JOINING DATA IN R WITH DATA.TABLE

Welcome to the course

Scott Ritchie
Postdoctoral Researcher in Systems Genomics

Joining data.tables

- Combine information from two data.tables into a single data.table

demographics:

name	gender	age
Trey	NA	54
Matthew	M	43
Angela	F	39

+

shipping:

name	address
Trey	12 High street
Matthew	7 Mill road
Angela	33 Pacific boulevard

→

name	gender	age	address
Trey	NA	54	12 High street
Matthew	M	43	7 Mill road
Angela	F	39	33 Pacific boulevard

Course overview

- Chapter 1: Joining data with `merge()`
- Chapter 2: Joins in the `data.table` workflow
- Chapter 3: Troubleshooting joins
- Chapter 4: Concatenating and reshaping `data.table`s

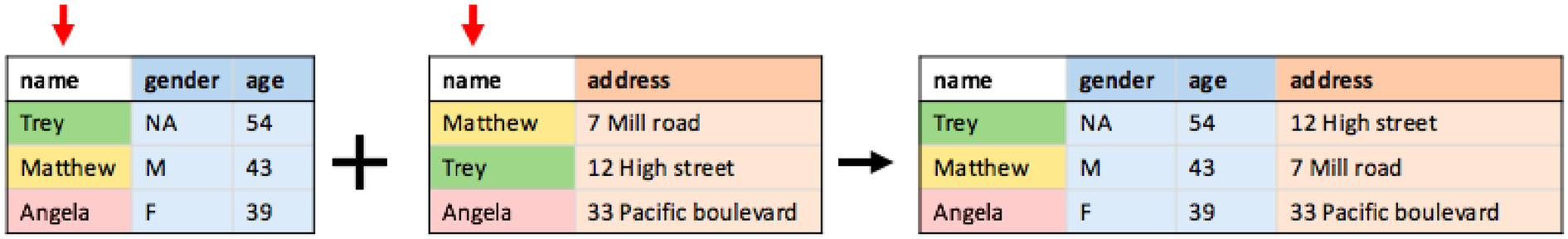
Table keys

Columns that link information across two tables

```
library(data.table)

demographics <- data.table(name   = c("Trey", "Matthew", "Angela"),
                           gender = c(NA, "M", "F"),
                           age    = c(54, 43, 39))

shipping <- data.table(name    = c("Matthew", "Trey", "Angela"),
                       address = c("7 Mill road", "12 High street",
                                   "33 Pacific boulevard"))
```



name	gender	age
Trey	NA	54
Matthew	M	43
Angela	F	39

+

name	address
Matthew	7 Mill road
Trey	12 High street
Angela	33 Pacific boulevard

→

name	gender	age	address
Trey	NA	54	12 High street
Matthew	M	43	7 Mill road
Angela	F	39	33 Pacific boulevard

Inspecting data.tables in your R session

The `tables()` function will show you all `data.tables` loaded in your R session

```
tables()

            NAME NROW NCOL MB             COLS KEY
1: demographics    3    3  0 name,gender,age
2:     shipping    3    2  0    name,address
Total: 0MB
```

Inspecting data.tables in your R session

The `str()` will show you the type of each column in a single `data.table`

```
str(demographics)

Classes ‘data.table’ and 'data.frame':    3 obs. of  3 variables:
 $ name  : chr  "Trey" "Matthew" "Angela"
 $ gender: chr  NA "M" "F"
 $ age   : num  54 43 39
 - attr(*, ".internal.selfref")=<externalptr>
```

Inspecting data.tables in your R session

Printing a `data.table`

```
demographics_all

         name sex age
  1:     Trey  NA  54
  2:  Matthew   M  43
  3:   Angela   F  39
  4: Michelle   F  63
  5:  Mohamed   M  26
 ---
102:  Patrick   M  27
103:      Wei   F  41
104:     Adam   M  33
105:  Somchai   M  53
106:     Alma   F  19
```

JOINING DATA IN R WITH DATA.TABLE

Let's practice!

