dplyr and pipes

Sean Anderson
sean@seananderson.ca
@sean_anderson

Stats Beerz September 2014
Simon Fraser University

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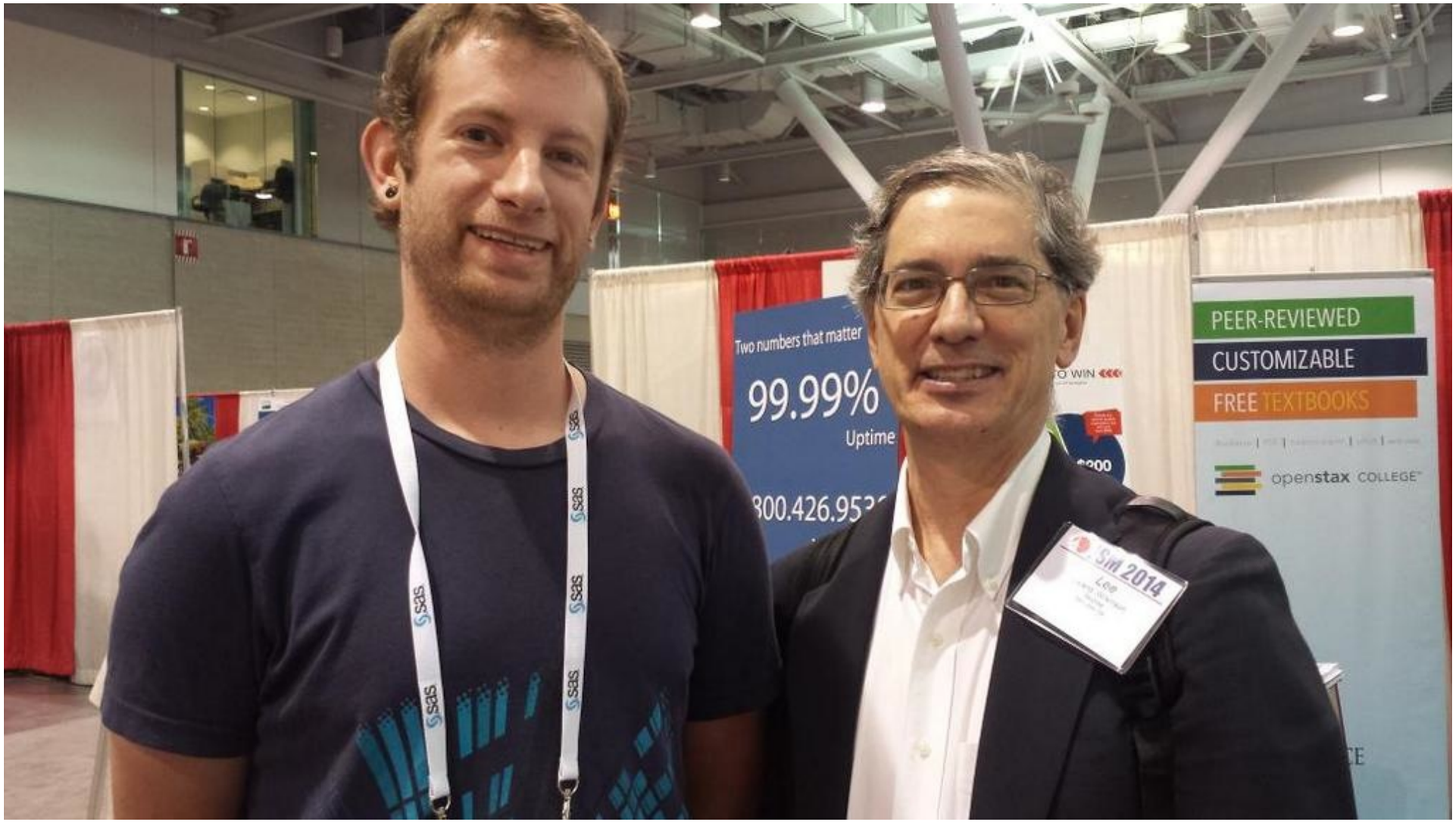
Workshop notes and files:

http://tinyurl.com/dplyr-1



https://twitter.com/knitesh/status/496670944963080192

Data analysis is the process by which data becomes understanding, knowledge and insight

