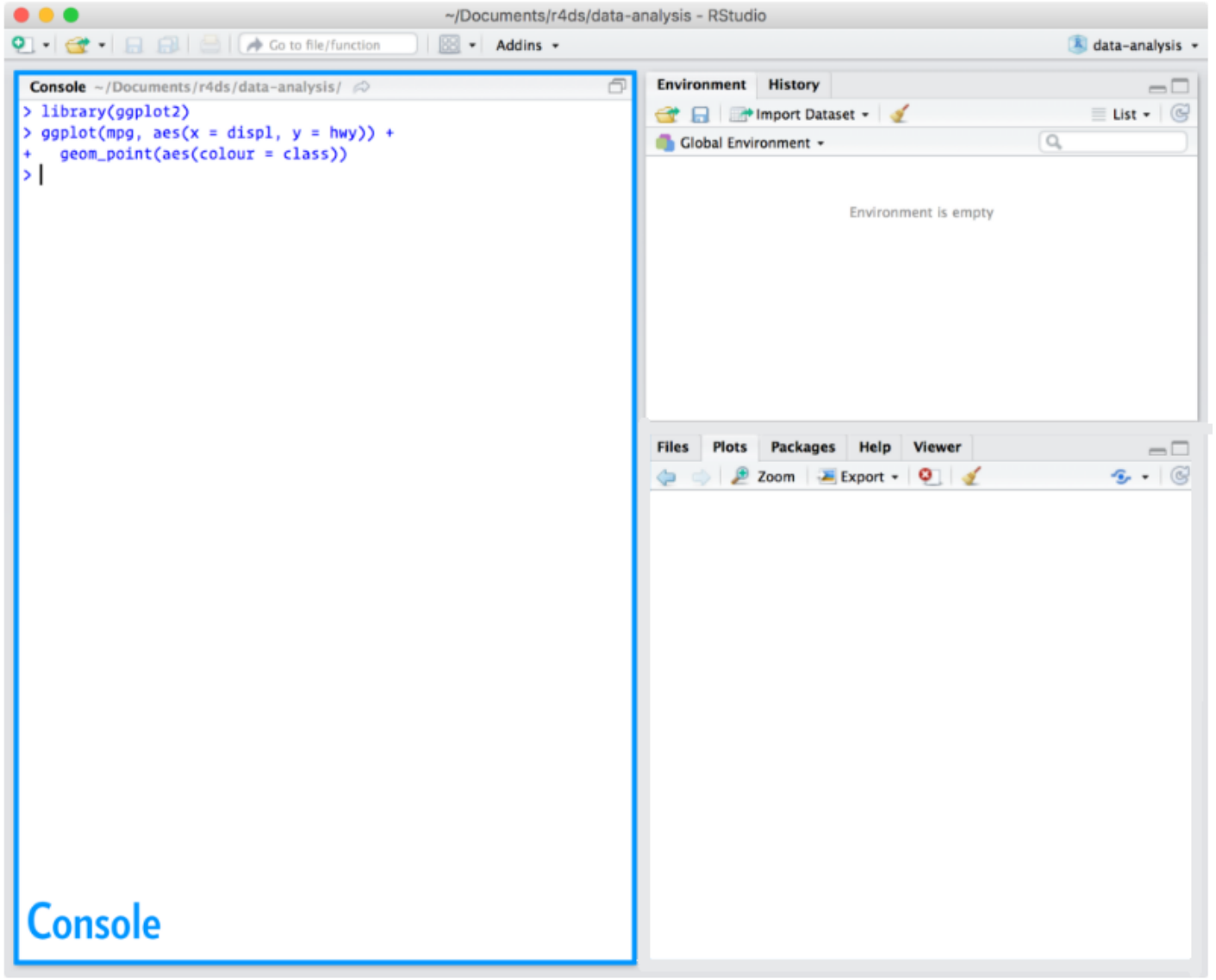
You never have to think about R and RStudio as separate: Opening R-Studio opens an R session.

The **Console** is your window to R.

