

# PROGRAMMING WITH R

variables

# control structures

loops

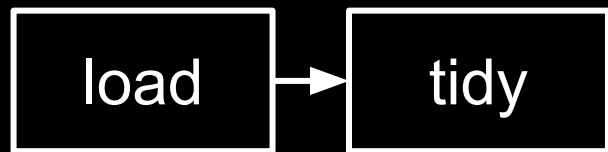
functions

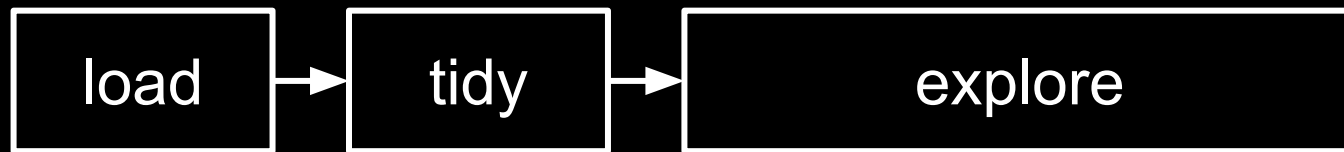
libraries

# DATA ANALYSIS

load

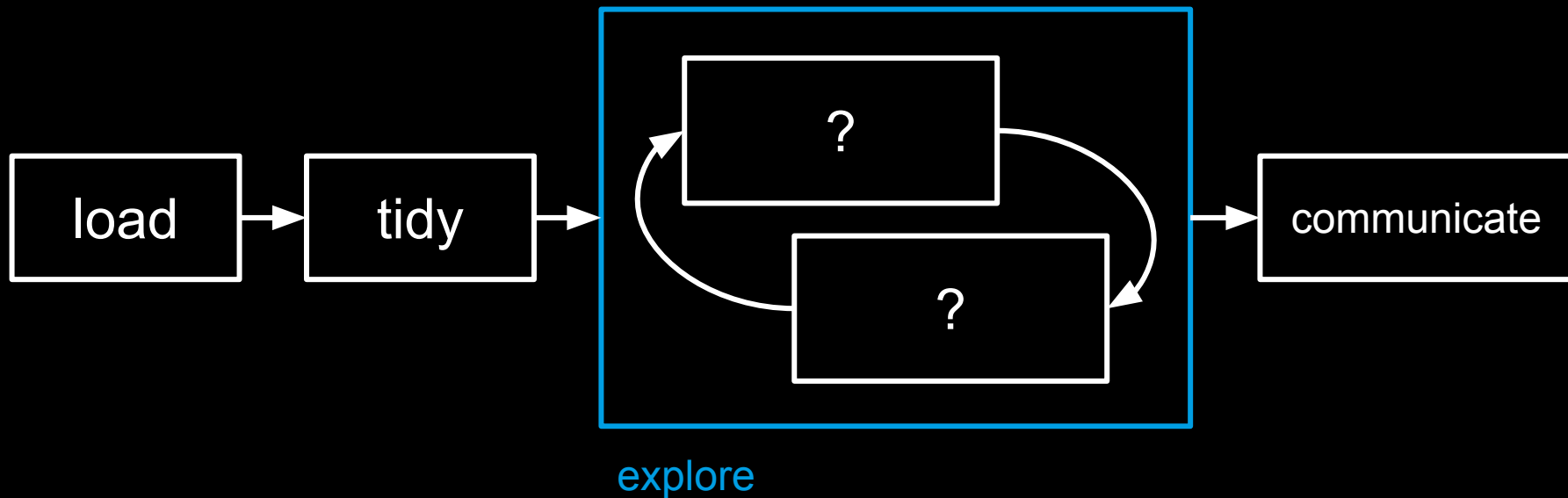


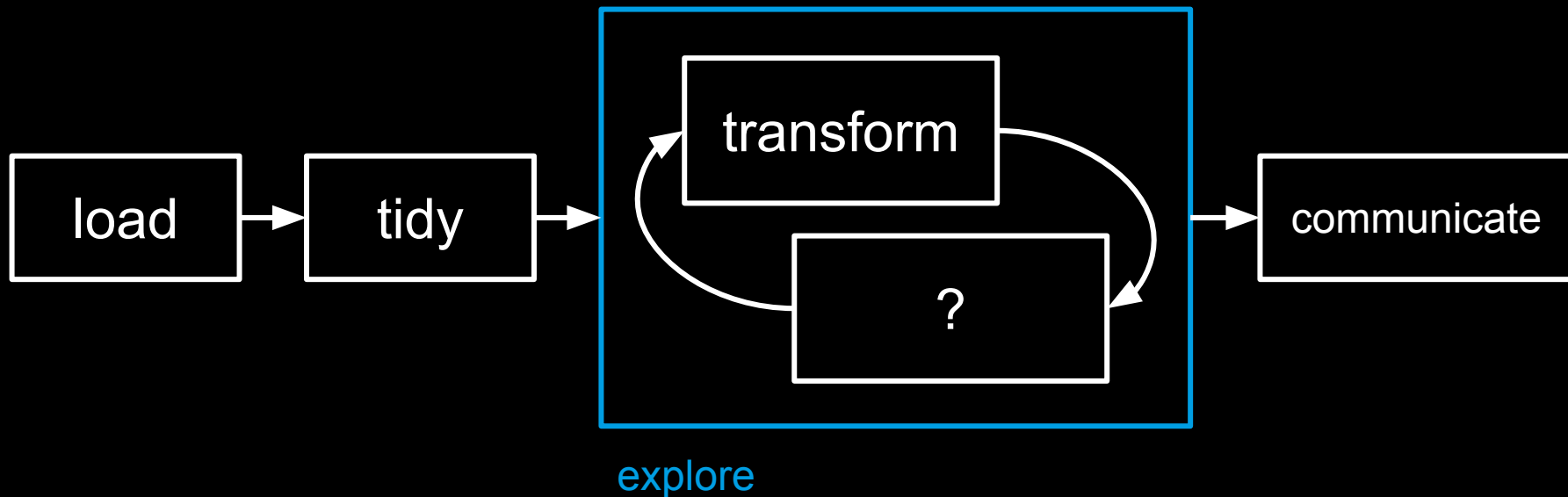


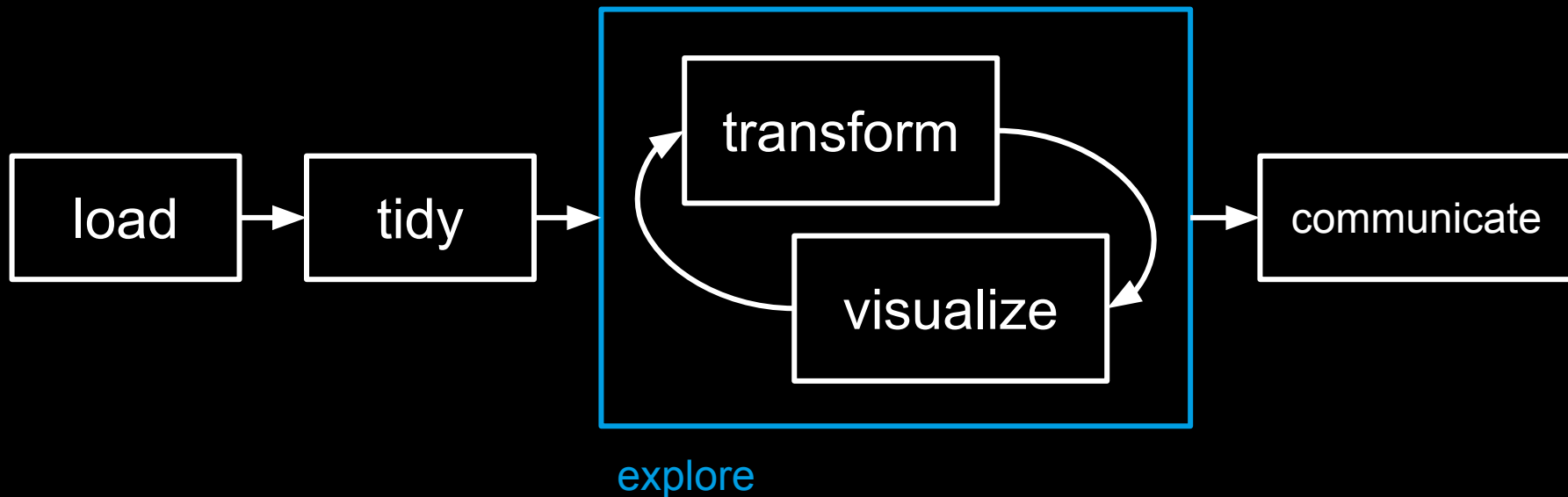


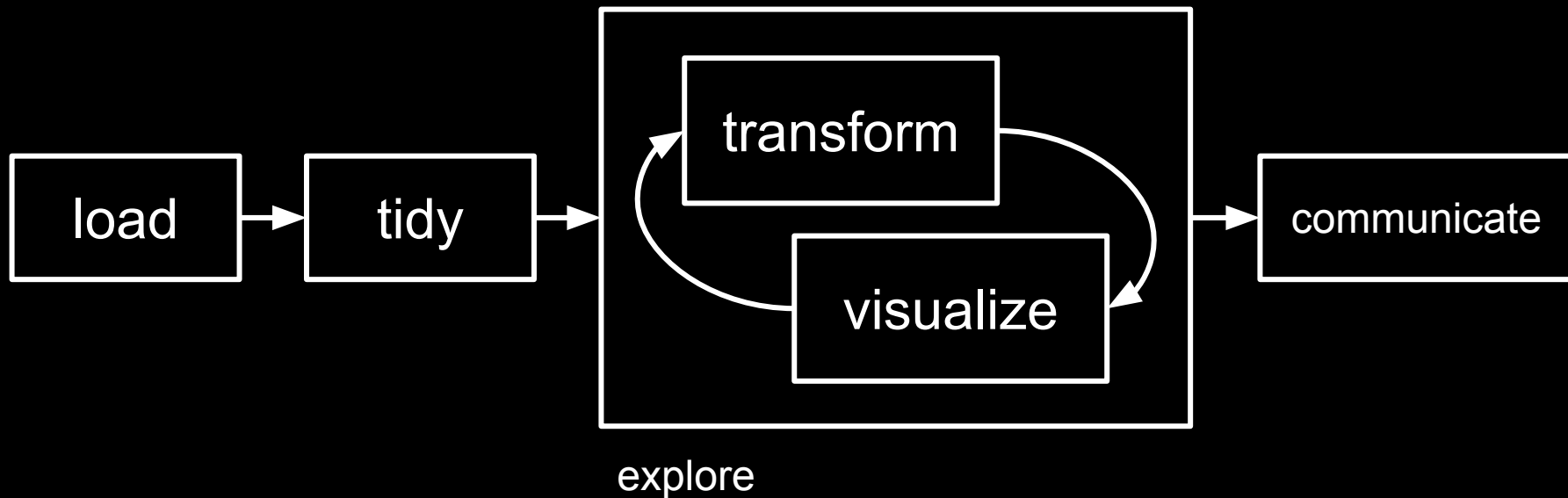




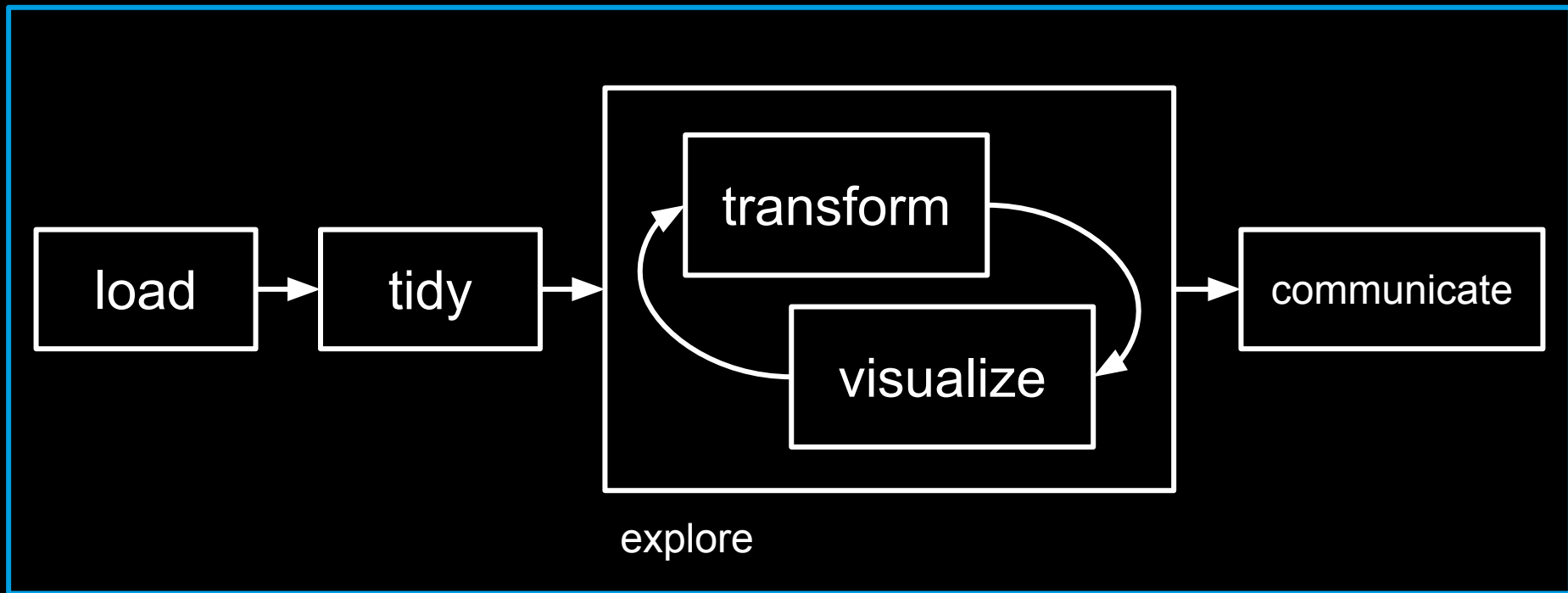




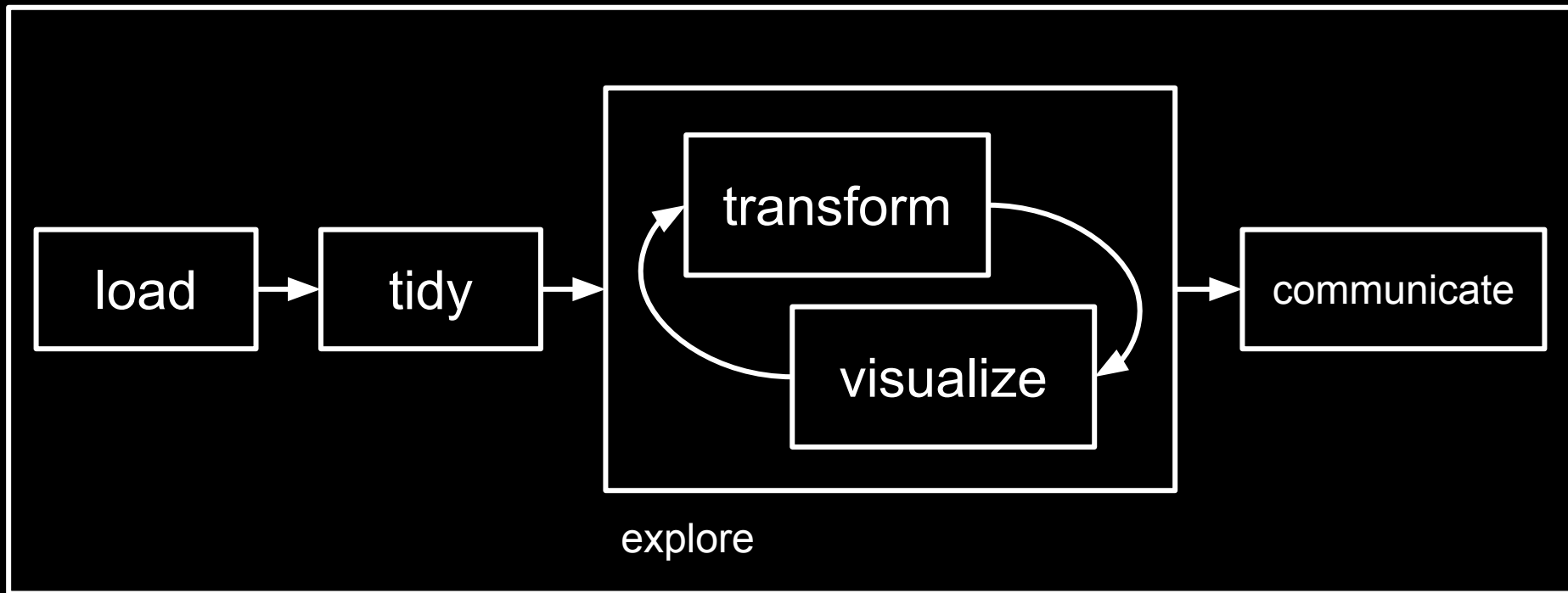








program



program

# VECTORS

$c(2, 3, 5, 7, 11, 13, 17)$

# DATA FRAMES

{{ tibble }}

# LOAD DATA

{{ readr }}



```
read_csv()  
read_delim()
```

{{ readxl }}

`read_excel()`

