Why learn the Tidyverse?

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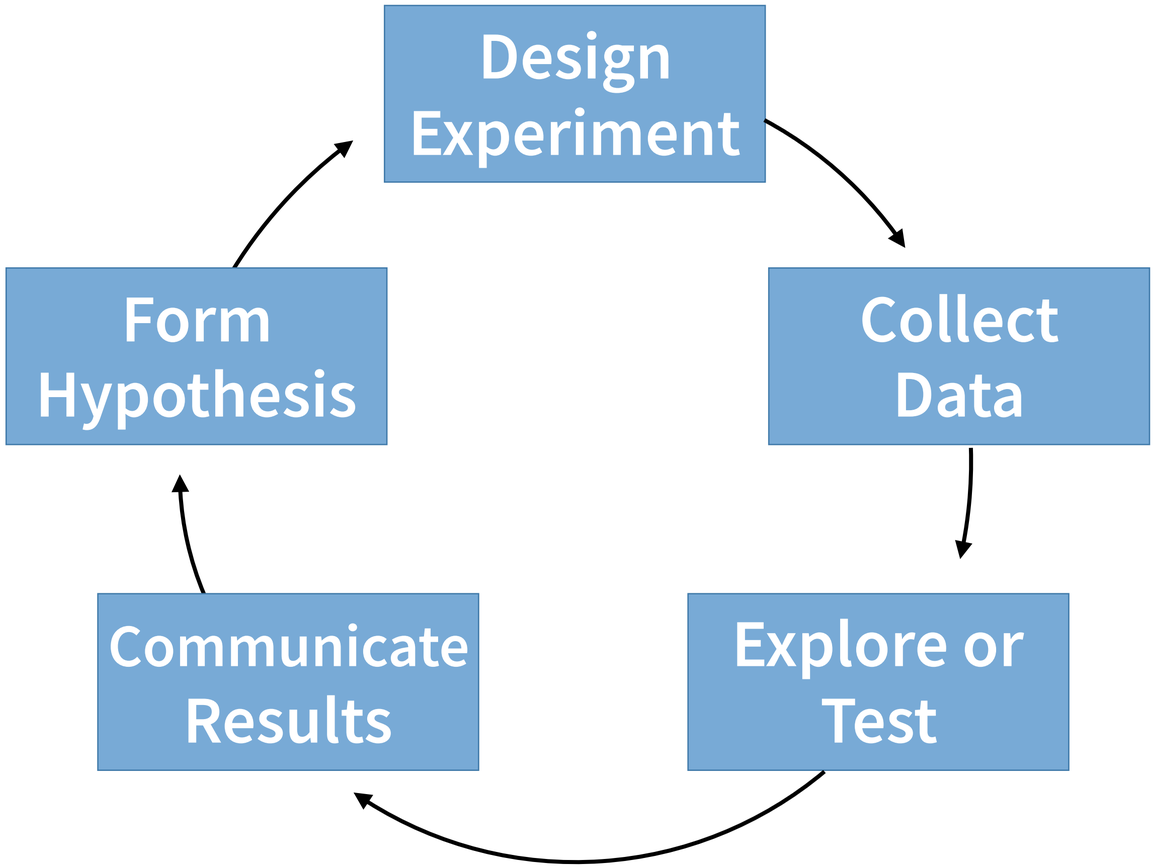
"Data Science"



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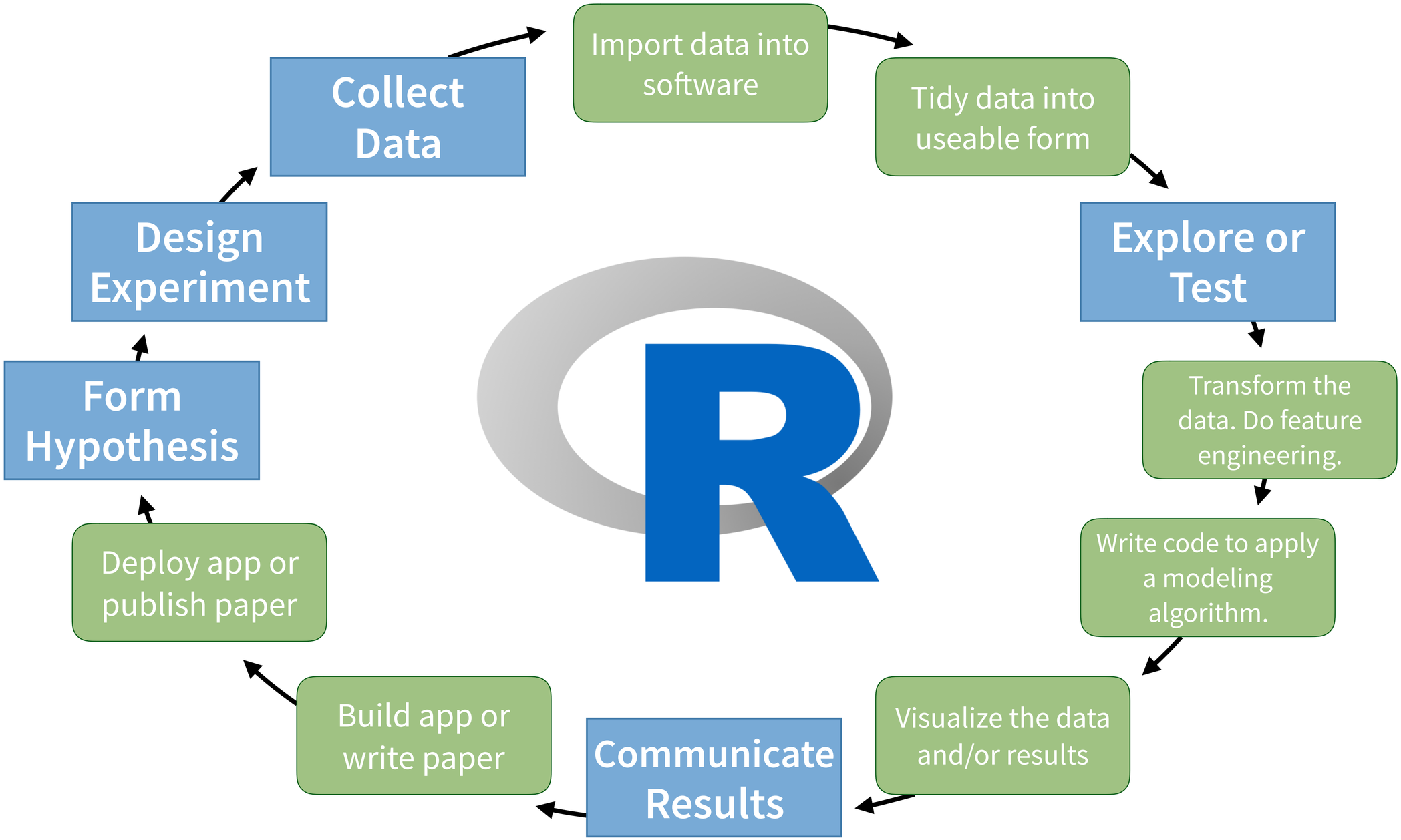

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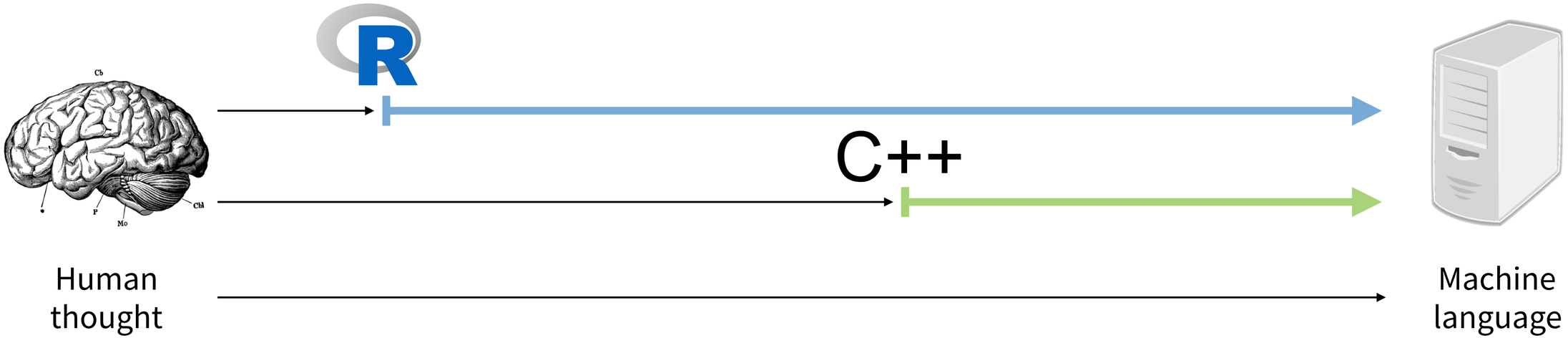
R - A computer language for scientists



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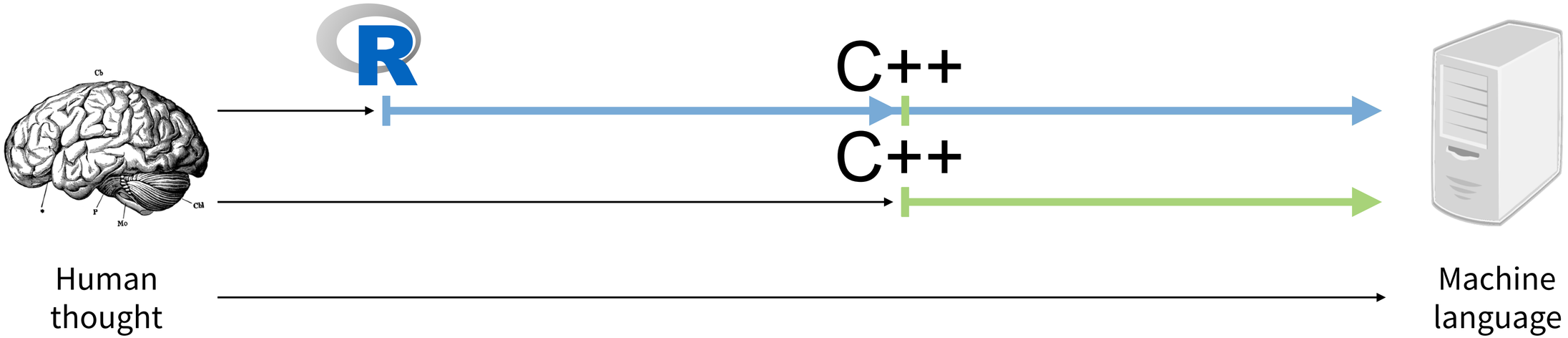
R - A computer language for scientists



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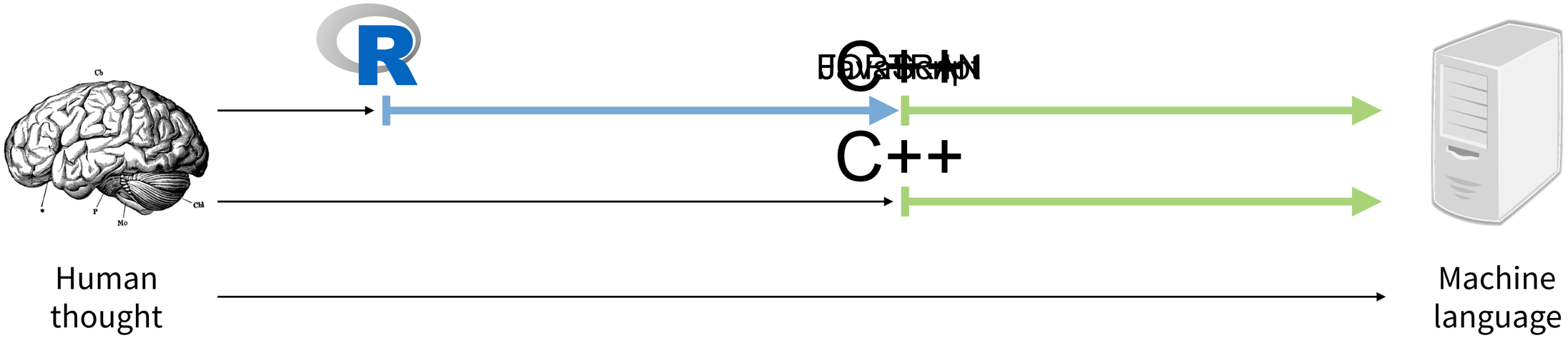
R - A computer language for scientists



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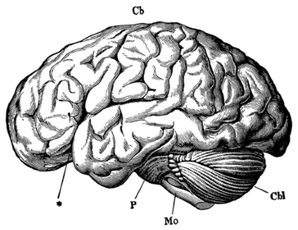
R - A computer language for scientists



Human thought

map()

sapply()

for()

C++

Machine language

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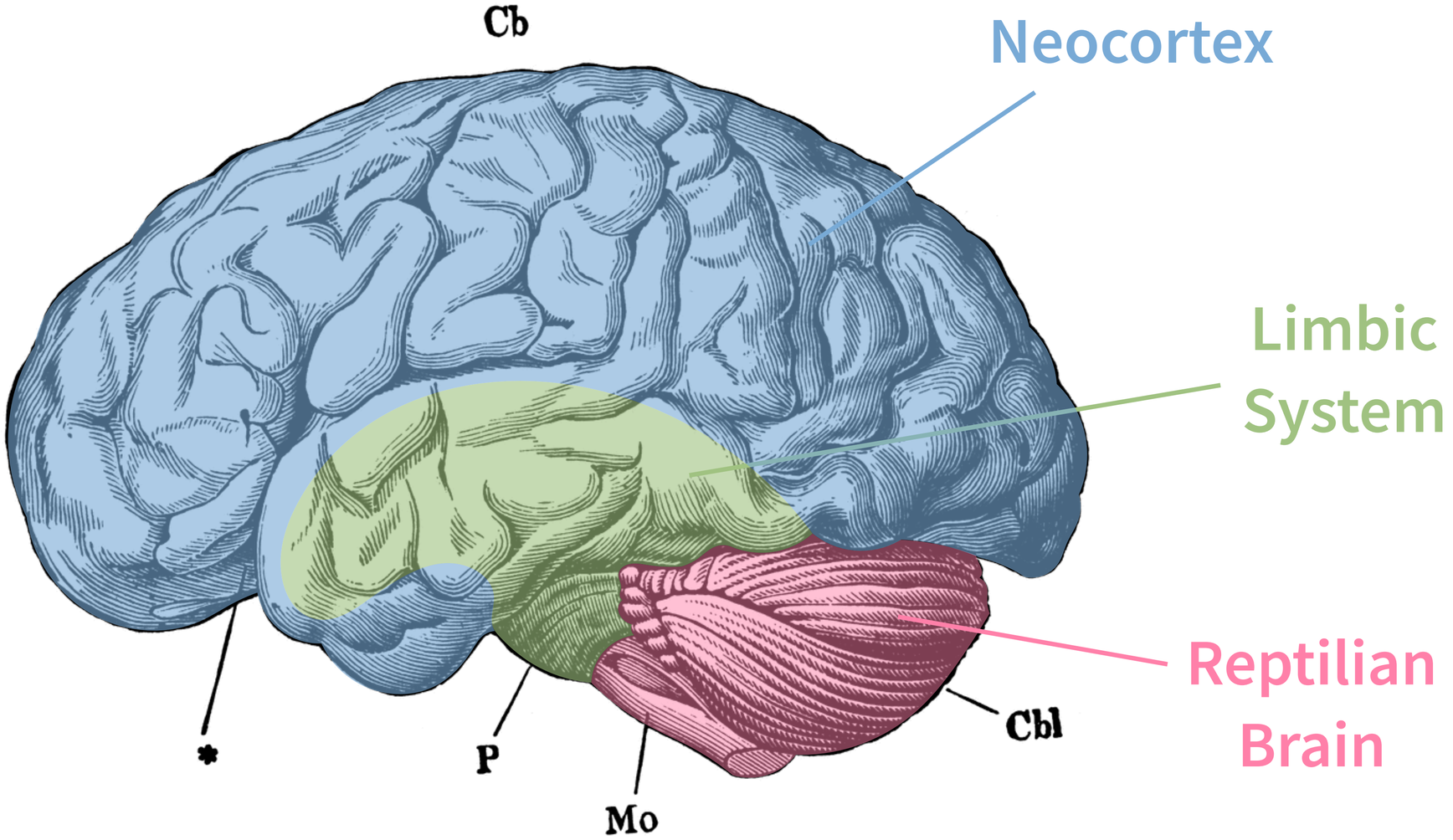