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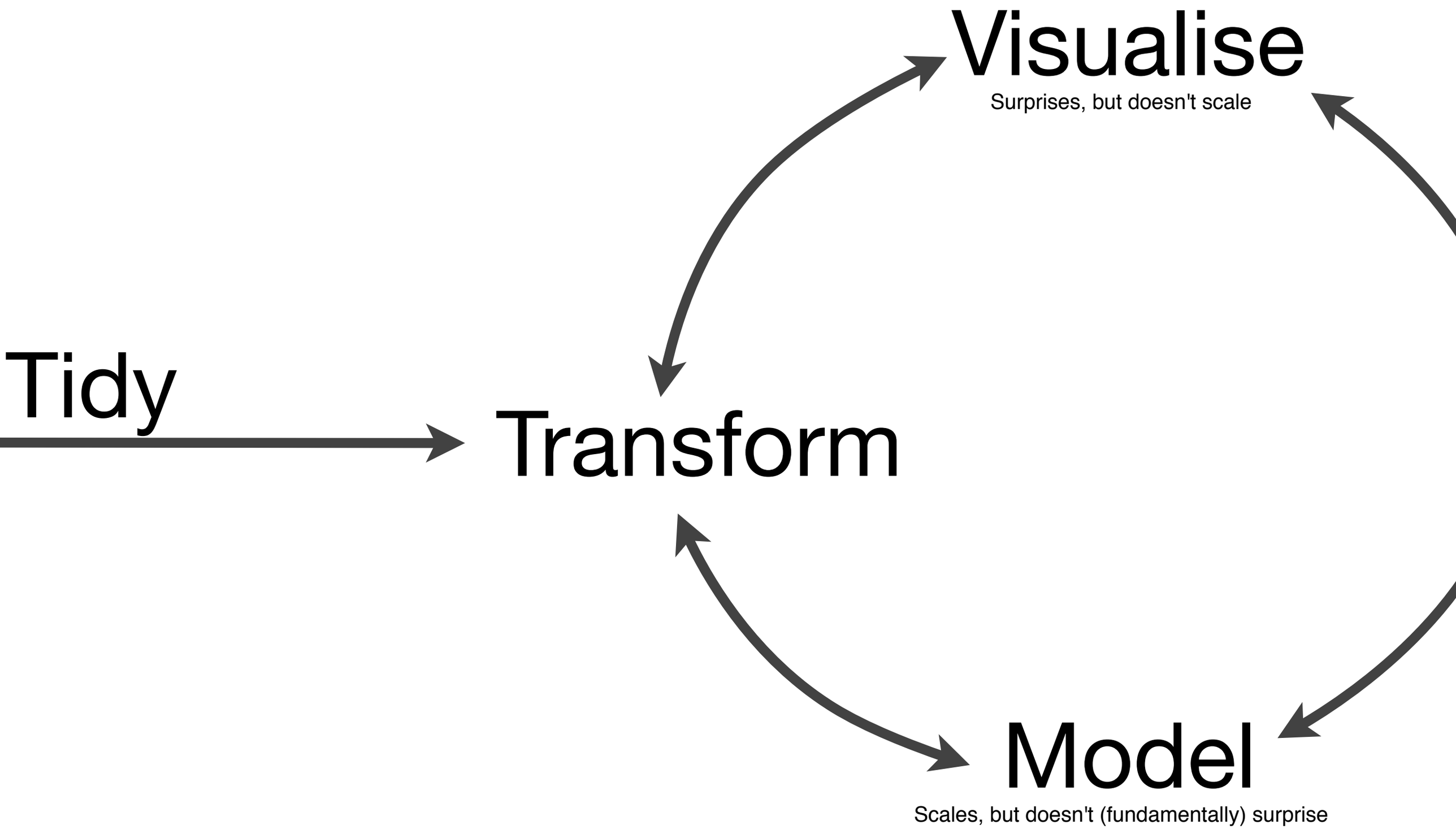