# TIDY DATA

# tidy data

each variable is a column;  
each column is a variable.

each observation is a row;  
each row is an observation.

each value is a cell; each cell  
is a single value.

country	year	cases	population
Afghanistan	1999	745	19987071
Afghanistan	2000	2666	20595360
Brazil	1999	37737	172006362
Brazil	2000	80488	174504898

country	year	cases	population
Afghanistan	1999	745	19987071
Afghanistan	2000	2666	20595360
Brazil	1999	37737	172006362
Brazil	2000	80488	174504898

variables

country	year	cases	population
Afghanistan	1999	745	1997071
Afghanistan	2000	2666	2005360
Brazil	1999	37737	17296362
Brazil	2000	60488	17494898

observations



country	year	cases	population
Afghanistan	1999	745	19987071
Afghanistan	2000	2666	20595360
Brazil	1999	37737	172006362
Brazil	2000	80488	174504898

values

country	year	type	count
Afghanistan	1999	cases	745
Afghanistan	1999	population	19987071
Afghanistan	2000	cases	2666
Afghanistan	2000	population	20595360
Brazil	1999	cases	37737
Brazil	1999	population	172006362
Brazil	2000	cases	80488
Brazil	2000	population	174504898

longer



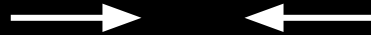
country	year	type	count
Afghanistan	1999	cases	745
Afghanistan	1999	population	19987071
Afghanistan	2000	cases	2666
Afghanistan	2000	population	20595360
Brazil	1999	cases	37737
Brazil	1999	population	172006362
Brazil	2000	cases	80488
Brazil	2000	population	174504898

wider



country	cases_1999	cases_2000	pop_1999	pop_2000
Afghanistan	745	2666	19987071	20595360
Brazil	37737	172006362	80488	174504898

compressed



country	year	rate
Afghanistan	1999	745 / 19987071
Afghanistan	2000	2666 / 20595360
Brazil	1999	37737 / 172006362
Brazil	2000	80488 / 174504898

# tidy

country	year	cases	population
Afghanistan	1999	745	19987071
Afghanistan	2000	2666	20595360
Brazil	1999	37737	172006362
Brazil	2000	80488	174504898

# tidy

country	year	cases	population
Afghanistan	1999	745	19987071
Afghanistan	2000	2666	20595360
Brazil	1999	37737	172006362
Brazil	2000	80488	174504898