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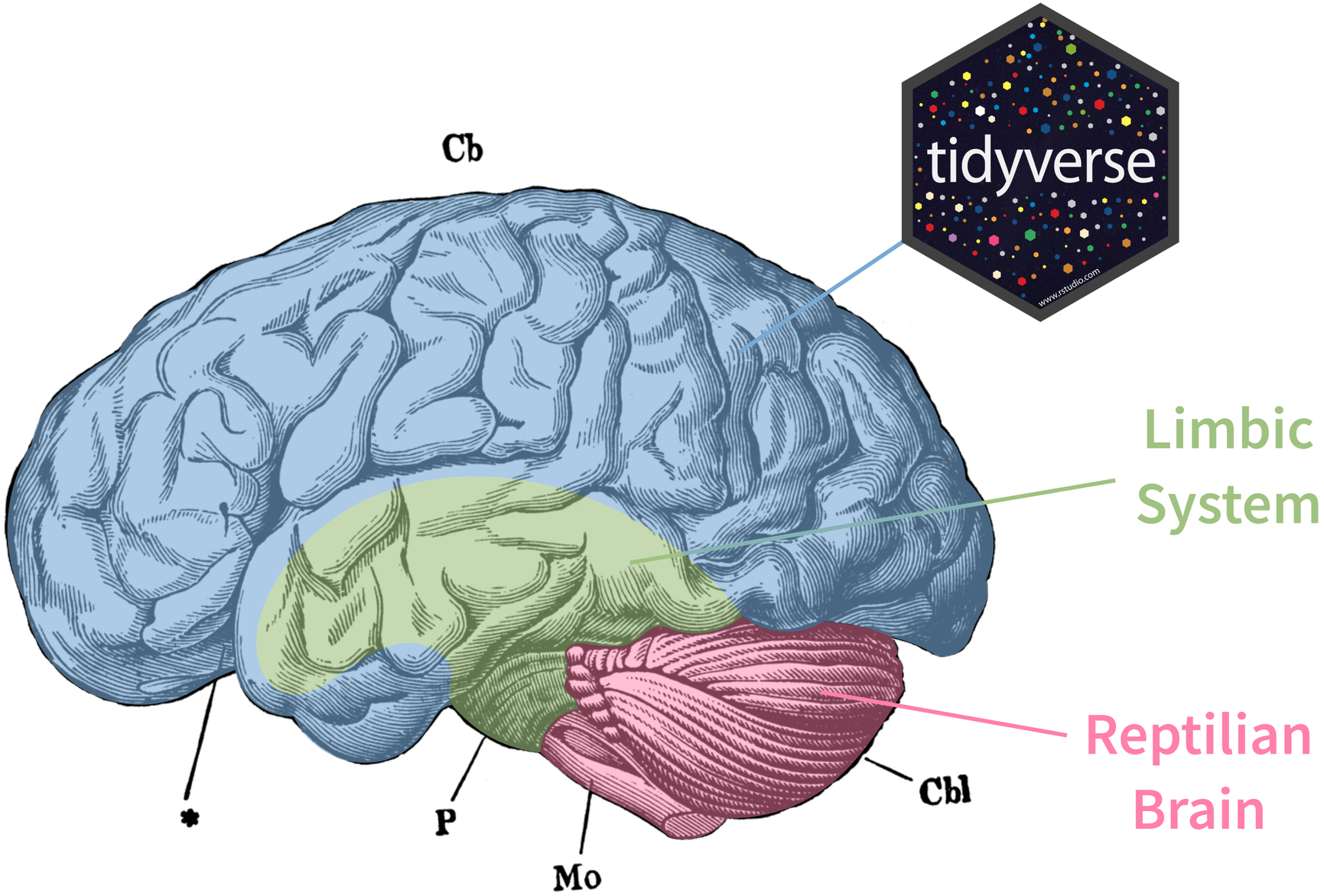

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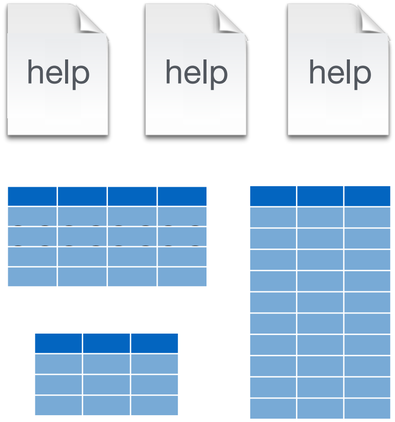
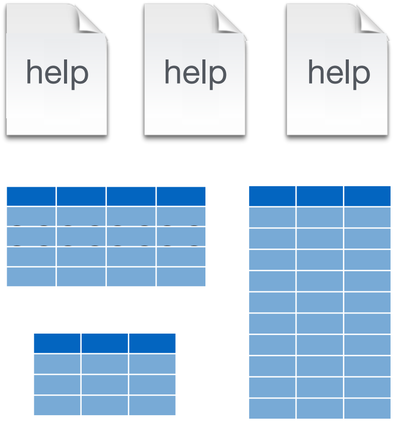
Tidyverse

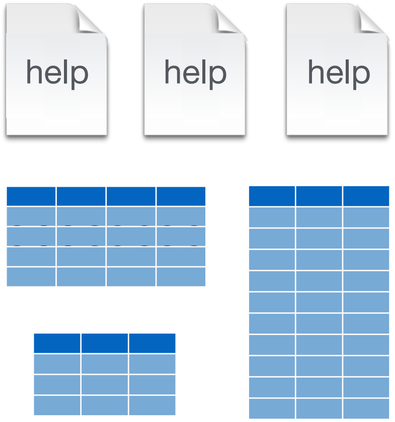
R Packages



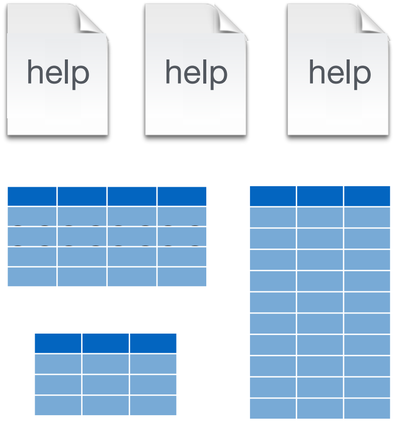
function1()
function2()
function3()
function4()



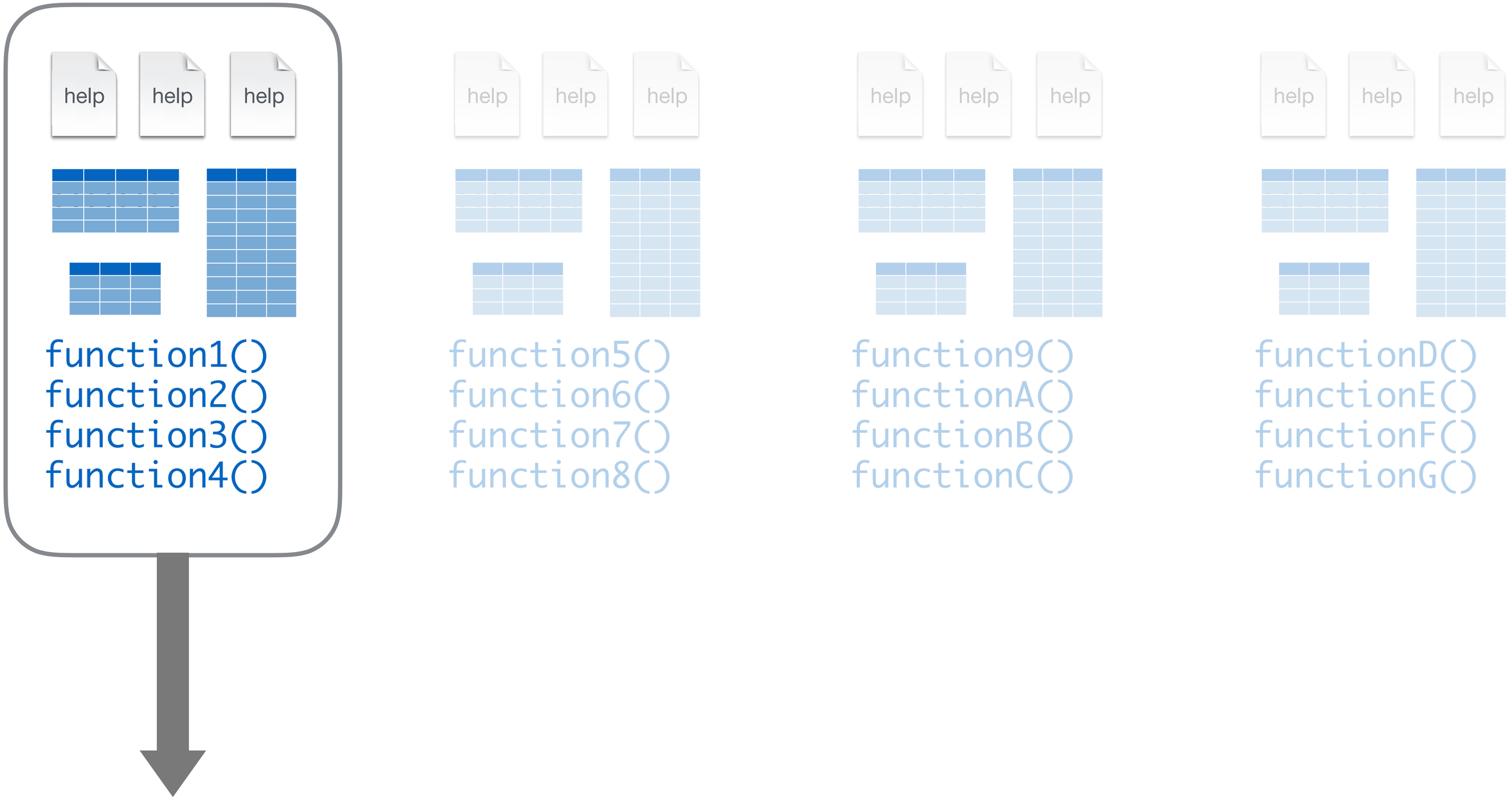
function5()
function6()
function7()
function8()



function9()
functionA()
functionB()
functionC()



functionD()
functionE()
functionF()
functionG()


help
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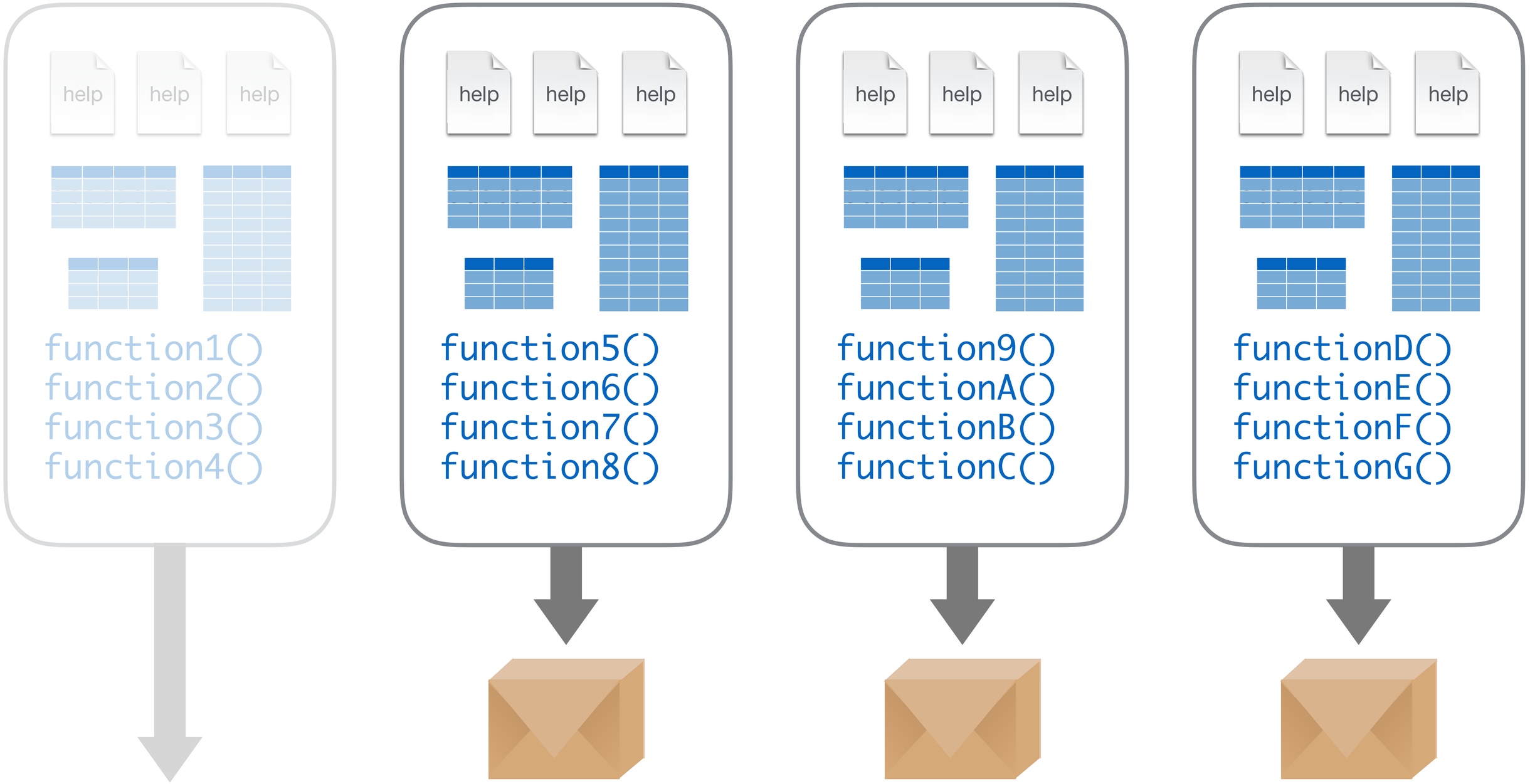
Base R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functionC()
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help
functionD()
functionE()
functionF()
functionG()
Base R
R Packages