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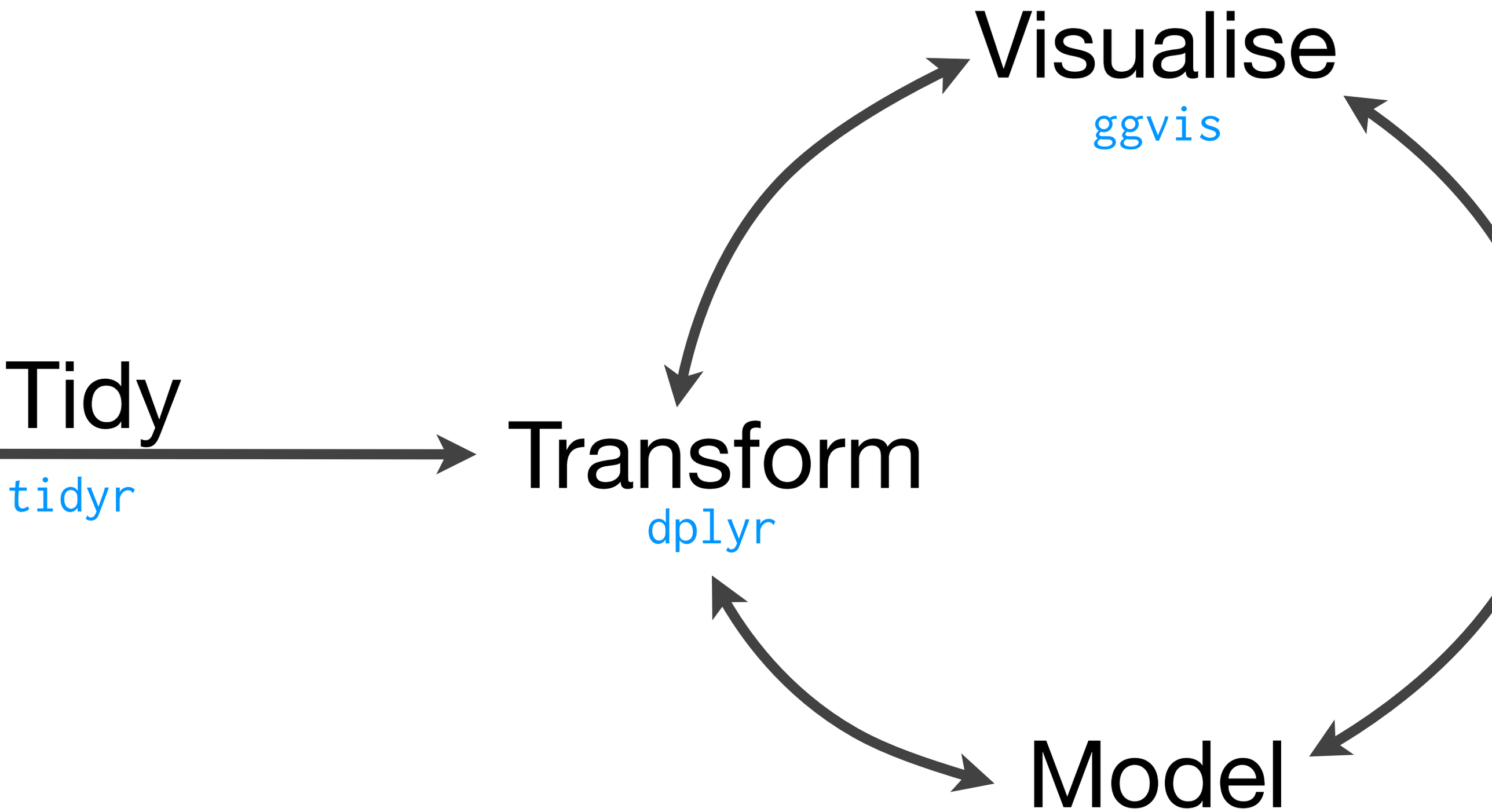

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1. Mammals
2. Verbs
3. Pipes