You can code directly in the console...

```
pi*2      [Enter]
37/12     [Enter]
```

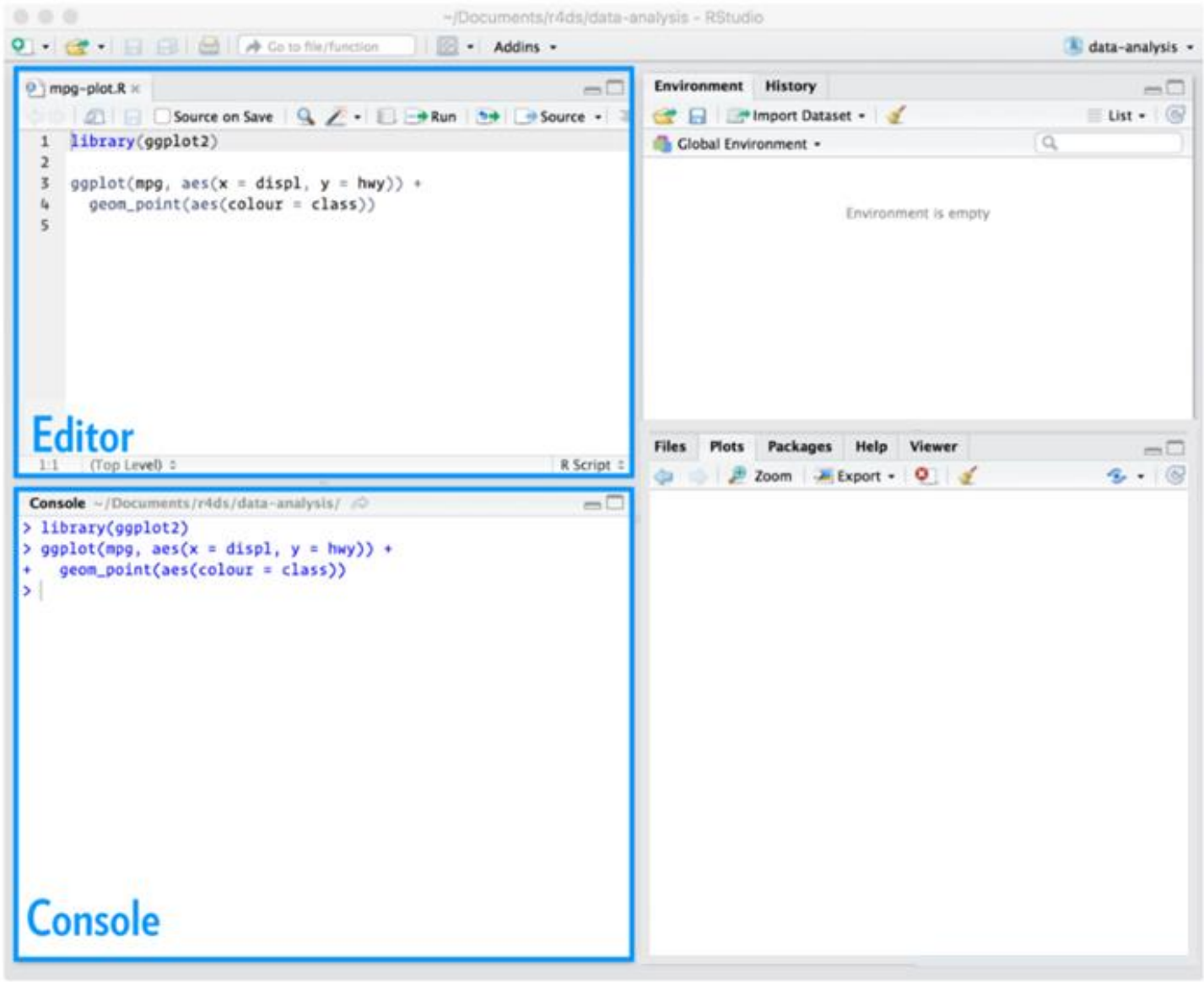
... but there is a better way...



The Editor.