Using packages

1

```
install.packages("foo")
```

Downloads files to computer

1 x per computer

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Using packages

1

```
install.packages("foo")
```

Downloads files to computer

1 x per computer

2

```
library("foo")
```

Loads package

1 x per R Session

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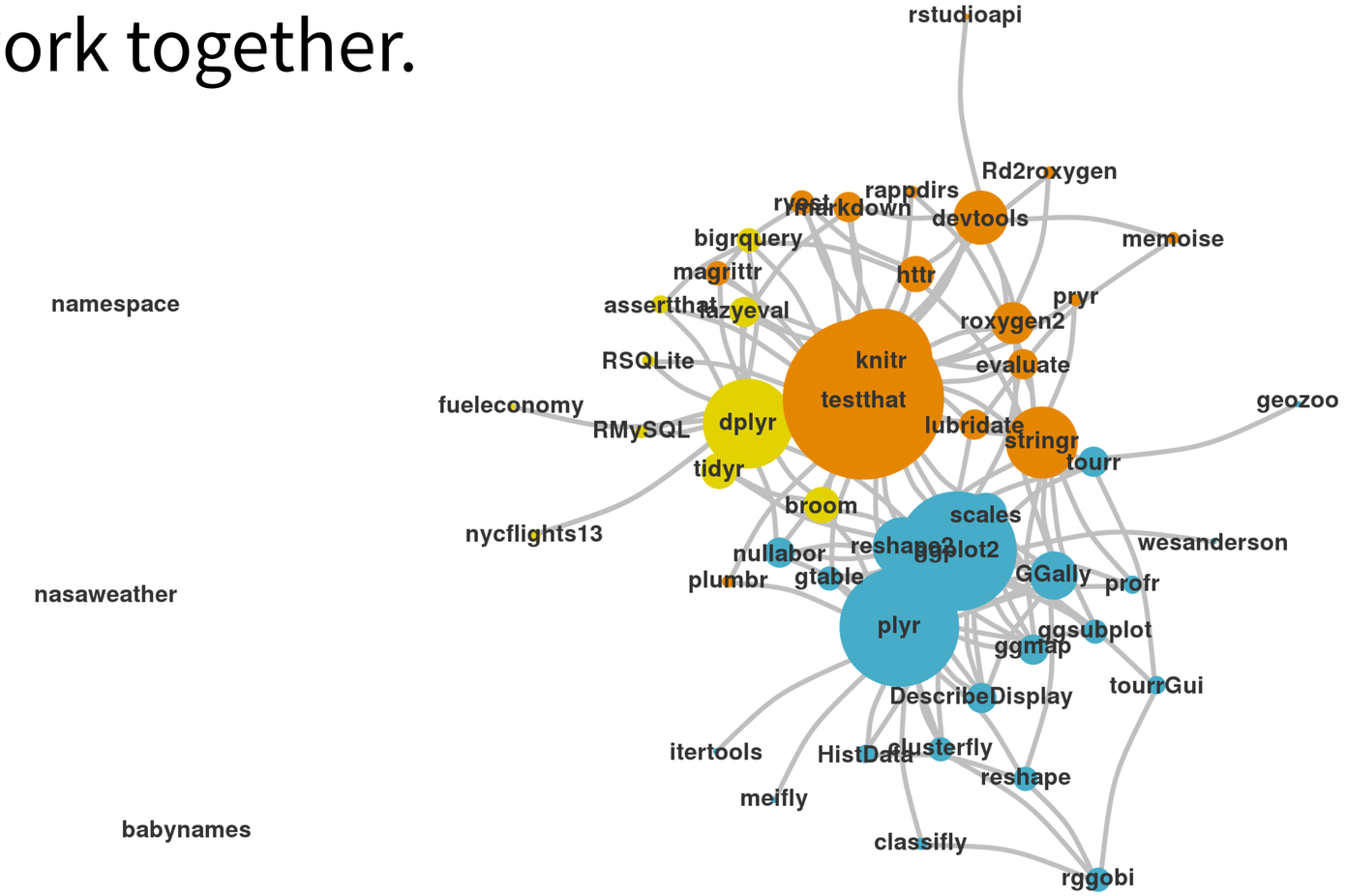
The Tidyverse

A collection of modern R packages that share common philosophies, embed best practices, and are designed to work together.



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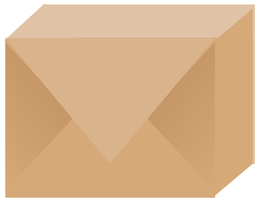
Display by Adolfo Álvarez

tidyverse



An R package that serves as a short cut for installing and loading the components of the tidyverse.

```
library("tidyverse")
```

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```
install.packages("tidyverse")
```

does the equivalent of

```
install.packages("ggplot2")
install.packages("dplyr")
install.packages("tidyr")
install.packages("readr")
install.packages("purrr")
install.packages("tibble")
install.packages("hms")
install.packages("stringr")
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install.packages("httr")
install.packages("jsonlite")
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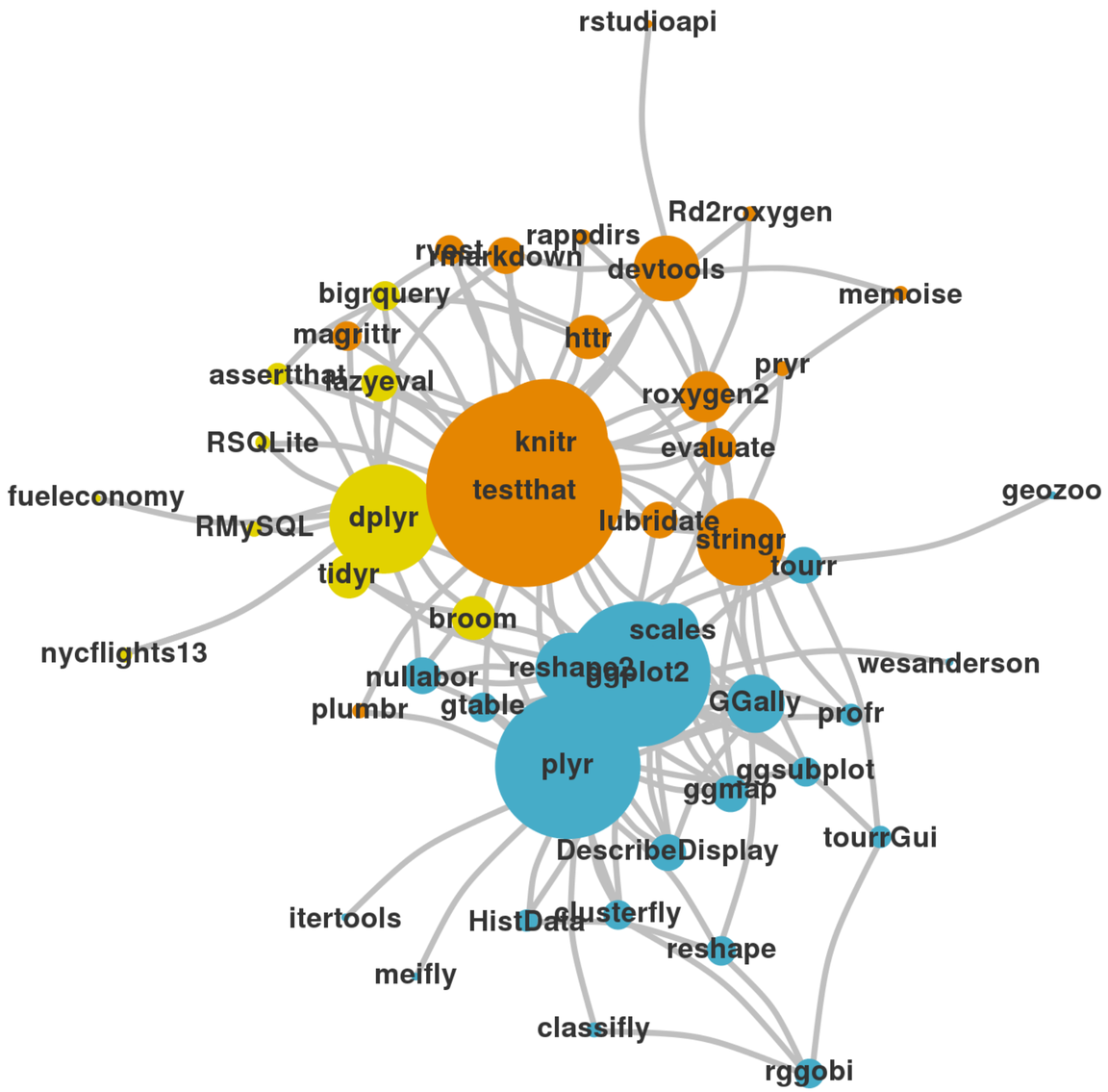
install.packages("rvest")
install.packages("xml2")
install.packages("modelr")
install.packages("broom")
```



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```

Visualization tools

Six functions

- arrange()
- filter()
- select()
- mutate()
- summarise()
- group_by()

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Tidy tools

Tidy tools

Functions are easiest to use when they are:

1. **Simple** - They do one thing, and they do it well
2. **Composable** - They can be combined with other functions for multi-step operations

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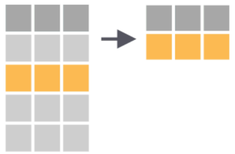
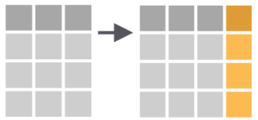
1. Simple - They do one thing, and they do it well

arrange(.data, …**)**
Order rows by values of a column (low to high), use with **desc()** to order from high to low.



filter(.data, …**)**
Extract rows that meet logical criteria.

select(.data, …**)**
Extract columns by name.



mutate(.data, …**)**
Compute new column(s).

summarise(.data, …)
Compute table of summaries. Use **group_by()** to compute groupwise summaries.

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2. **Composable** - They can be combined with other functions for multi-step operations

%>%

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pipes

x %>% f(y)
becomes **f(x, y)**