The bad news:
It’s going to be frustrating

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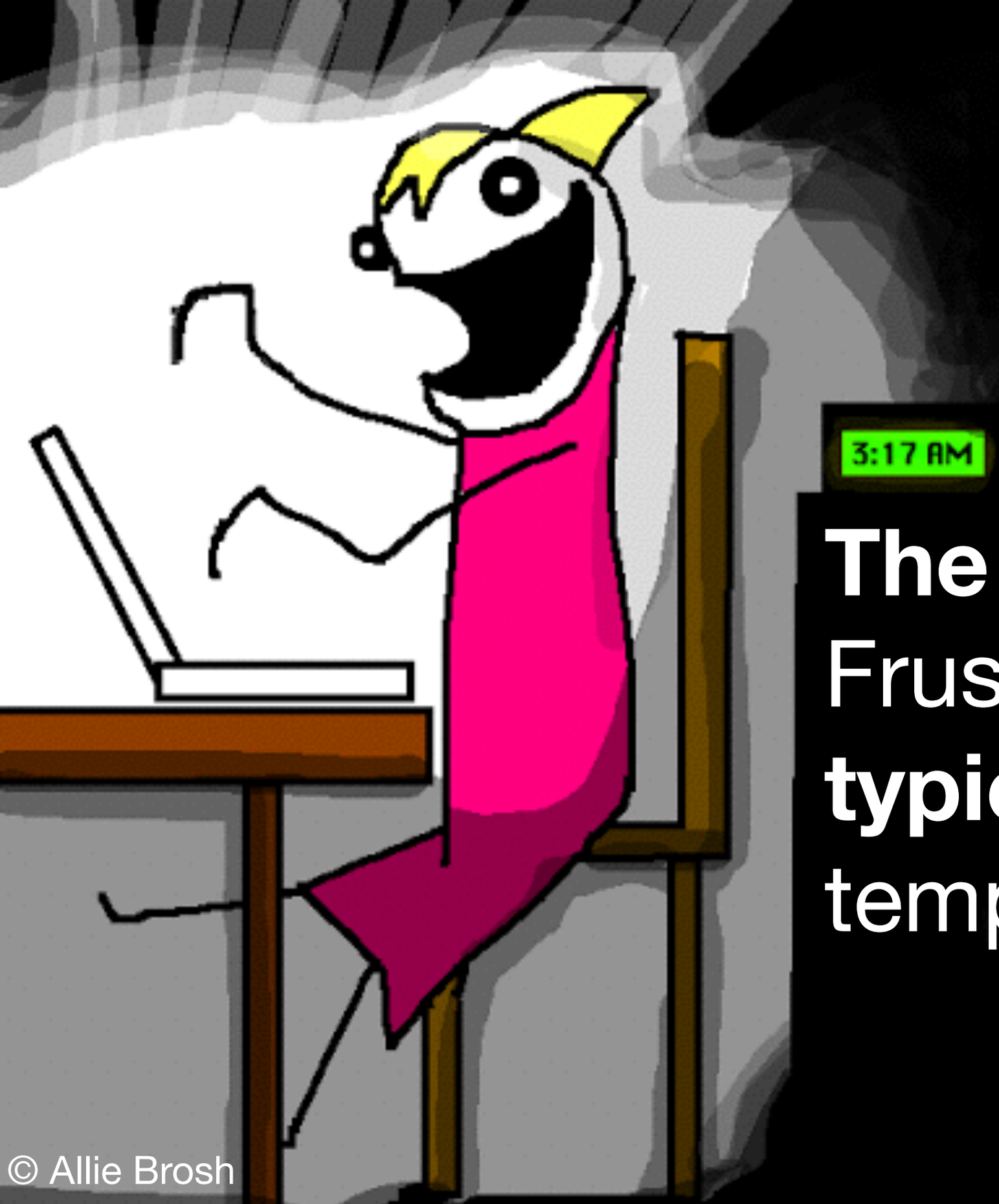
http://hyperboleandahalf.blogspot.com/2010/09/four-levels-of-social-entrapment.html



The good news:
Frustration is **typical** and temporary

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http://hyperboleandahalf.blogspot.com/2010/06/this-is-why-ill-never-be-adult.html

Rstudio projects

- Isolate code and results from different projects. Restart where you left off.
- Double-click `dplyr-intro.Rproj` file to open. (One R file for each section)
- (If you don't use RStudio, just change working directories)

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PanTHERIA mammals data

Jones, K.E., *et al*. PanTHERIA: a species-level database of life history, ecology, and geography of extant and recently extinct mammals. Ecology 90:2648. <http://esapubs.org/archive/ecol/E090/184/>

```
library(dplyr)
source("1-data.R")

mammals
glimpse(mammals)
```

dplyr verbs

select

```
df <- data.frame(
  color = c("blue", "black", "blue", "blue", "black"),
  value = 1:5)
```

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df

color	value
blue	1
black	2
blue	3
blue	4
black	5

→

color
blue
black
blue
blue
black

```
select(df, color)
```

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df

color	value
blue	1
black	2
blue	3
blue	4
black	5

→

value
1
2
3
4
5

```
select(df, -color)
```

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Read `?select`

What are 3 different ways you could select columns from `mammals`?