vector

{{ tidyrr }}



```
pivot_wider()
```

`pivot_longer()`

{{ stringr }}

```
str_detect()  
str_trim()  
str_squish()
```

# TRANSFORM DATA

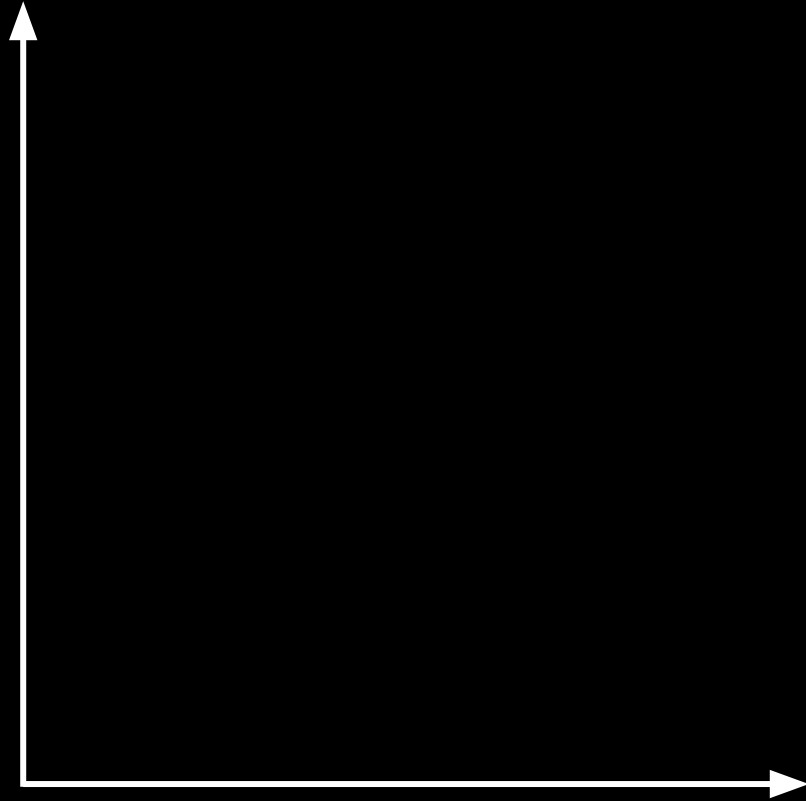
{{ dplyr }}

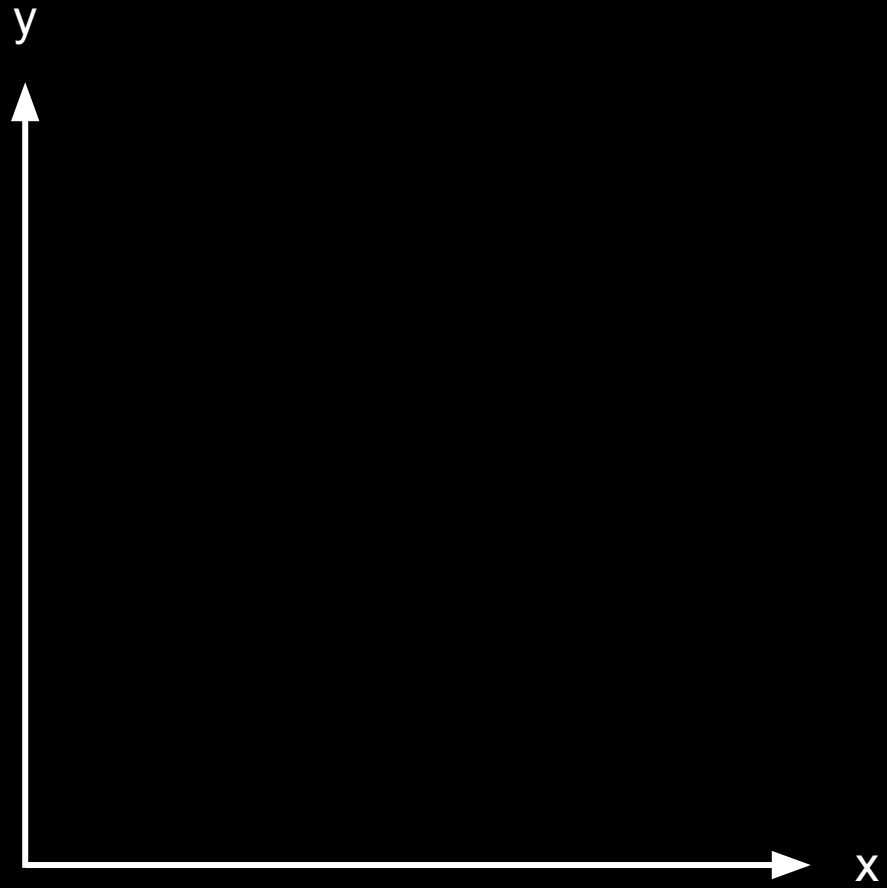
# VISUALIZE DATA

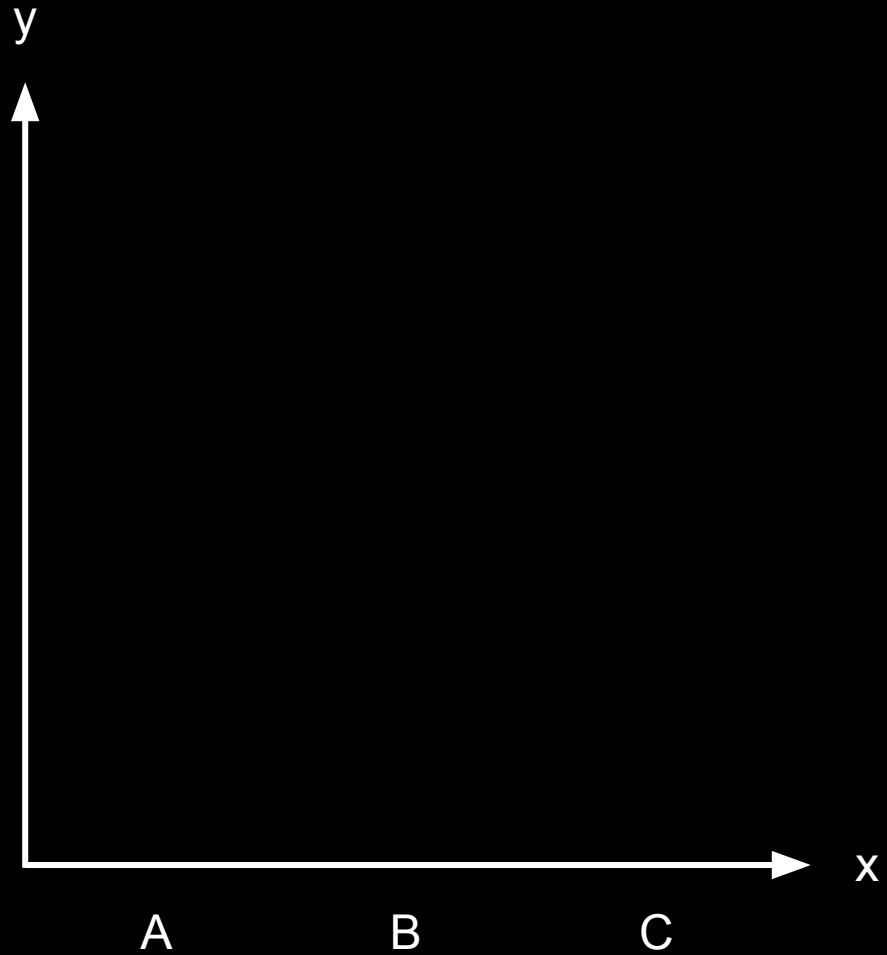
