WORKING WITH DATA IN THE TIDYVERSE

# Cast Column Types

Alison Hill
Professor & Data Scientist

## Why bother?

## The readr package

```
library(readr) # once per work session
```

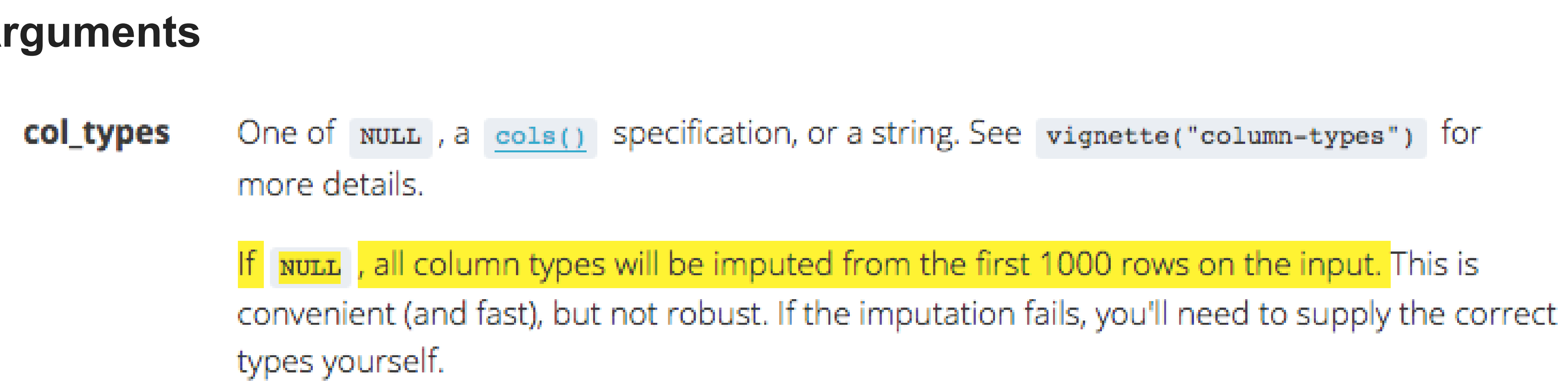
[1] http://readr.tidyverse.org

## read_csv

```
?read_csv
```

```
read_csv(file, col_names = TRUE, col_types = NULL,
  locale = default_locale(), na = c("", "NA"), quoted_na = TRUE,
  quote = "\"", comment = "", trim_ws = TRUE, skip = 0, n_max = Inf,
  guess_max = min(1000, n_max), progress = show_progress())
```

## The col_types argument



### Arguments

**col_types** One of `NULL`, a `cols()` specification, or a string. See `vignette("column-types")` for more details.

If `NULL`, all column types will be imputed from the first 1000 rows on the input. This is convenient (and fast), but not robust. If the imputation fails, you'll need to supply the correct types yourself.

## bakers_tame

```
bakers_tame

# A tibble: 10 x 6
   series baker         age num_episodes aired_us last_date_uk
    <dbl> <chr>       <dbl>        <dbl> <lgl>    <date>
 1      3. Natasha      36.           1. FALSE    2012-08-14
 2      3. Sarah-Jane   28.           7. FALSE    2012-09-25
 3      3. Cathryn      27.           8. FALSE    2012-10-02
 4      4. Lucy         38.           2. TRUE     2013-08-27
 5      4. Howard       51.           6. TRUE     2013-09-24
 6      4. Beca         31.           9. TRUE     2013-10-15
 7      4. Kimberley    30.          10. TRUE     2013-10-22
 8      5. Enwezor      39.           2. TRUE     2014-08-13
 9      5. Jordan       32.           3. TRUE     2014-08-20
10      5. Iain         31.           4. TRUE     2014-08-27
```

## Tame versus raw bakers

```
bakers_tame %>% dplyr::slice(1:4)

# A tibble: 4 x 6
  series baker          age num_episodes aired_us last_date_uk
   <dbl> <chr>        <dbl>        <dbl> <lgl>    <date>
1     3. Natasha        36.           1. FALSE    2012-08-14
2     3. Sarah-Jane     28.           7. FALSE    2012-09-25
3     3. Cathryn        27.           8. FALSE    2012-10-02
4     4. Lucy           38.           2. TRUE     2013-08-27
```

```
bakers_raw %>% dplyr::slice(1:4)

# A tibble: 4 x 6
  series baker      age      num_episodes aired_us last_date_uk
   <dbl> <chr>      <chr>           <dbl>    <dbl> <chr>
1     3. Natasha    36 years           1.       0. 14 August 2012
2     3. Sarah-Jane 28 years           7.       0. 25 September 2012
3     3. Cathryn    27 years           8.       0. 2 October 2012
4     4. Lucy       38 years           2.       1. 27 August 2013
```