filter

df

color	value
blue	1
black	2
blue	3
blue	4
black	5

→

color	value
blue	1
blue	3
blue	4

```
filter(df, color == "blue")
```

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df

color	value
blue	1
black	2
blue	3
blue	4
black	5

→

color	value
blue	1
blue	4

```
filter(df, value %in% c(1, 4))
```

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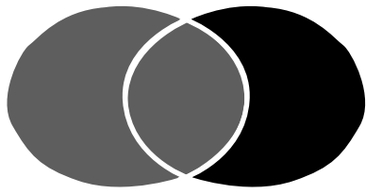
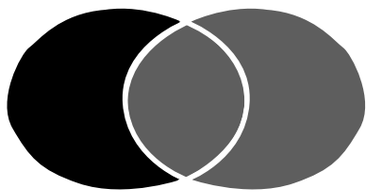
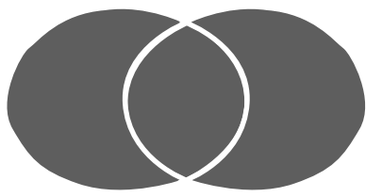
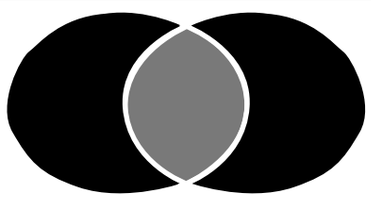
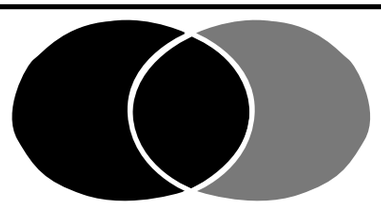
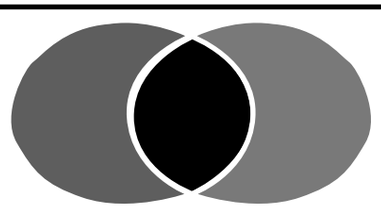
	a
	b
	a	b
	a & b
	a & !b
	xor(a, b)

```
x > 1
x >= 1
x < 1
x <= 1
x != 1
x == 1
x %in% ("a", "b")
```

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1. Which mammals are heavier than 10,000 kg (1e7 g)?
2. Which mammals from the order Carnivora weigh less than 200g?

arrange

df

color	value
4	1
1	2
5	3
3	4
2	5

→

color	value
1	2
2	5
3	4
4	1
5	3

```
arrange(df, color)
```

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df

color	value
4	1
1	2
5	3
3	4
2	5

→

color	value
5	3
4	1
3	4
2	5
1	2

```
arrange(df, desc(color))
```

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1. Arrange mammals from small to large body mass.
2. Arrange mammals from large to small body mass.
3. Arrange mammals from small to large body mass within taxonomic order.

mutate

df

color	value
blue	1
black	2
blue	3
blue	4
black	5

→

color	value	double
blue	1	2
black	2	4
blue	3	6
blue	4	8
black	5	10

```
mutate(df, double = 2 * value)
```

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df

color	value
blue	1
black	2
blue	3
blue	4
black	5

→

color	value	double	quadruple
blue	1	2	4
black	2	4	8
blue	3	6	12
blue	4	8	16
black	5	10	20

```
mutate(df, double = 2 * value,
    quadruple = 2 * double)
```

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1. Make a new column with mass per body length.
2. Try making one column in g/mm and another in kg/mm.

summarise

(with group_by)

df

color	value
blue	1
black	2
blue	3
blue	4
black	5

→

total
15

```
summarise(df, total = sum(value))
```

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df

color	value
blue	1
black	2
blue	3
blue	4
black	5

→

color	total
blue	8
black	7

```
by_color <- group_by(df, color)
summarise(by_color, total = sum(value))
```

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Summary functions

- `min(x), median(x), max(x), quantile(x, p)`
- `n(), n_distinct(), sum(x), mean(x)`
- `sum(x > 10), mean(x > 10)`
- `sd(x), var(x), iqr(x), mad(x)`

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1. What is the mean adult body mass?
2. What is the mean adult body mass by taxonomic order?

Data pipelines

$$\% > \%$$

```
f(data, …)
```

```
data %>% f(…)
```

try pronouncing %>% “then”

https://twitter.com/romain_francois/status/511791664570970112

https://twitter.com/hadleywickham/status/494875052467167232

https://twitter.com/yokkuns/status/505679441381433344

```
coffee %>%
grind(as="espresso") %>%
brew %>%
increase_productivity(by="drinking")
```

https://twitter.com/stefanbache/status/511911497346584576

```
increase_productivity(
  brew(
    grind(coffee,
          as="espresso")
    ),
  by="drinking
)
```

```
x <- c(1, 2, 3)
x %>% max
x %>% plot
x %>% sum(4)
```

1. Pipe mammals to the arrange function to sort by body mass.
2. Using pipes: Find the species with the highest mass to length ratio, sort by decreasing body-mass ratio, and select this new column.
3. Using pipes: What taxonomic orders have a median litter size greater than 3?

More information

https://github.com/hadley/dplyr

http://cran.r-project.org/web/packages/dplyr/vignettes/introduction.html

https://github.com/smbache/magrittr

http://cran.r-project.org/web/packages/magrittr/vignettes/magrittr.html