If you don't see the **Editor** pane, go to the toolbar and click:

View →
Panes →
Show All Panes



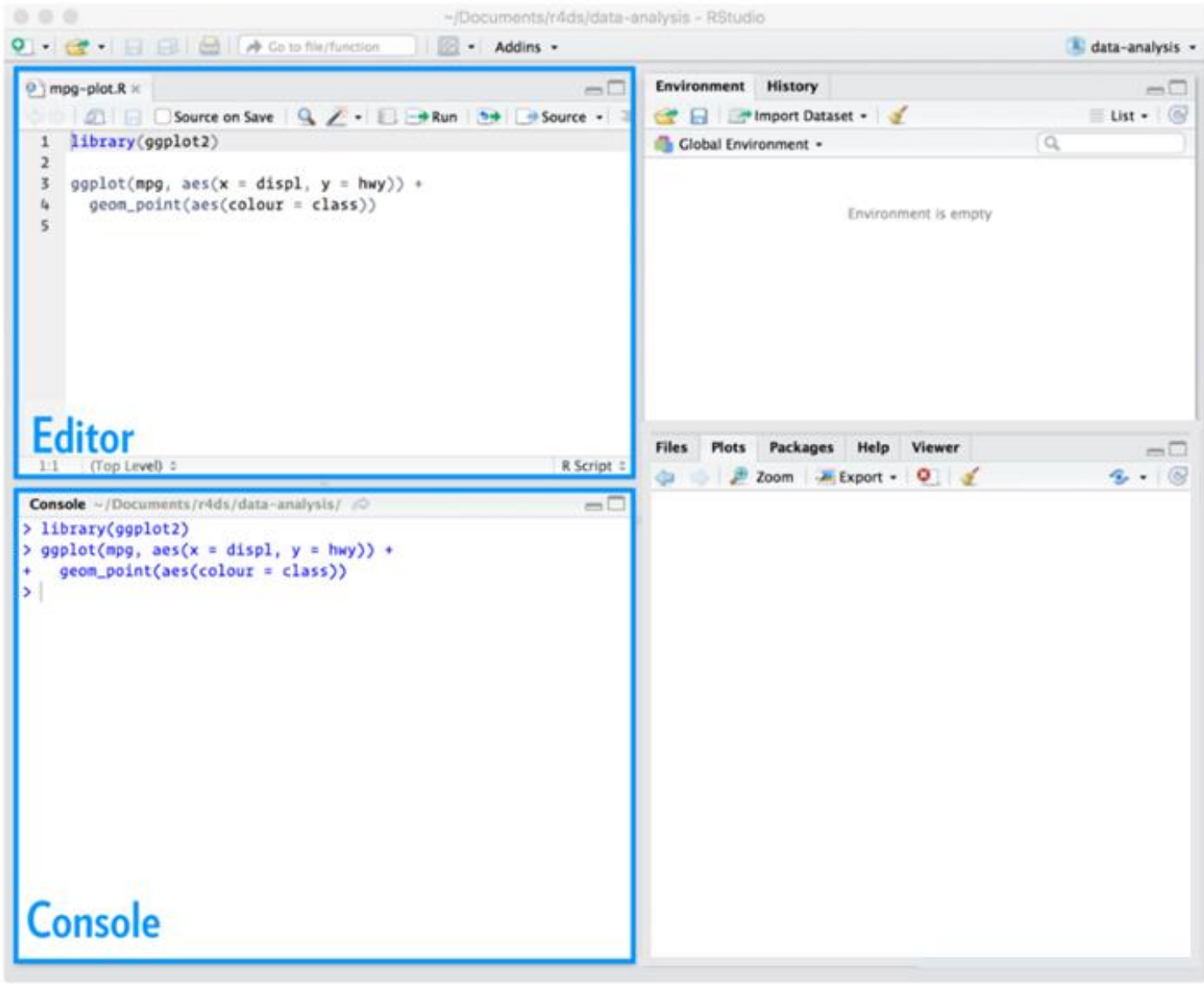
The **Editor** is just like any other text editor (you can copy, paste, and save the text)