# data

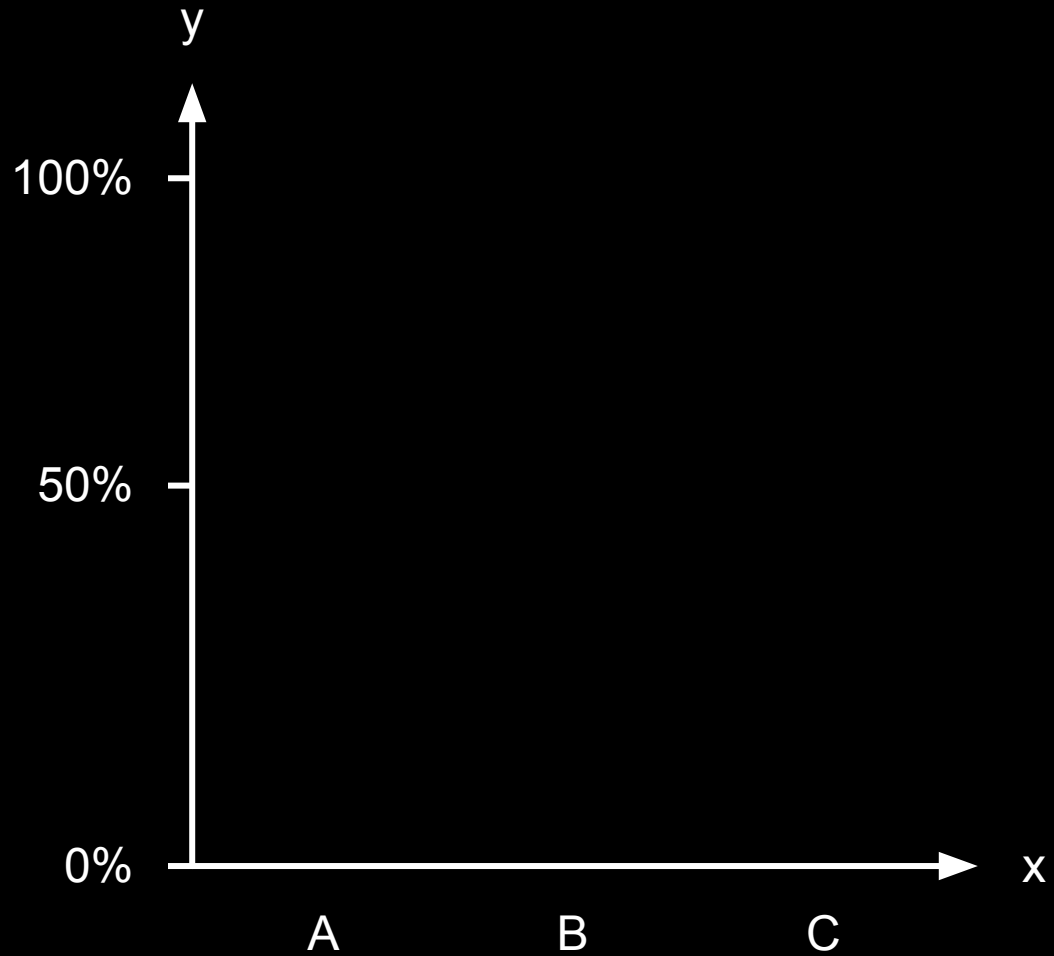
category	pct
A	75
B	33
C	100

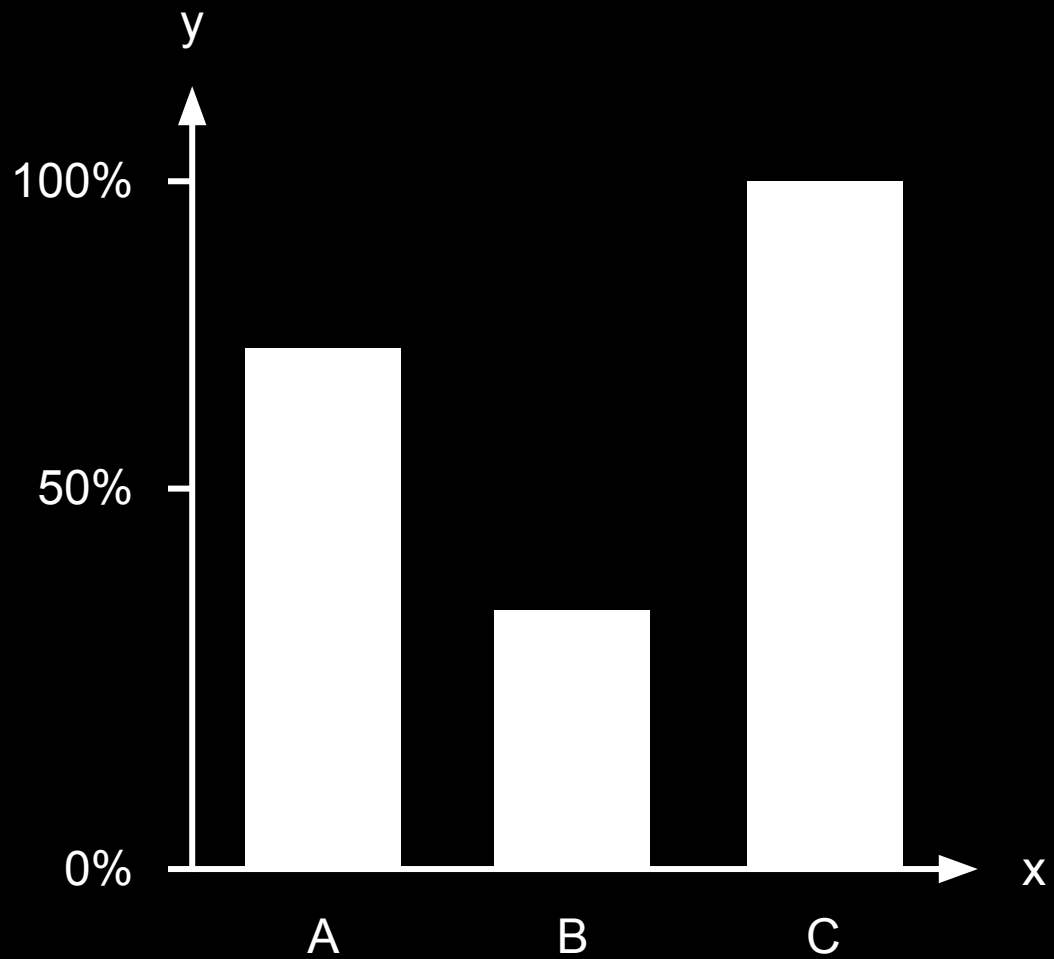




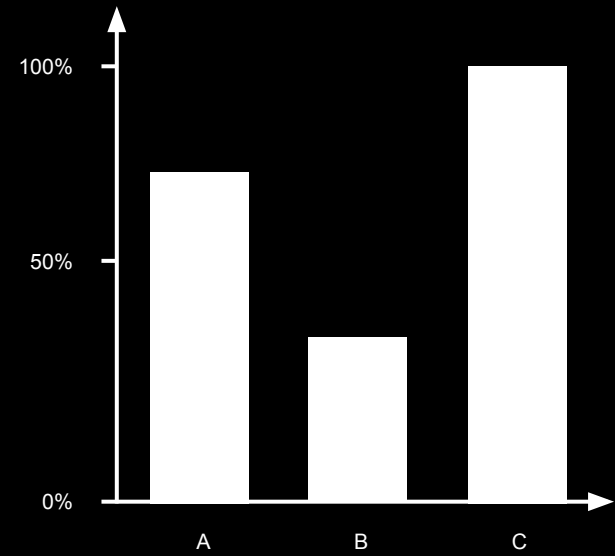








category	pct
A	75
B	33
C	100



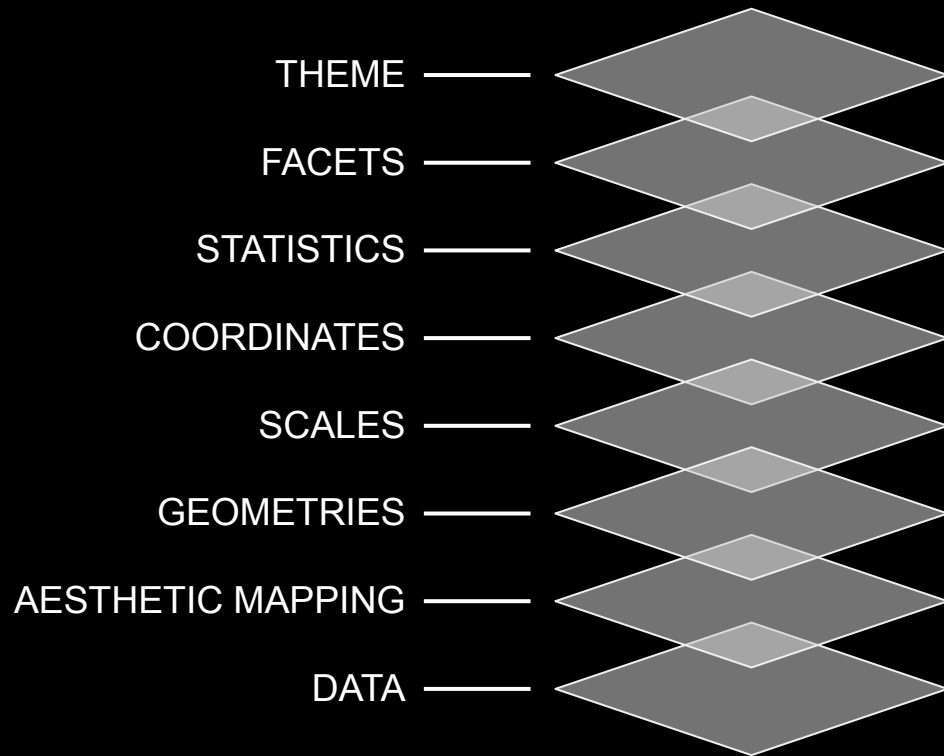