```
gapminder          arrange(_____, desc(pop))
```

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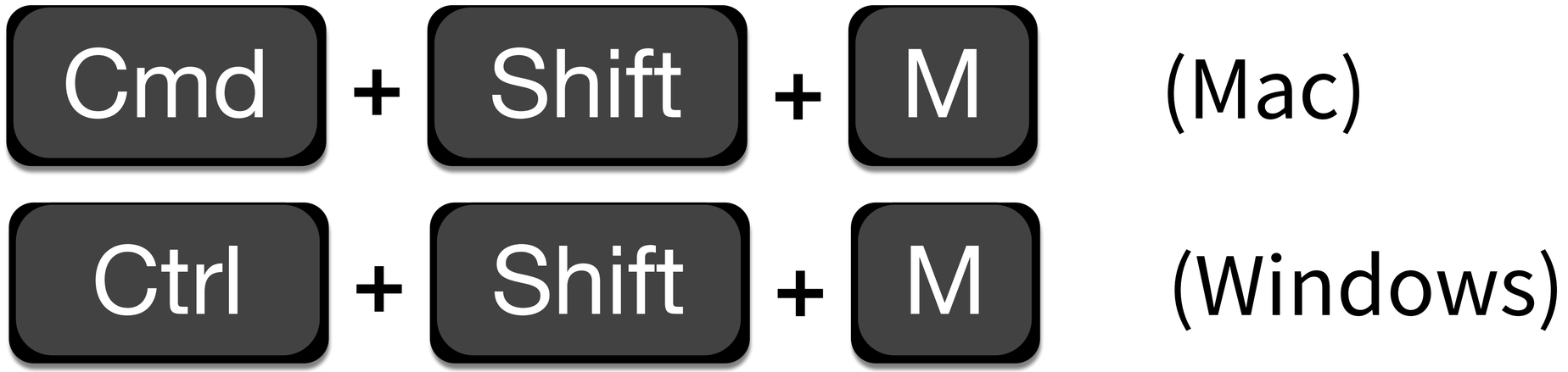
Shortcut to type %>%



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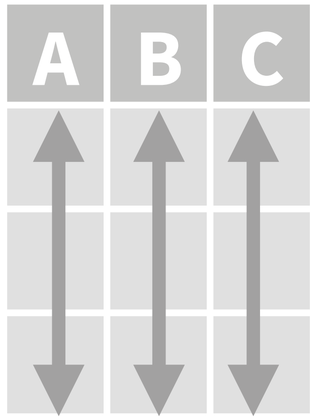
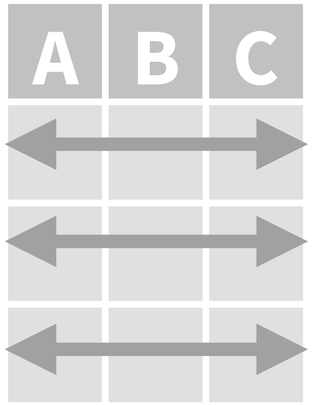
Tidy Data

Tidy data

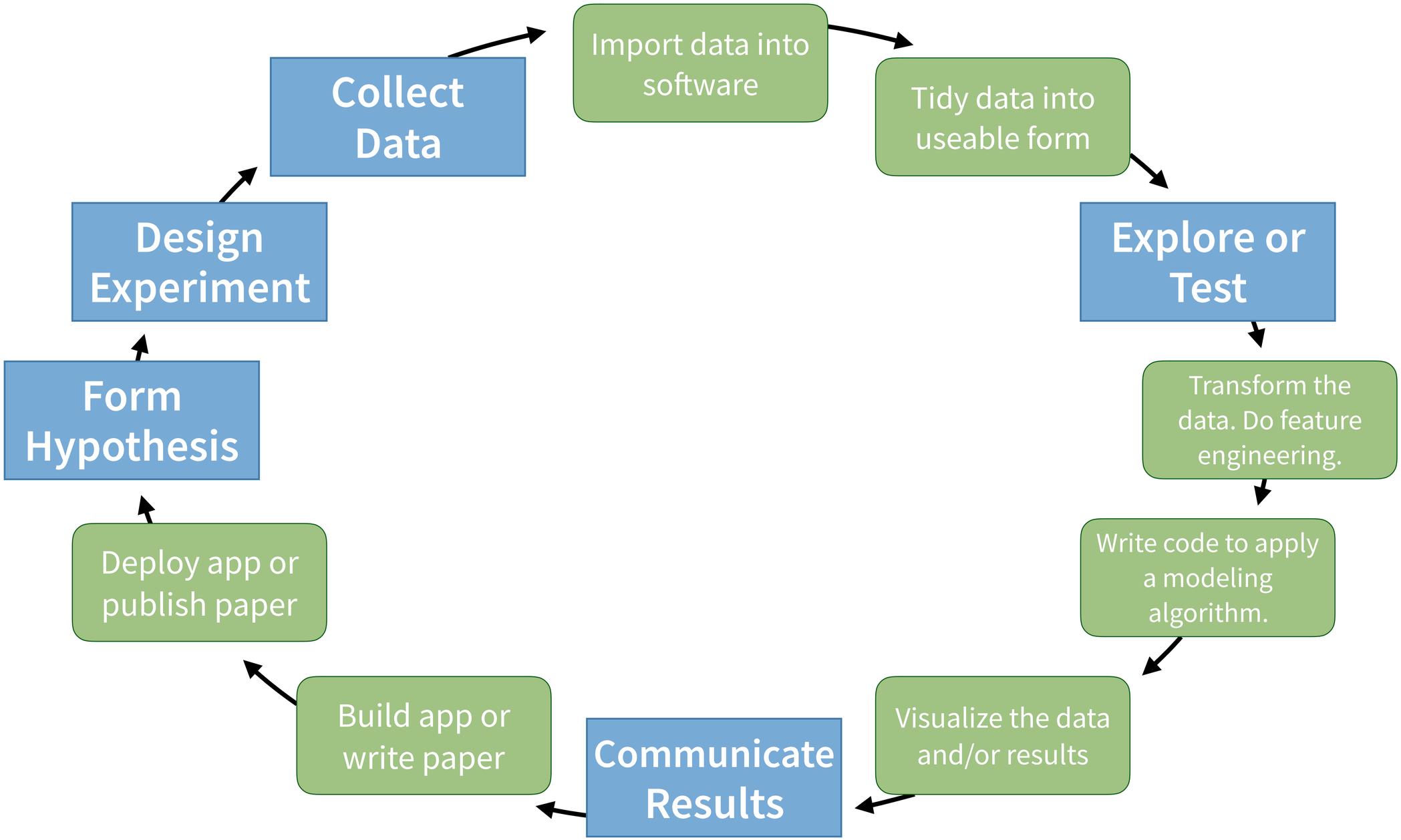


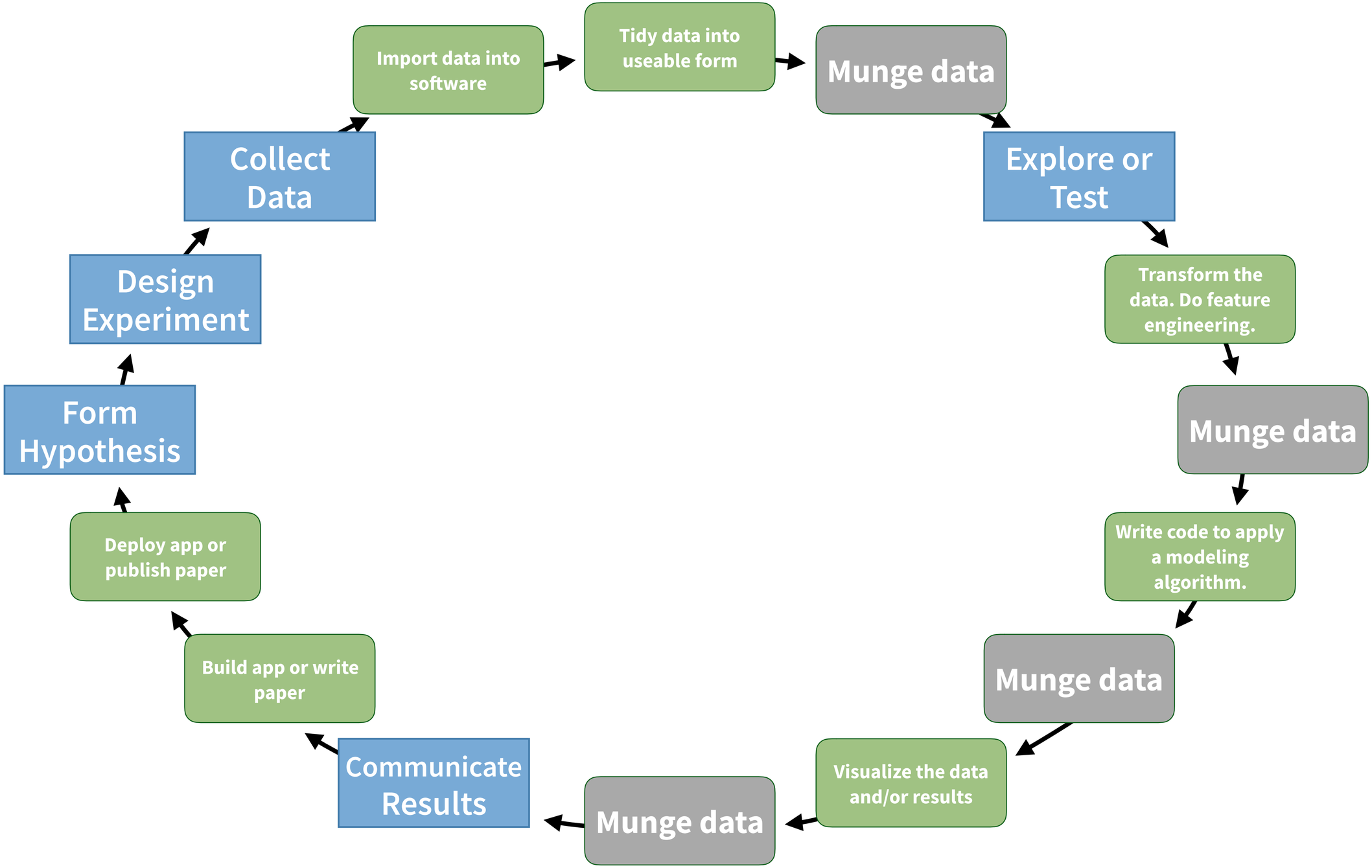
&



Each **variable** is in its own **column**

Each **observation**, or **case**, is in its own **row**


Collect Data
Import data into software
Tidy data into useable form
Explore or Test
Transform the data. Do feature engineering.
Write code to apply a modeling algorithm.
Visualize the data and/or results
Communicate Results
Build app or write paper
Deploy app or publish paper
Form Hypothesis
Design Experiment


Collect Data
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Tidy data into useable form
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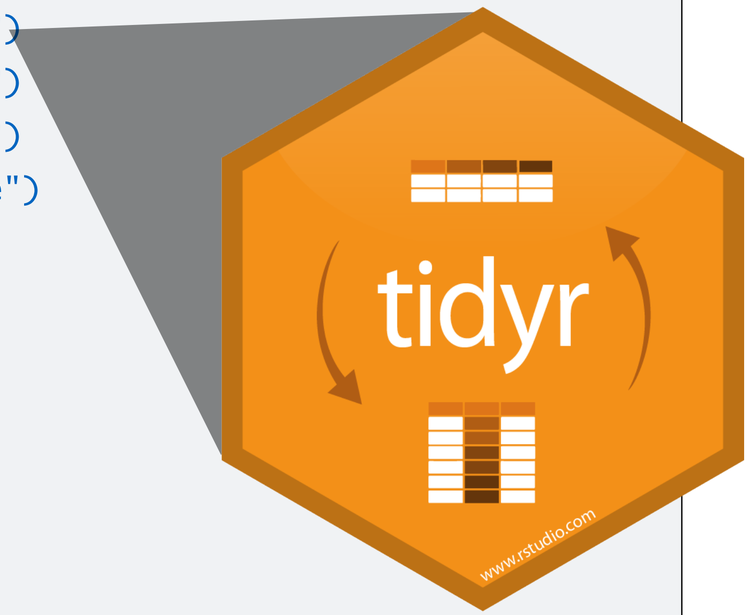

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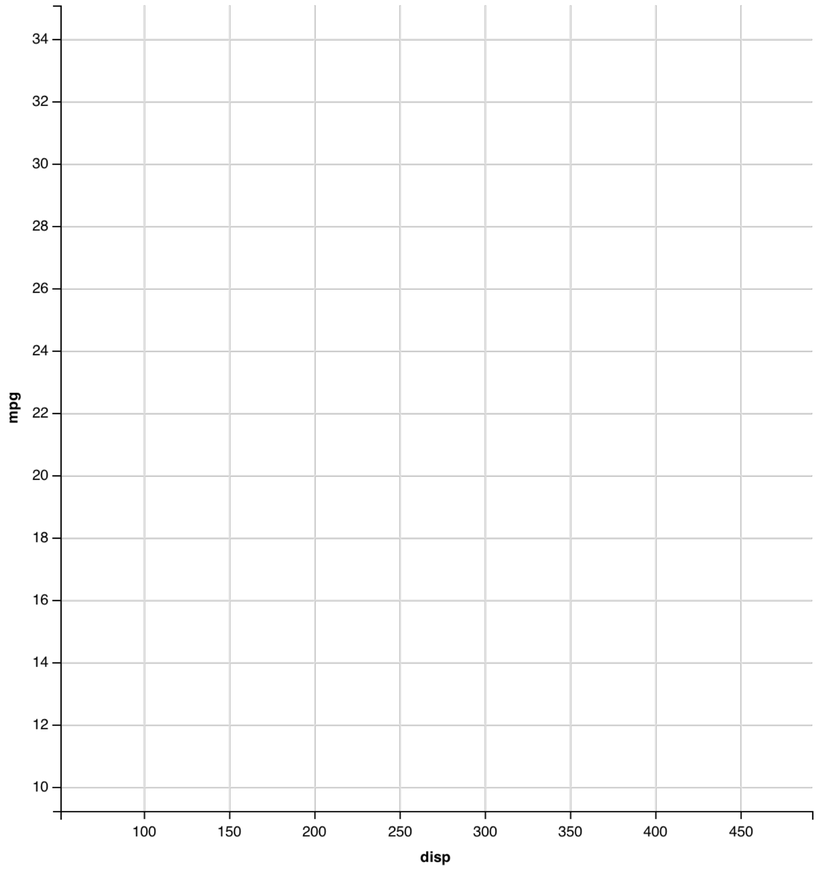
Grammar of Graphics

mpg	cyl	disp	hp
21.0	6	160.0	2
21.0	6	160.0	2
22.8	4	108.0	1
21.4	6	258.0	2
18.7	8	360.0	3
18.1	6	225.0	2
14.3	8	360.0	5
24.4	4	146.7	1
22.8	4	140.8	1
19.2	6	167.6	2
17.8	6	167.6	2
16.4	8	275.8	3
17.3	8	275.8	3
15.2	8	275.8	3
10.4	8	472.0	4
10.4	8	460.0	4
14.7	8	440.0	4
32.4	4	78.7	1
30.4	4	75.7	1
33.9	4	71.1	1



data **geom**

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mappings

fill

mpg	cyl	disp	hp
21.0	6	160.0	2
21.0	6	160.0	2
22.8	4	108.0	1
21.4	6	258.0	2
18.7	8	360.0	3
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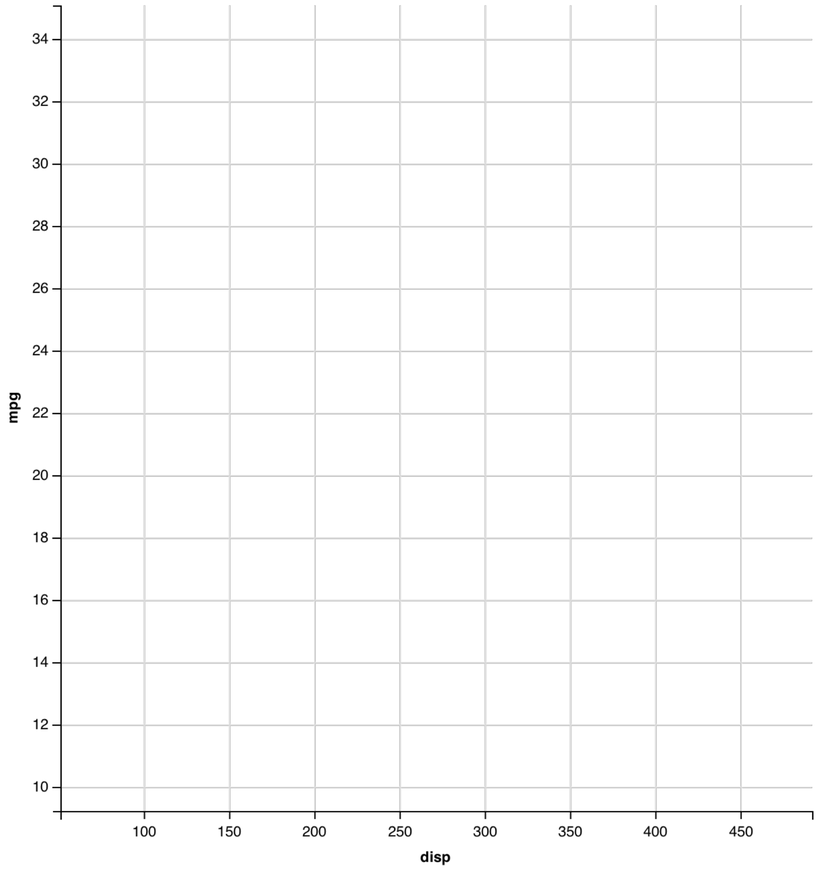

data geom

CC by RStudio

mappings

shape fill

mpg	cyl	disp	hp
21.0	6	160.0	2
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22.8	4	108.0	1
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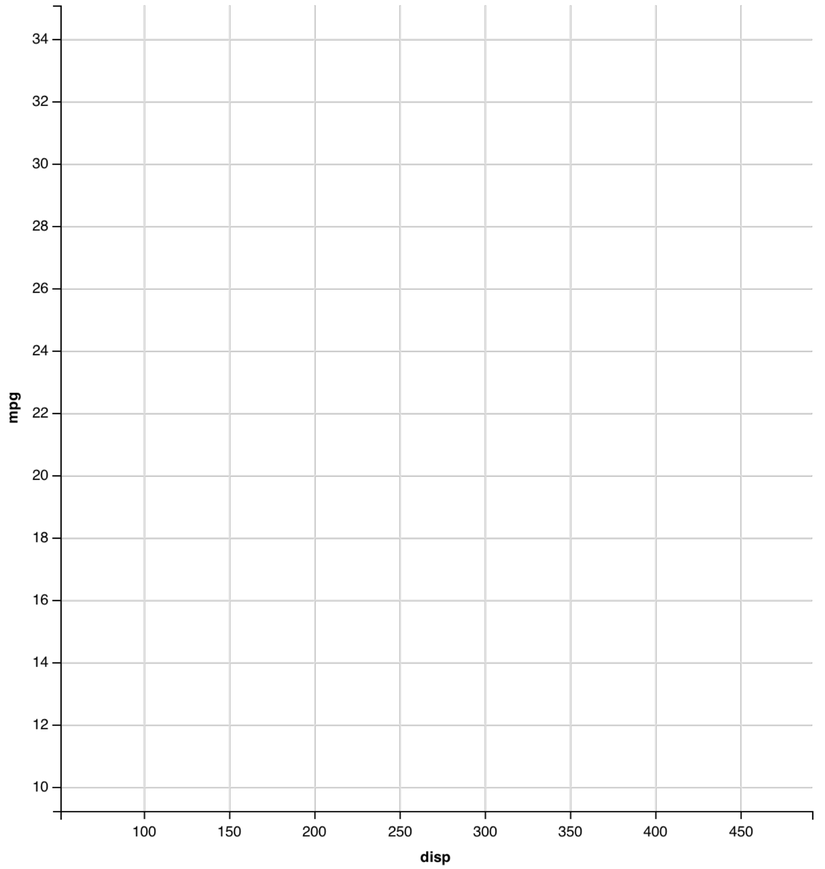

data geom

CC by RStudio

mappings

shape x fill

mpg	cyl	disp	hp
21.0	6	160.0	2
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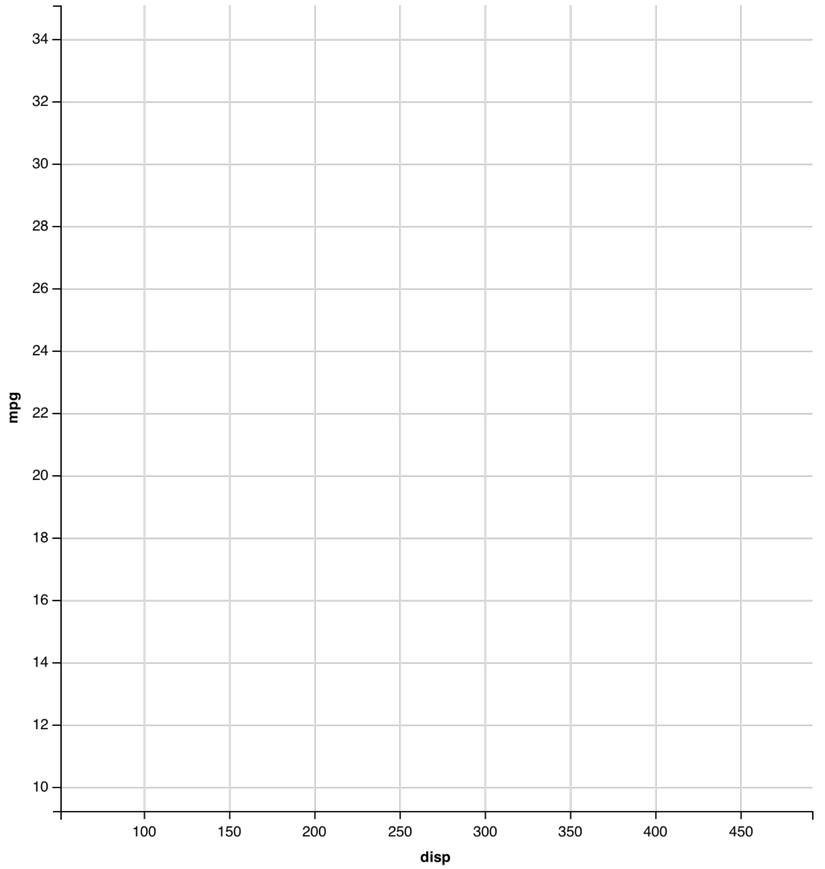

data geom

CC by RStudio

mappings

y shape x fill

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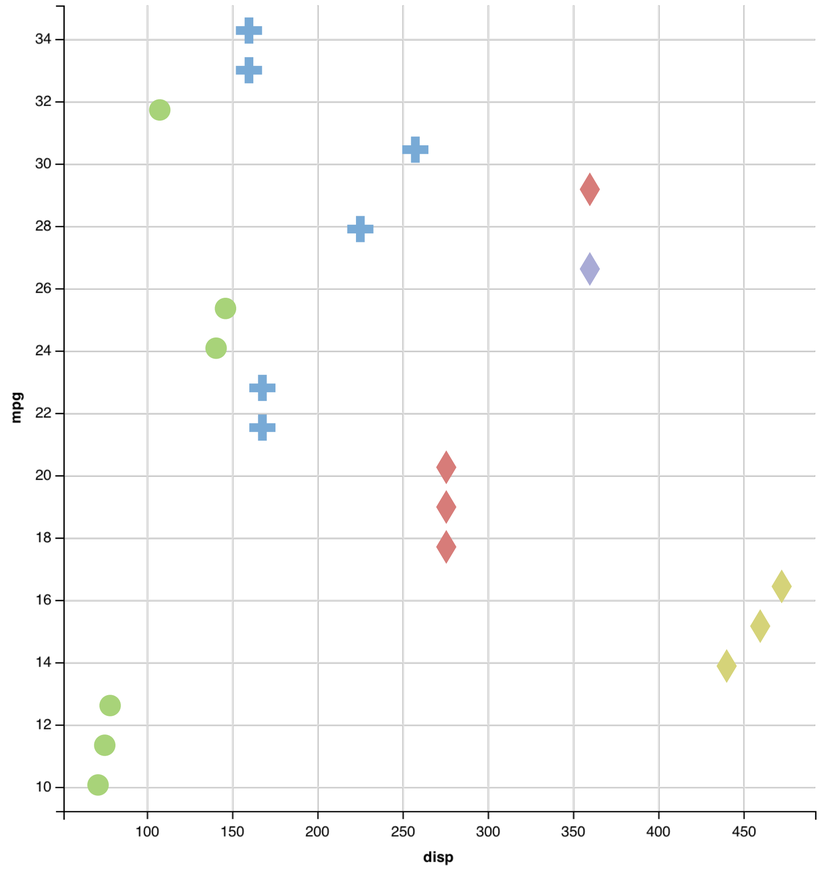

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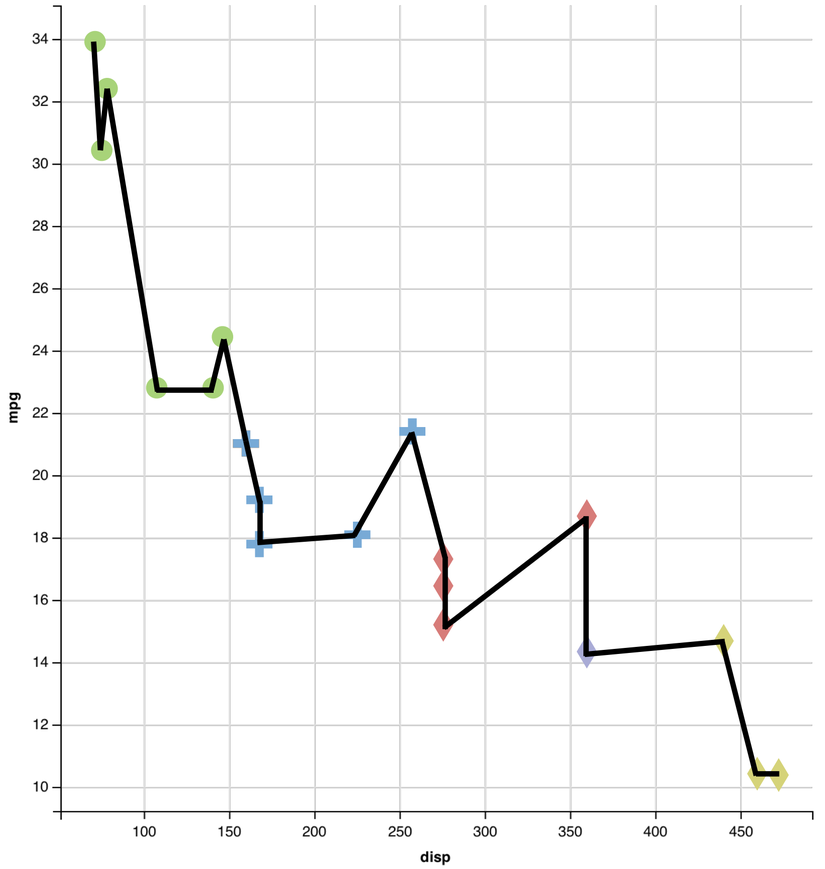
15.2	8	275.8	3
10.4	8	472.0	4
10.4	8	460.0	4
14.7	8	440.0	4
32.4	4	78.7	1
30.4	4	75.7	1
33.9	4	71.1	1



data

geom

points

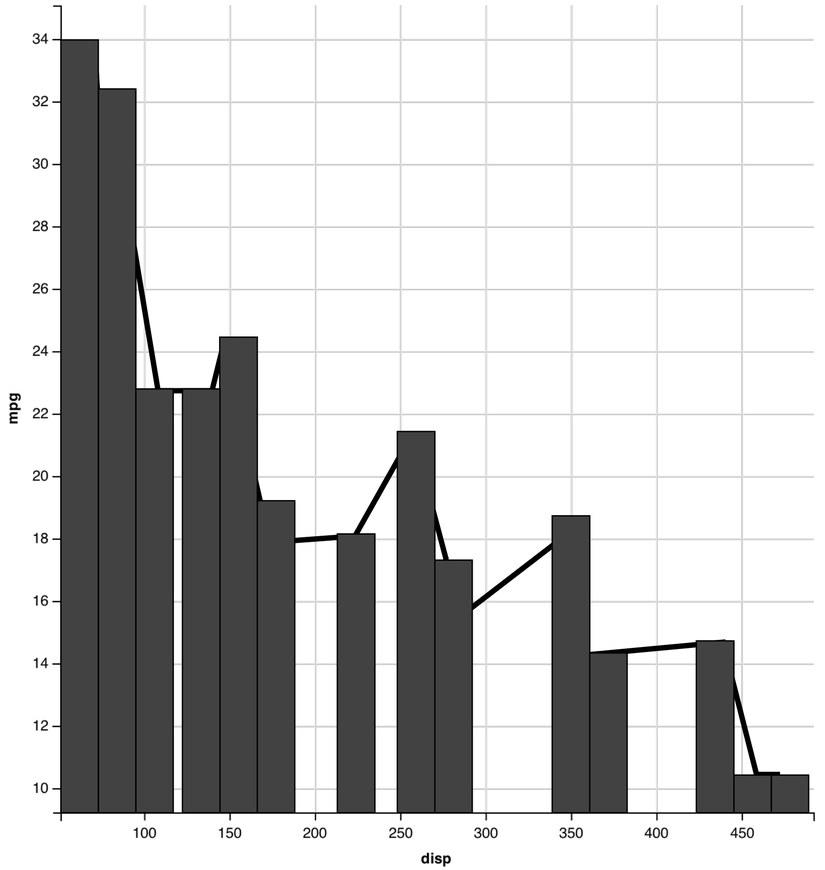
lines

CC by RStudio

mappings

y x

mpg	cyl	disp	hp
21.0	6	160.0	2
21.0	6	160.0	2
22.8	4	108.0	1
21.4	6	258.0	2
18.7	8	360.0	3
18.1	6	225.0	2
14.3	8	360.0	5
24.4	4	146.7	1
22.8	4	140.8	1
19.2	6	167.6	2
17.8	6	167.6	2
16.4	8	275.8	3
17.3	8	275.8	3
15.2	8	275.8	3
10.4	8	472.0	4
10.4	8	460.0	4
14.7	8	440.0	4
32.4	4	78.7	1
30.4	4	75.7	1
33.9	4	71.1	1



data **geom**

points

lines

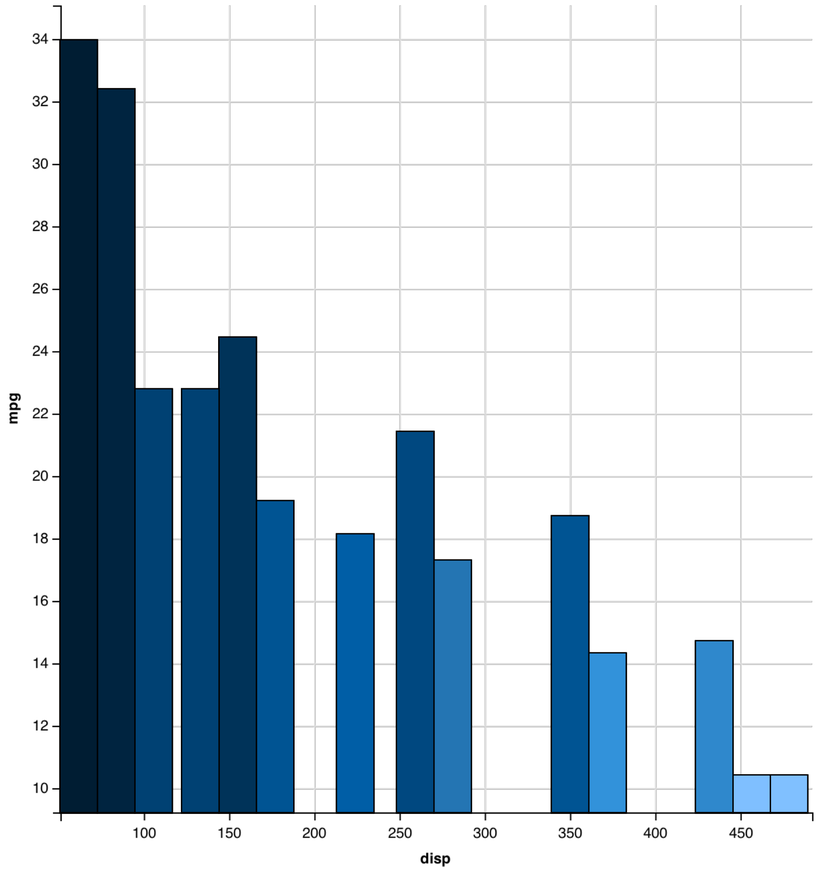
bars

CC by RStudio

mappings

y fill

mpg	cyl	disp	hp
21.0	6	160.0	2
21.0	6	160.0	2
22.8	4	108.0	1
21.4	6	258.0	2
18.7	8	360.0	3
18.1	6	225.0	2
14.3	8	360.0	5
24.4	4	146.7	1
22.8	4	140.8	1
19.2	6	167.6	2
17.8	6	167.6	2
16.4	8	275.8	3
17.3	8	275.8	3
15.2	8	275.8	3
10.4	8	472.0	4
10.4	8	460.0	4
14.7	8	440.0	4
32.4	4	78.7	1
30.4	4	75.7	1
33.9	4	71.1	1



data

geom

points

lines

bars

CC by RStudio

To make a graph

[template]