More forgiving

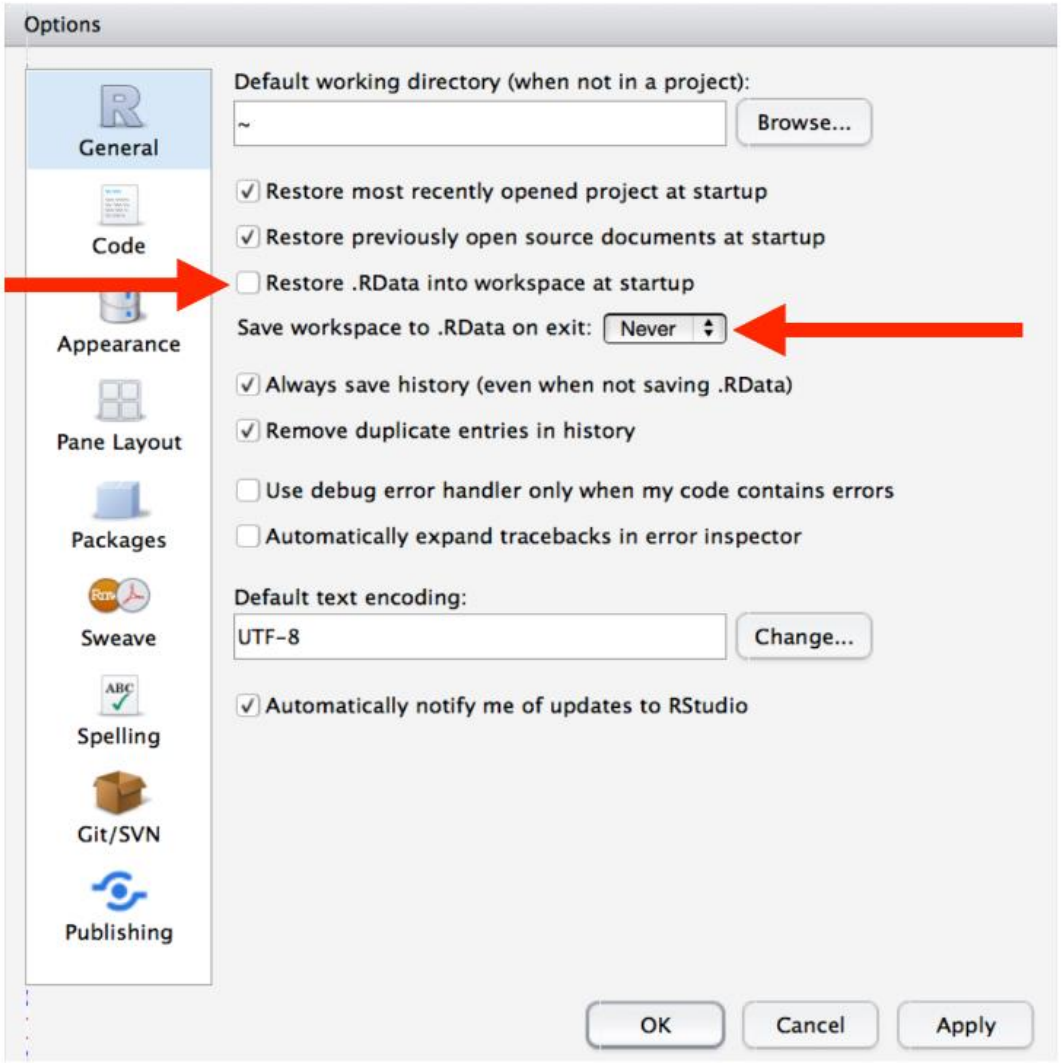
R Syntax highlighting

Autocomplete

Ctrl + Enter (sends line of code to Console)



Tools → Global Options



Credit: R for Data Science. See Chapter 6 for discussion of why this is important

Packages

Packages

R packages are like apps for your phone:

"base R"

Extend the capabilities of out of the box R

with extra functions, datasets, documentation

Packages

Download App

Open the App

Happens just once

Every new session

Download
(`install.packages`)

"Open"
`library()`

Phone detail from photo by Rahul Chakraborty on Unsplash

Packages

```
install.packages("gapminder")
```

will download a package to your personal library. Then:

```
library(gapminder)
```

tells R to load the gapminder package from your personal library. (Needed once every session)

CRAN repository

12,000+ packages. Free. Peer reviewed.

(Manifold possibilities) eg. machine learning, mine twitter data, create PowerPoint docs, maps.

Other ways to get packages (eg. GitHub, …)

Packages:

tidyverse

What is the tidyverse?

The tidyverse package collects (some of) the most popular R packages into one.

All have the same underlying principles:

Provide simple tools (with consistent structure) to help solve complex problems

What is the tidyverse?

During the workshop we will use the ggplot2, dplyr, and readr packages. These are bundled up in the tidyverse package. We load it by running:

```
library(tidyverse)
```

This work is licensed as

End