{{ ggplot2 }}

{{ ggplot2 }}

Grammar of Graphics

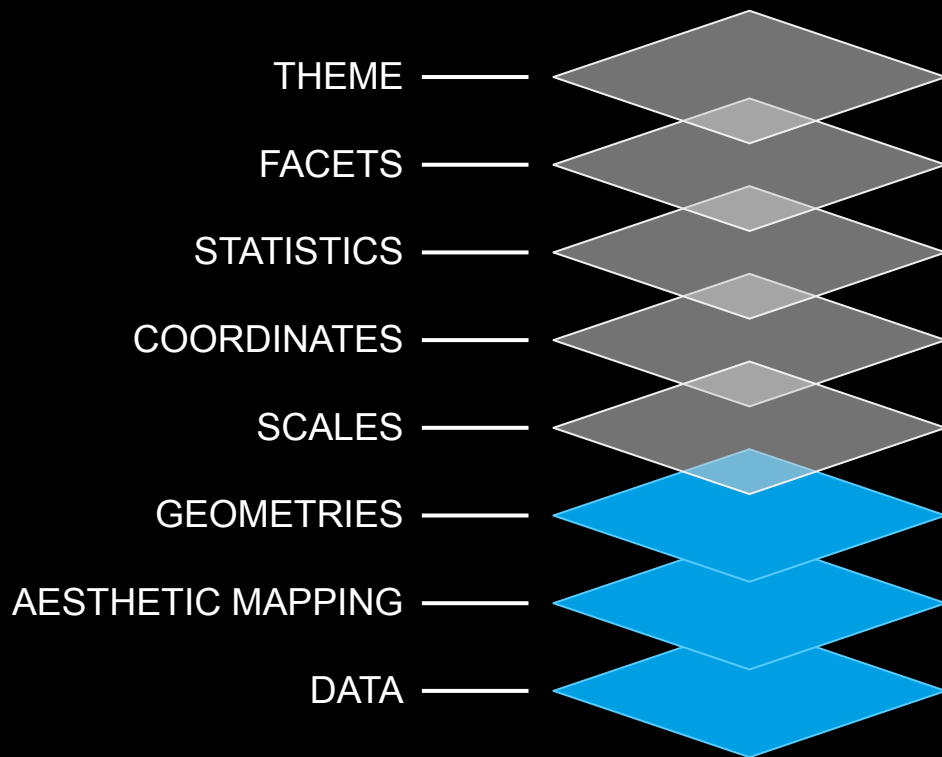


Any  
data  
visualization



Has useful defaults

Mandatory



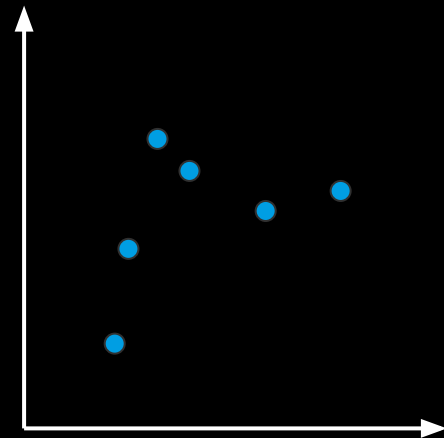
`ggplot()`

```
ggplot() +  
  aes()
```

```
ggplot() +  
  aes() +  
  geom_point()
```

```
ggplot() +  
  aes() +  
  geom_point()
```

```
ggplot() +  
  aes() +  
  geom_point()
```



# COMMUNICATE FINDINGS



# Quarto

# PYTHON

{{ reticulate }}

Medium Text  
(24)

Large Text (32)

009ee3

55cbff

8eddff

DIVIDER

Tiny source (8)

Small text (18)