```
ggplot(data = <DATA>) +
  <GEOM_FUNCTION>(mapping = aes(<MAPPINGS>))
```

CC by RStudio

To make a graph

mpg	cyl	disp	hp
21.0	6	160.0	2
21.0	6	160.0	2
22.8	4	108.0	1
21.4	6	258.0	2
18.7	8	360.0	3
18.1	6	225.0	2
14.3	8	360.0	5
24.4	4	146.7	1
22.8	4	140.8	1
19.2	6	167.6	2
17.8	6	167.6	2
16.4	8	275.8	3
17.3	8	275.8	3
15.2	8	275.8	3
10.4	8	472.0	4
10.4	8	460.0	4
14.7	8	440.0	4
32.4	4	78.7	1
30.4	4	75.7	1
33.9	4	71.1	1

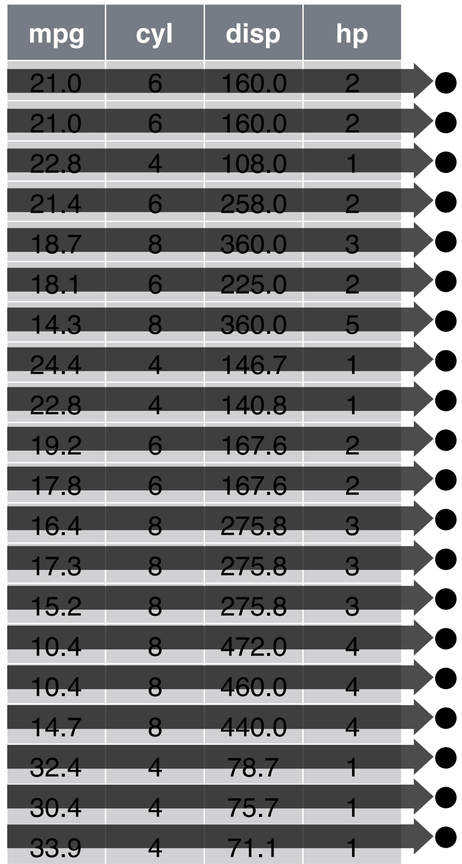
data

1. Pick a **data** set