JOINING DATA IN R WITH DATA.TABLE

The merge function

Scott Ritchie
Postdoctoral Researcher in Systems Genomics

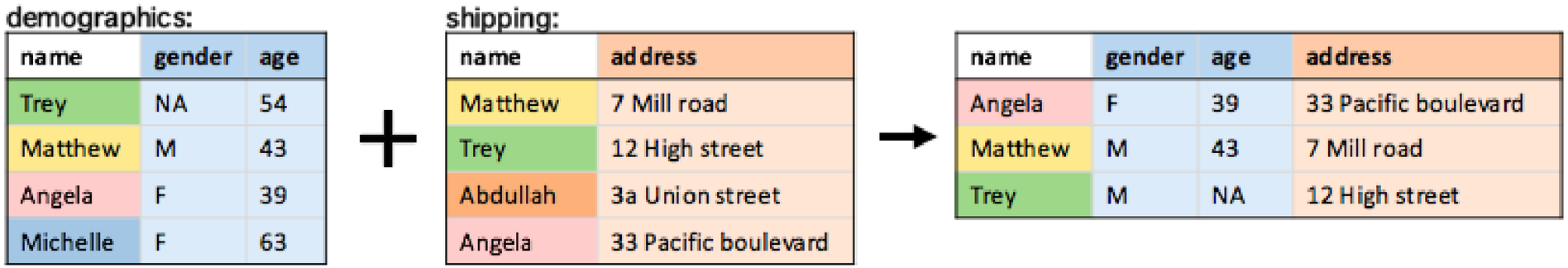
Joins

- Concept of joins come from database query languages (e.g. SQL).
- Four standard joins:
  - inner
  - full
  - left
  - right
- All four can be done using `merge()`

Inner join

Only keep observations that have information in both `data.tables`

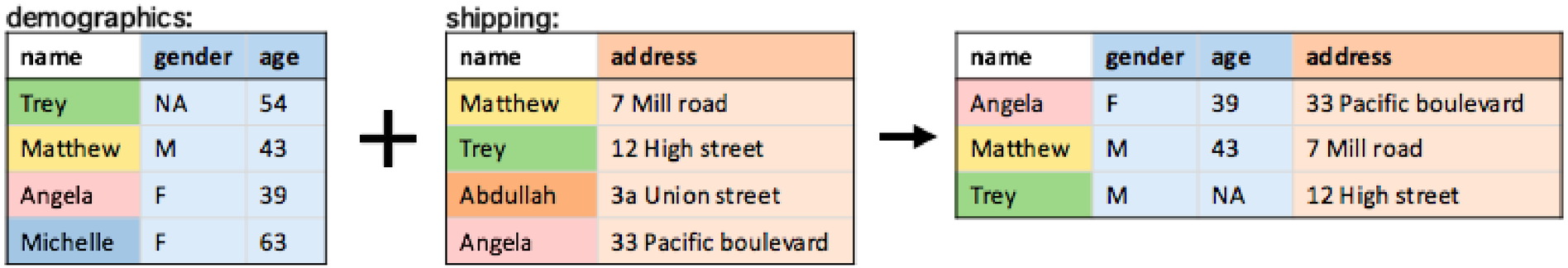
```
merge(x = demographics, y = shipping,
      by.x = "name", by.y = "name")
```



The by argument

Use `by` to avoid repeated typing of the same column name

```
merge(x = demographics, y = shipping,
      by = "name")
```



demographics:

name	gender	age
Trey	NA	54
Matthew	M	43
Angela	F	39
Michelle	F	63

+

shipping:

name	address
Matthew	7 Mill road
Trey	12 High street
Abdullah	3a Union street
Angela	33 Pacific boulevard

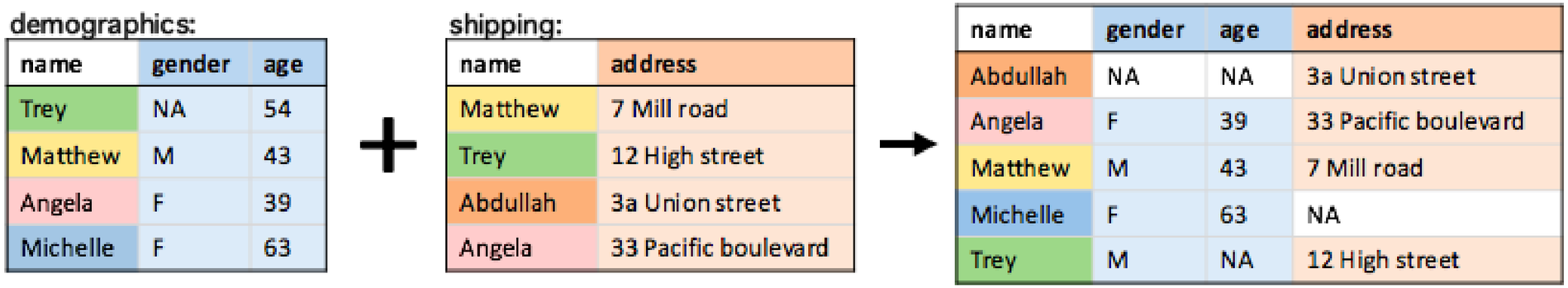
→

name	gender	age	address
Angela	F	39	33 Pacific boulevard
Matthew	M	43	7 Mill road
Trey	M	NA	12 High street