```
ggplot(data = <DATA>) +
  <GEOM_FUNCTION>(mapping = aes(<MAPPINGS>))
```

CC by RStudio

To make a graph



mpg	cyl	disp	hp
21.0	6	160.0	2
21.0	6	160.0	2
22.8	4	108.0	1
21.4	6	258.0	2
18.7	8	360.0	3
18.1	6	225.0	2
14.3	8	360.0	5
24.4	4	146.7	1
22.8	4	140.8	1
19.2	6	167.6	2
17.8	6	167.6	2
16.4	8	275.8	3
17.3	8	275.8	3
15.2	8	275.8	3
10.4	8	472.0	4
10.4	8	460.0	4
14.7	8	440.0	4
32.4	4	78.7	1
30.4	4	75.7	1
33.9	4	71.1	1

data **geom**

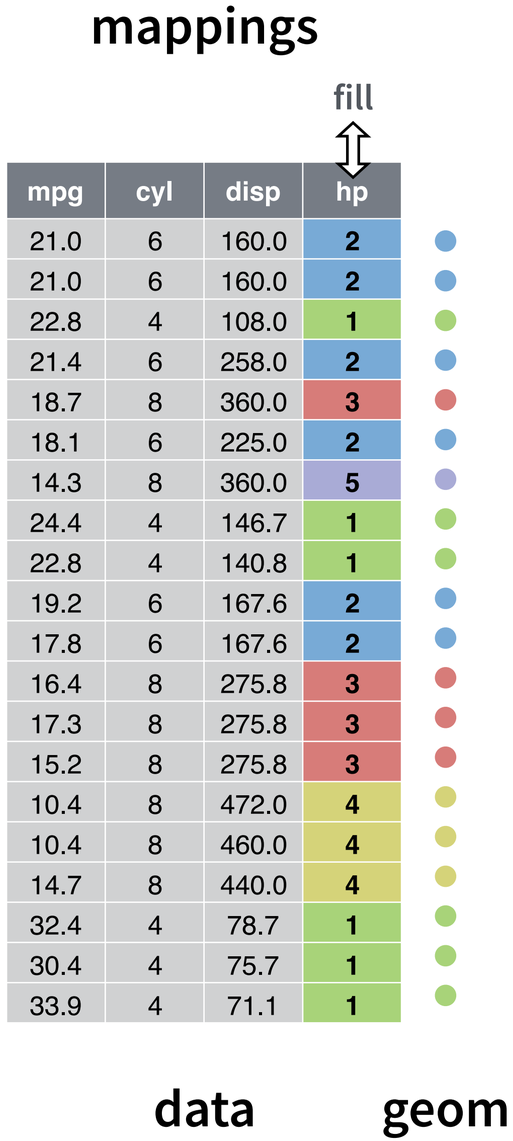
1. Pick a **data** set

```
ggplot(data = <DATA>) +
  <GEOM_FUNCTION>(mapping = aes(<MAPPINGS>))
```

2. Choose a **geom** to display cases

CC by RStudio

To make a graph



1. Pick a **data** set

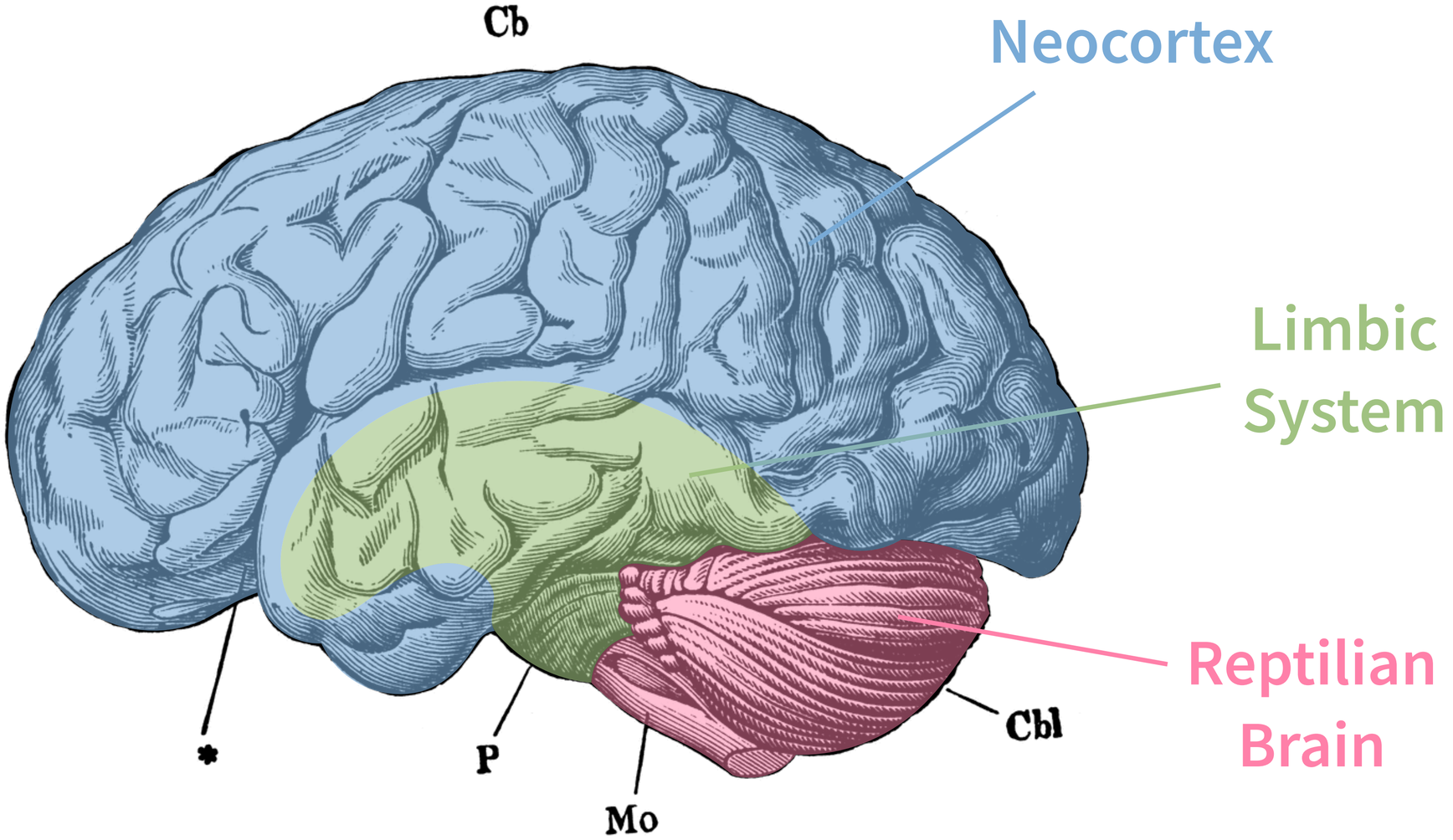
```
ggplot(data = <DATA>) +
  <GEOM_FUNCTION>(mapping = aes(<MAPPINGS>))
```

2. Choose a **geom** to display cases

3. **Map** aesthetic properties to variables

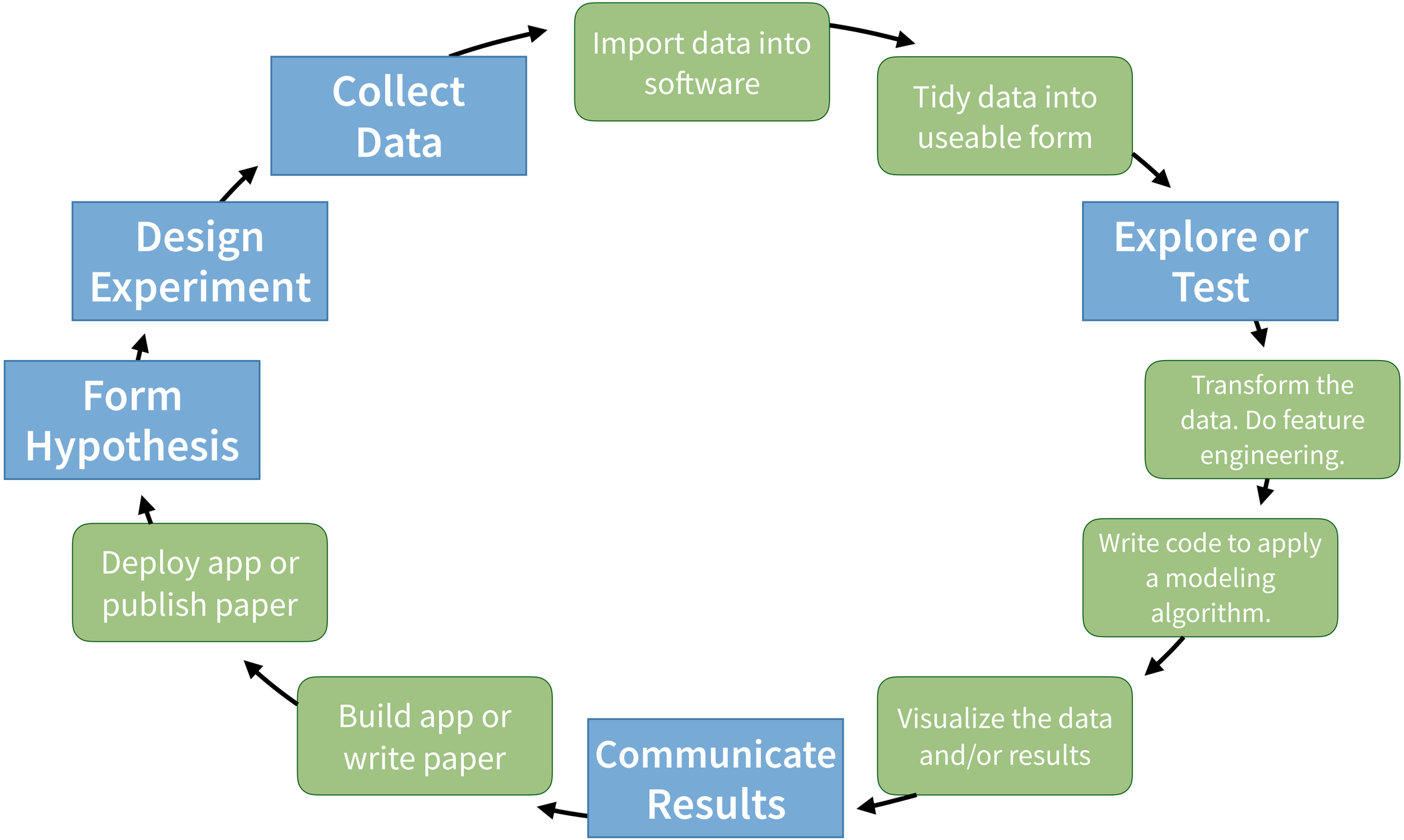
CC by RStudio

Wrap up



CC by RStudio

CC by RStudio



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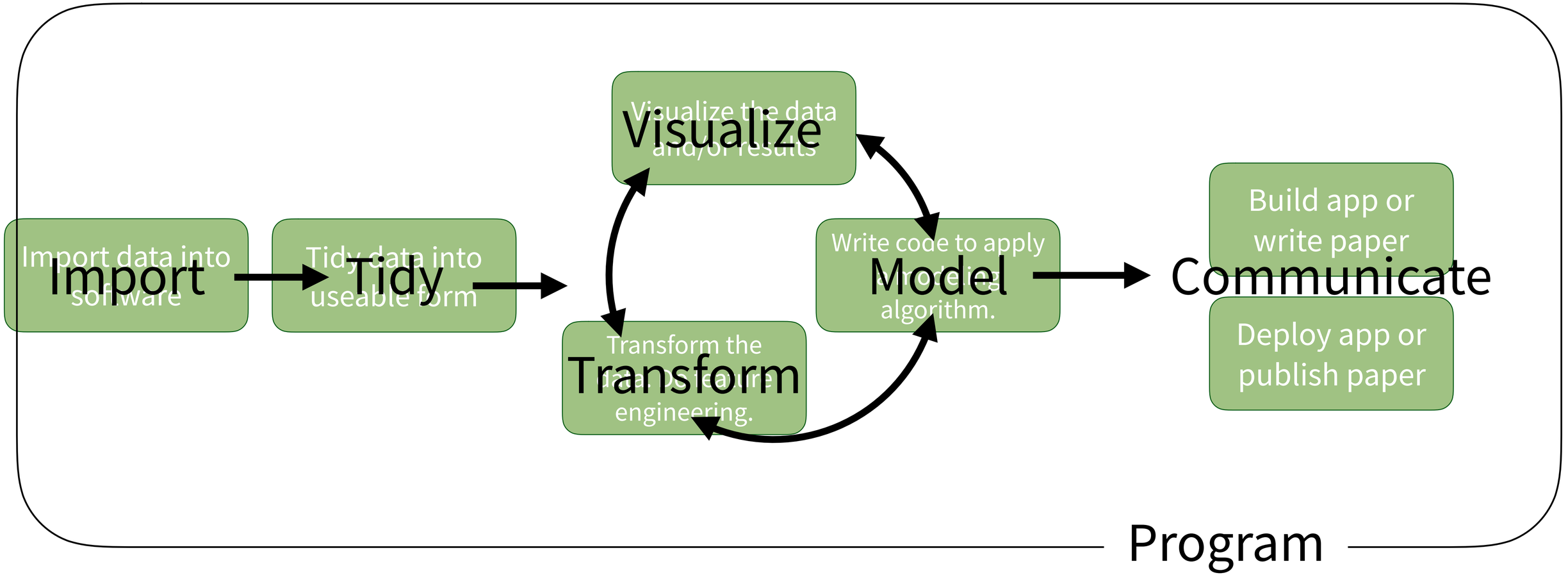
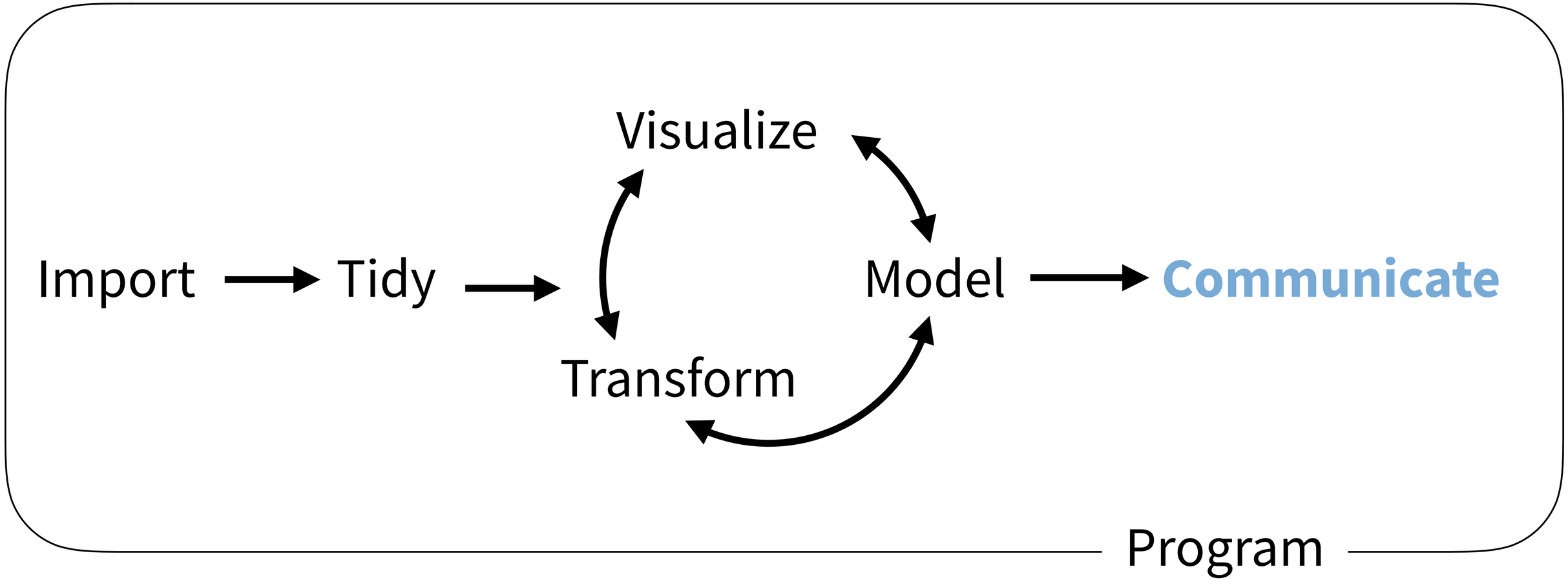
(Applied) **Data Science**



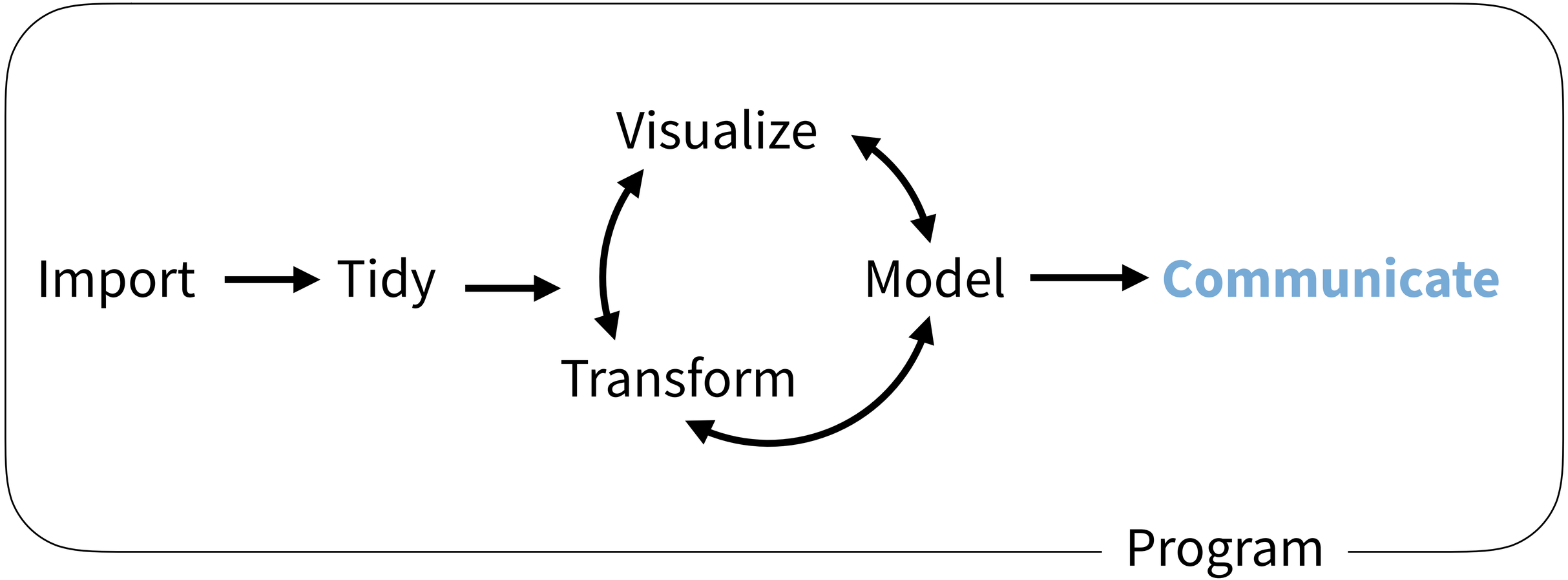
CC by RStudio