Full join

Keep all observations that are in either `data.table`

```
merge(x = demographics, y = shipping,
      by = "name", all = TRUE)
```



demographics:

name	gender	age
Trey	NA	54
Matthew	M	43
Angela	F	39
Michelle	F	63

+

shipping:

name	address
Matthew	7 Mill road
Trey	12 High street
Abdullah	3a Union street
Angela	33 Pacific boulevard

→

name	gender	age	address
Abdullah	NA	NA	3a Union street
Angela	F	39	33 Pacific boulevard
Matthew	M	43	7 Mill road
Michelle	F	63	NA
Trey	M	NA	12 High street

JOINING DATA IN R WITH DATA.TABLE

Let's practice!

JOINING DATA IN R WITH DATA.TABLE

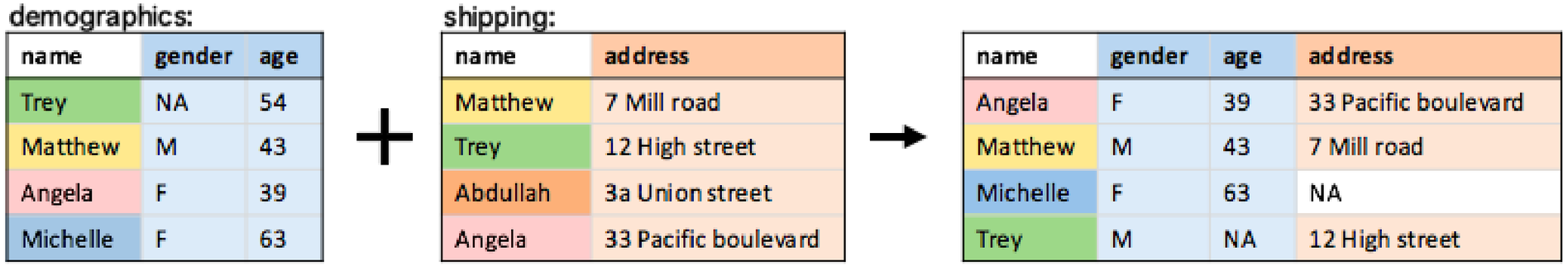
Left and right joins

Scott Ritchie
Postdoctoral Researcher in Systems Genomics

Left joins

Add information **from** the right `data.table` **to** the left `data.table`

```
merge(x = demographics, y = shipping, by = "name", all.x = TRUE)
```



Right joins

Add information **from** the left `data.table` to the **right** `data.table`

```
merge(x = demographics, y = shipping, by = "name", all.y = TRUE)
```

demographics:

name	gender	age
Trey	NA	54
Matthew	M	43
Angela	F	39
Michelle	F	63

+

shipping:

name	address
Matthew	7 Mill road
Trey	12 High street
Abdullah	3a Union street
Angela	33 Pacific boulevard

→

name	gender	age	address
Abdullah	NA	NA	3a Union street
Angela	F	39	33 Pacific boulevard
Matthew	M	43	7 Mill road
Trey	M	NA	12 High street

Right joins - Left joins

```
# Right join
merge(x = demographics, y = shipping, by = "name", all.y = TRUE)

# Same as
merge(x = shipping, y = demographics, by = "name", all.x = TRUE)
```

Default values

- Default values for `all`, `all.x` and `all.y` are `FALSE` in the `merge()` function
- Look up function argument defaults using `help("merge")`

Exercise instructions

Left **join** `shipping` **to** `demographics`:

```
merge(demographics, shipping by = "name", all.x = TRUE)
```

Right **join** `shipping` **to** `demographics`:

```
merge(demographics, shipping, by = "name", all.y = TRUE)
```

JOINING DATA IN R WITH DATA.TABLE

Let's practice!