(Applied) **Data Science**



CC by RStudio

(Applied) **Data Science**



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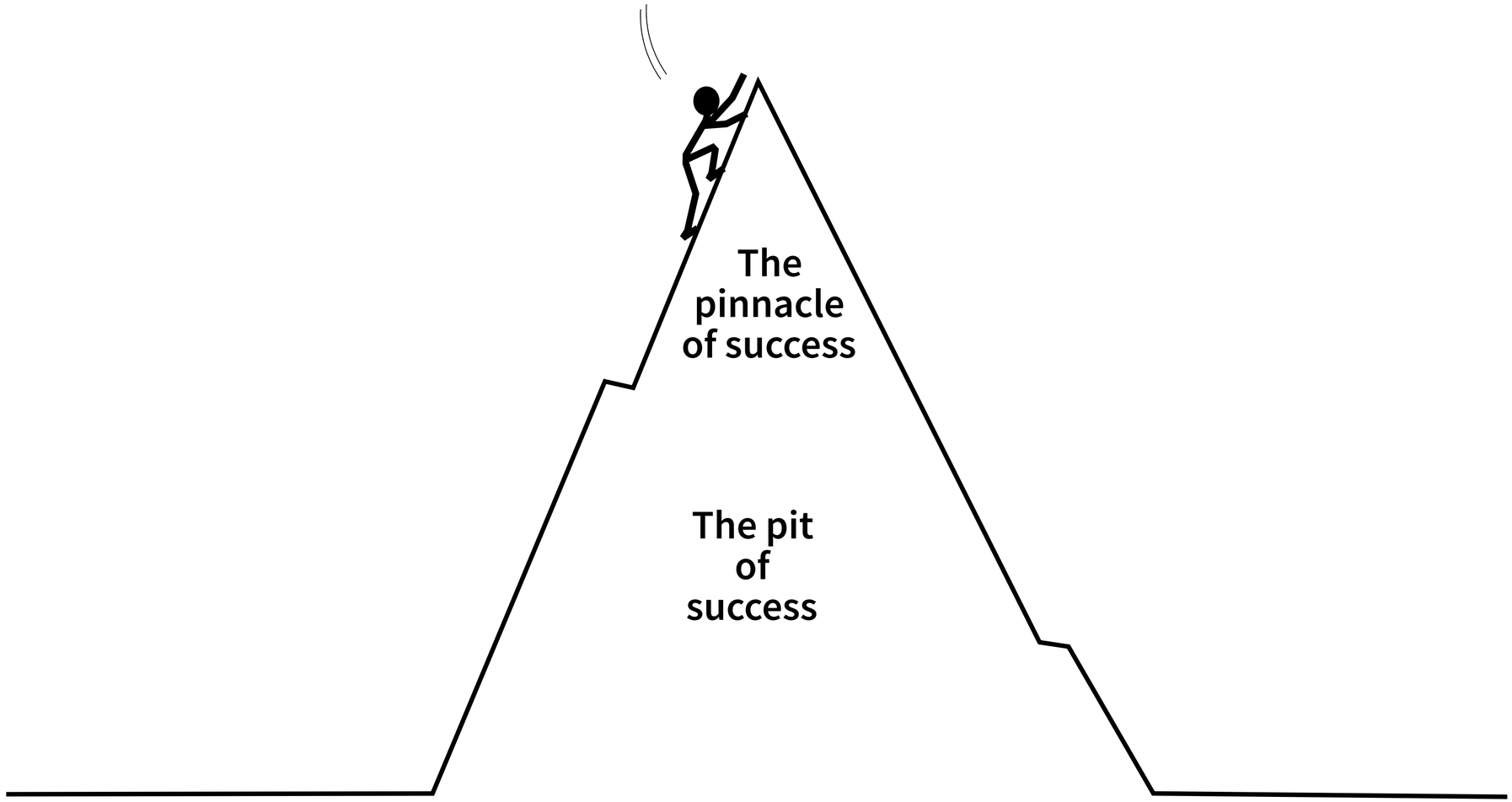

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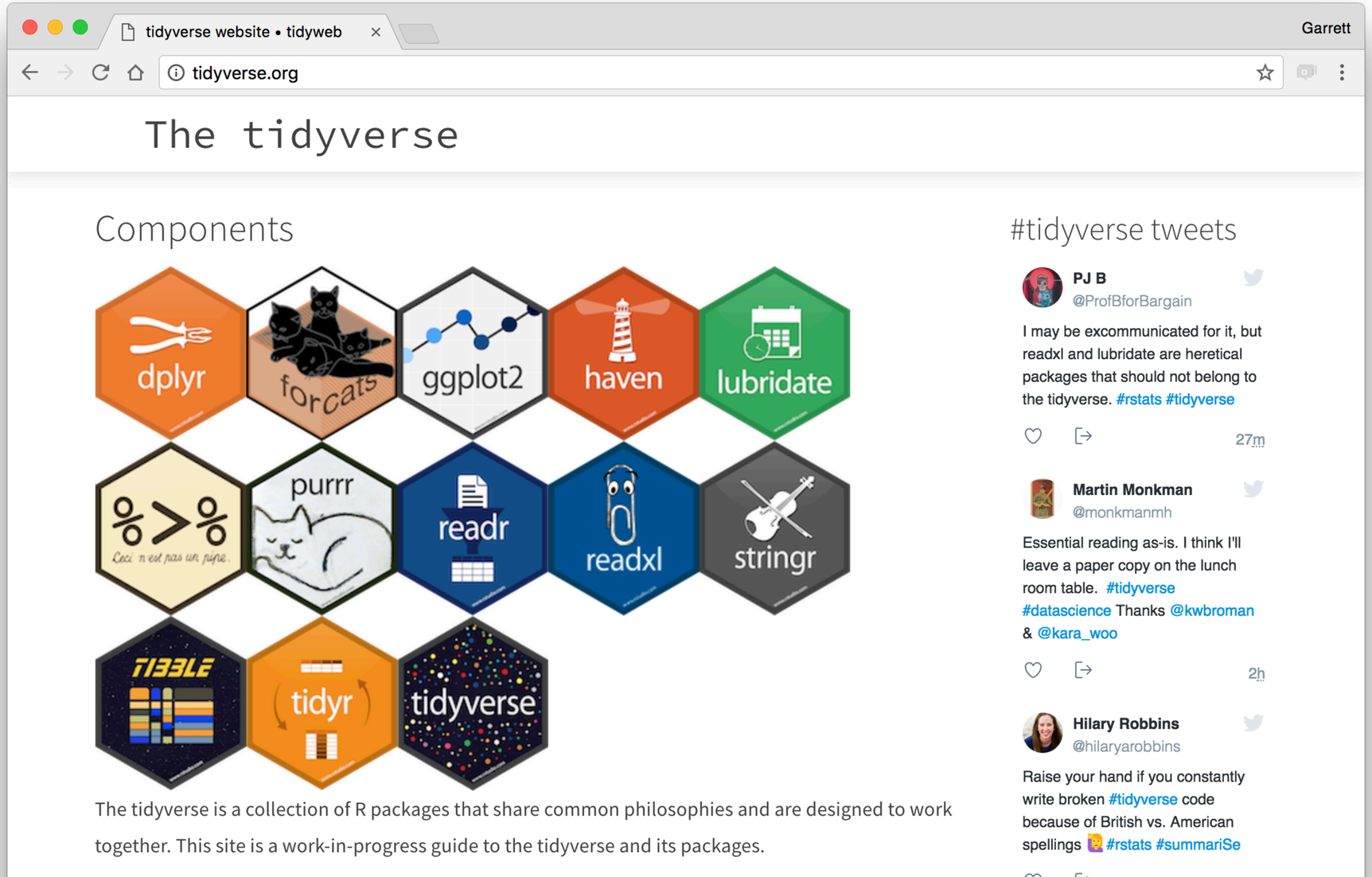

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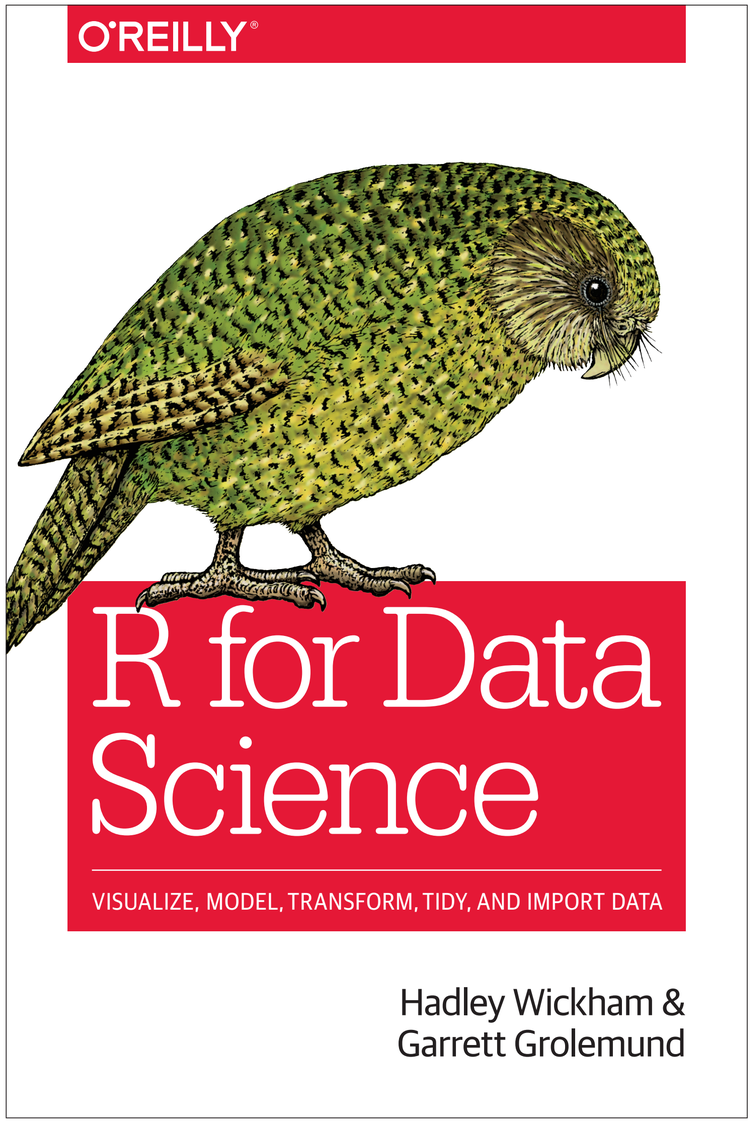

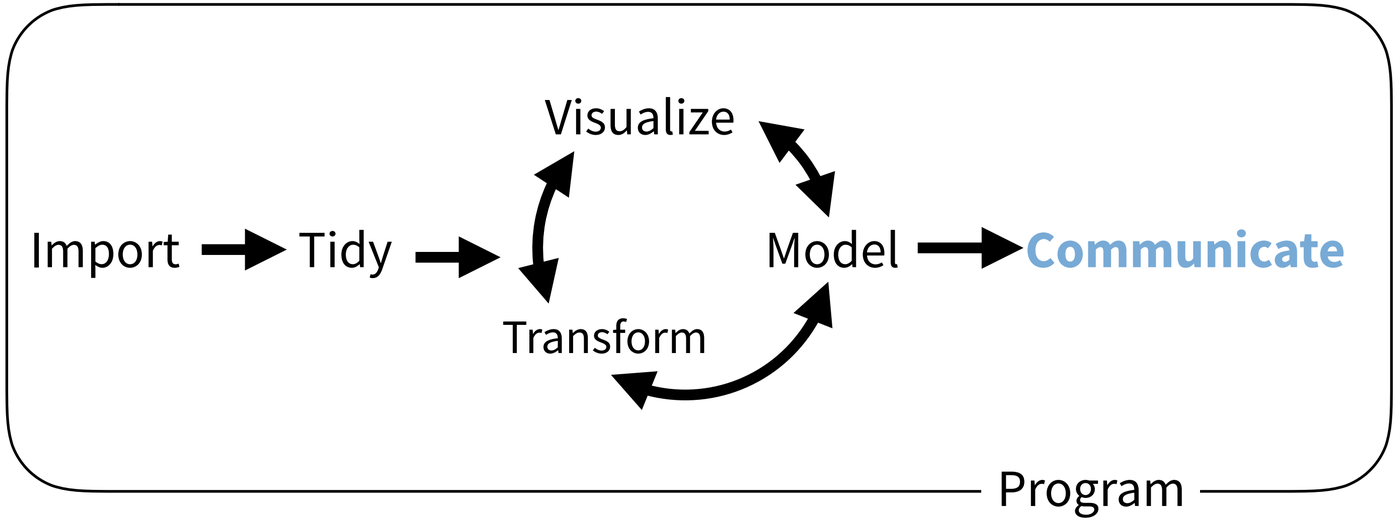

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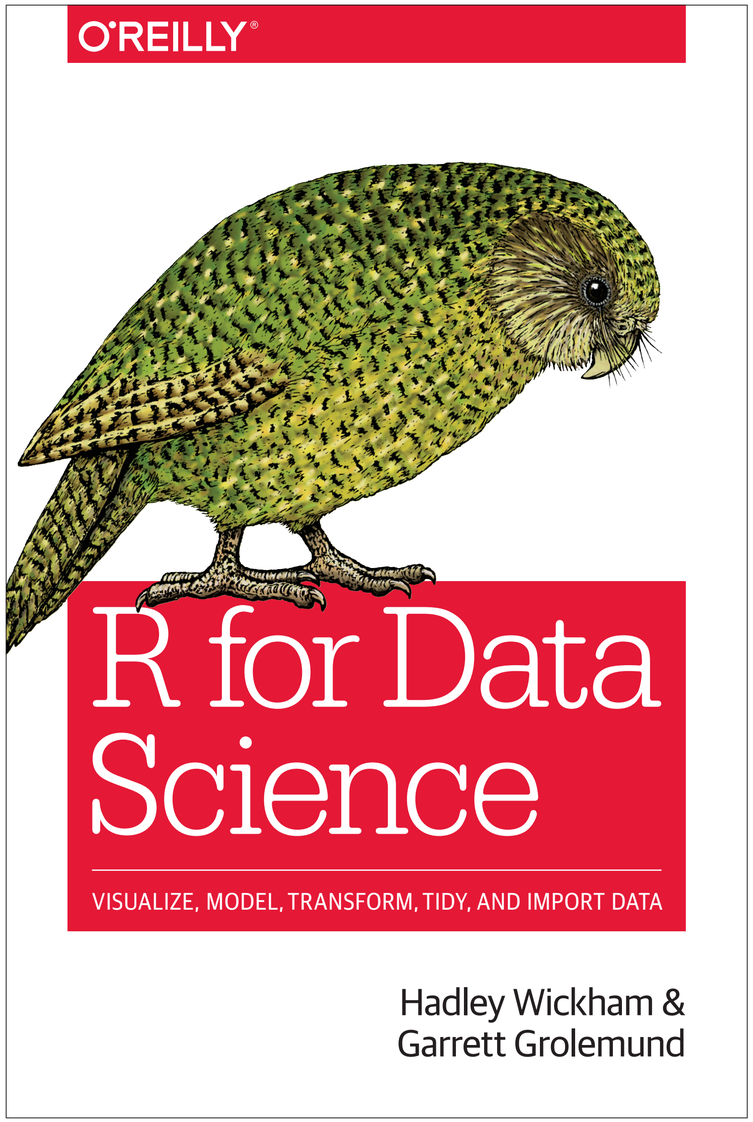
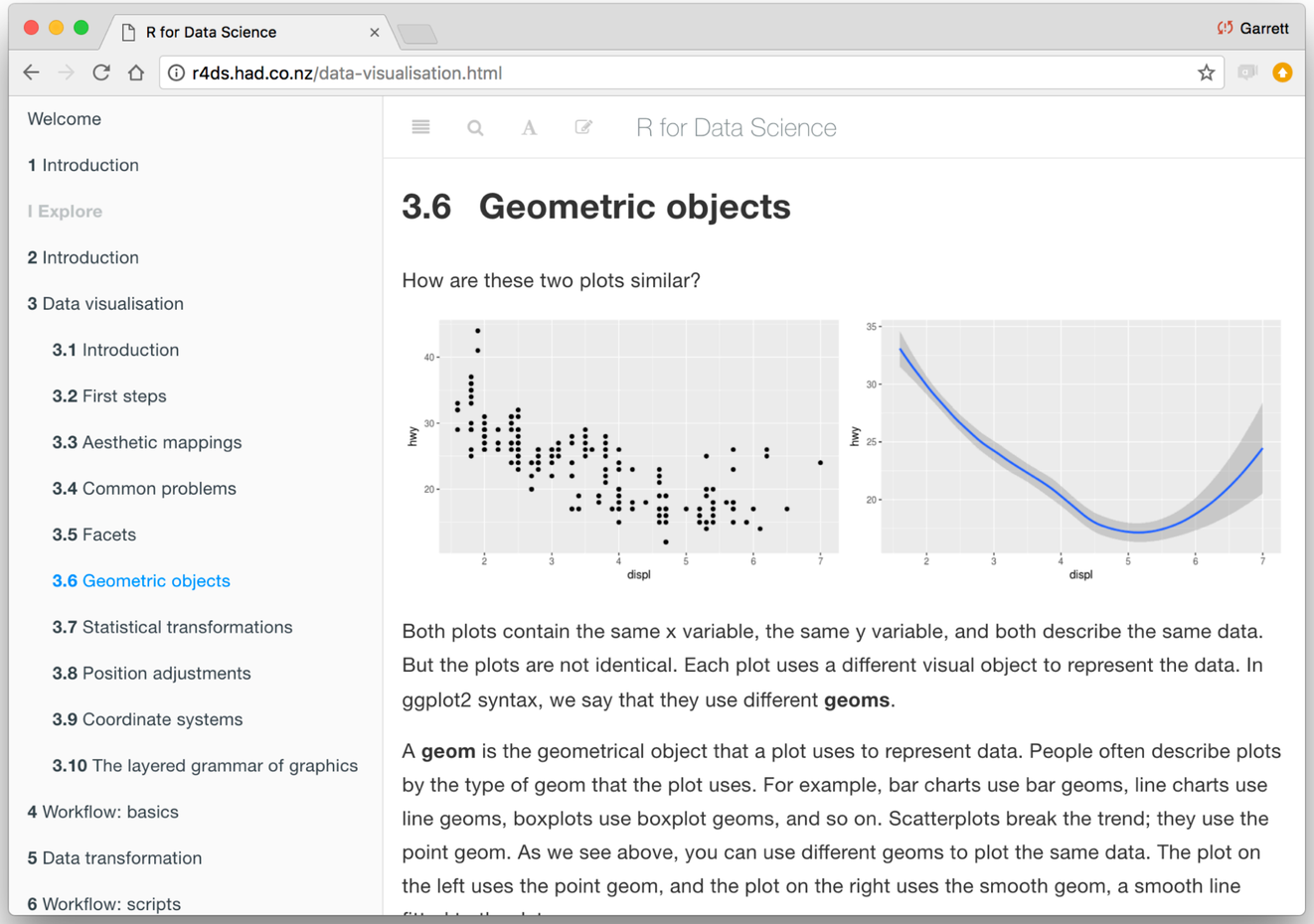


http://r4ds.had.co.nz/



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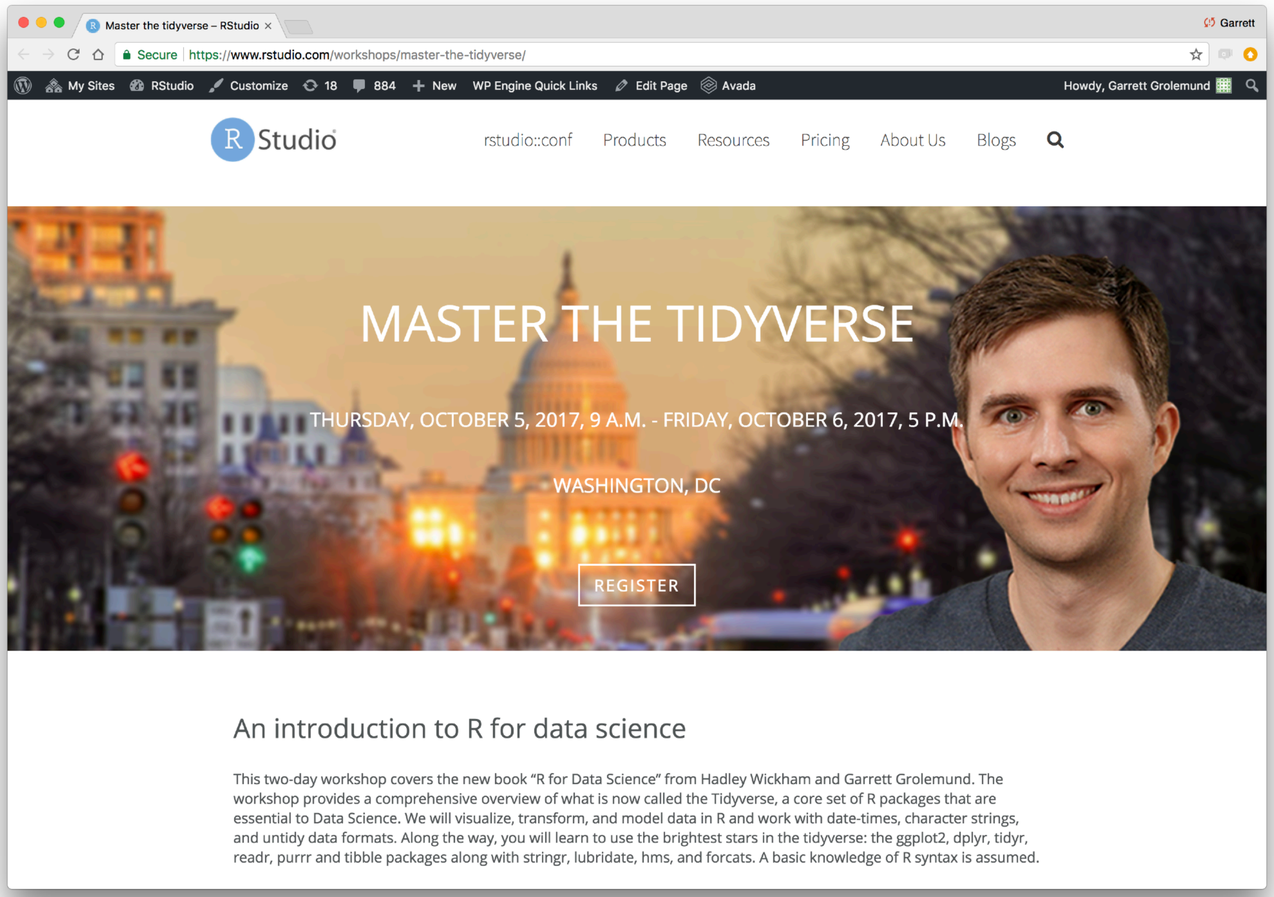
Thank You



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