## parse_number

```
bakers_raw %>% dplyr::slice(1:4)

# A tibble: 4 x 6
  series baker       age       num_episodes aired_us last_date_uk
   <dbl> <chr>       <chr>            <dbl>    <dbl> <chr>
1     3. Natasha     36 years            1.       0. 14 August 2012
2     3. Sarah-Jane 28 years            7.       0. 25 September 2012
3     3. Cathryn     27 years            8.       0. 2 October 2012
4     4. Lucy        38 years            2.       1. 27 August 2013
```

```
parse_number("36 years")

[1] 36
```

## From parsing to casting

```
parse_number("36 years")

[1] 36
```

```
bakers_tame <- read_csv(file = "bakers.csv",
                        col_types = cols(age = col_number())
                       )

bakers_tame %>% slice(1:4)

# A tibble: 4 x 6
  series baker          age num_episodes aired_us last_date_uk
   <dbl> <chr>        <dbl>        <dbl> <lgl>    <chr>
1      3. Natasha       36.           1. FALSE    14 August 2012
2      3. Sarah-Jane    28.           7. FALSE    25 September 2012
3      3. Cathryn       27.           8. FALSE    2 October 2012
4      4. Lucy          38.           2. TRUE     27 August 2013
```

## parse_date

```
bakers_tame %>% dplyr::slice(1:4)

# A tibble: 4 x 6
  series baker         age num_episodes aired_us last_date_uk
   <dbl> <chr>       <dbl>        <dbl> <lgl>    <chr>
1     3. Natasha       36.           1. FALSE    14 August 2012
2     3. Sarah-Jane    28.           7. FALSE    25 September 2012
3     3. Cathryn       27.           8. FALSE    2 October 2012
4     4. Lucy          38.           2. TRUE     27 August 2013
```

```
?parse_date
```

## Format the day

`parse_datetime()` recognises the following format specifications:

- Year: `"%Y"` (4 digits). `"%y"` (2 digits); 00-69 -> 2000-2069, 70-99 -> 1970-1999.
- Month: `"%m"` (2 digits), `"%b"` (abbreviated name in current locale), `"%B"` (full name in current locale).
- Day: `"%d"` (2 digits), `"%e"` (optional leading space)

```
parse_date("14 August 2012", format = "%d ___ ___")
```

## Format the month

`parse_datetime()` recognises the following format specifications:

- Year: `"%Y"` (4 digits). `"%y"` (2 digits); 00-69 -> 2000-2069, 70-99 -> 1970-1999.
- Month: `"%m"` (2 digits), `"%b"` (abbreviated name in current locale), `"%B"` (full name in current locale).
- Day: `"%d"` (2 digits), `"%e"` (optional leading space)

```
parse_date("14 August 2012", format = "%d %B ___")
```

## Format the year

`parse_datetime()` recognises the following format specifications:

- Year: `"%Y"` (4 digits). `"%y"` (2 digits); 00-69 -> 2000-2069, 70-99 -> 1970-1999.
- Month: `"%m"` (2 digits), `"%b"` (abbreviated name in current locale), `"%B"` (full name in current locale).
- Day: `"%d"` (2 digits), `"%e"` (optional leading space)

```
parse_date("14 August 2012", format = "%d %B %Y")

[1] "2012-08-14"
```

## Parse & cast last_date_uk

```
bakers <- read_csv("bakers.csv",
                   col_types = cols(
                     last_date_uk = col_date(format = "%d %B %Y")
                   ))

# A tibble: 10 x 6
   series baker         age num_episodes aired_us last_date_uk
    <dbl> <chr>       <dbl>        <dbl> <lgl>    <date>
 1     3. Natasha       36.           1. FALSE    2012-08-14
 2     3. Sarah-Jane    28.           7. FALSE    2012-09-25
 3     3. Cathryn       27.           8. FALSE    2012-10-02
 4     4. Lucy          38.           2. TRUE     2013-08-27
 5     4. Howard        51.           6. TRUE     2013-09-24
 6     4. Beca          31.           9. TRUE     2013-10-15
 7     4. Kimberley     30.          10. TRUE     2013-10-22
 8     5. Enwezor       39.           2. TRUE     2014-08-13
 9     5. Jordan        32.           3. TRUE     2014-08-20
10     5. Iain          31.           4. TRUE     2014-08-27
```

## Parse functions in readr

| Type | dplyr::glimpse() | readr::parse_*() | readr::col_*() |
|---|---|---|---|
| Logical | <lgl> | parse_logical() | col_logical() |
| Numeric | <int> *or* <dbl> | parse_number() | col_number() |
| Character | <chr> | parse_character() | col_character() |
| Factor | <fct> | parse_factor(levels) | col_factor(levels) |
| Date | <date> | parse_date(format) | col_date(format) |

WORKING WITH DATA IN THE TIDYVERSE

## Let's get to work!

WORKING WITH DATA IN THE TIDYVERSE

# Recode Values

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Professor & Data Scientist

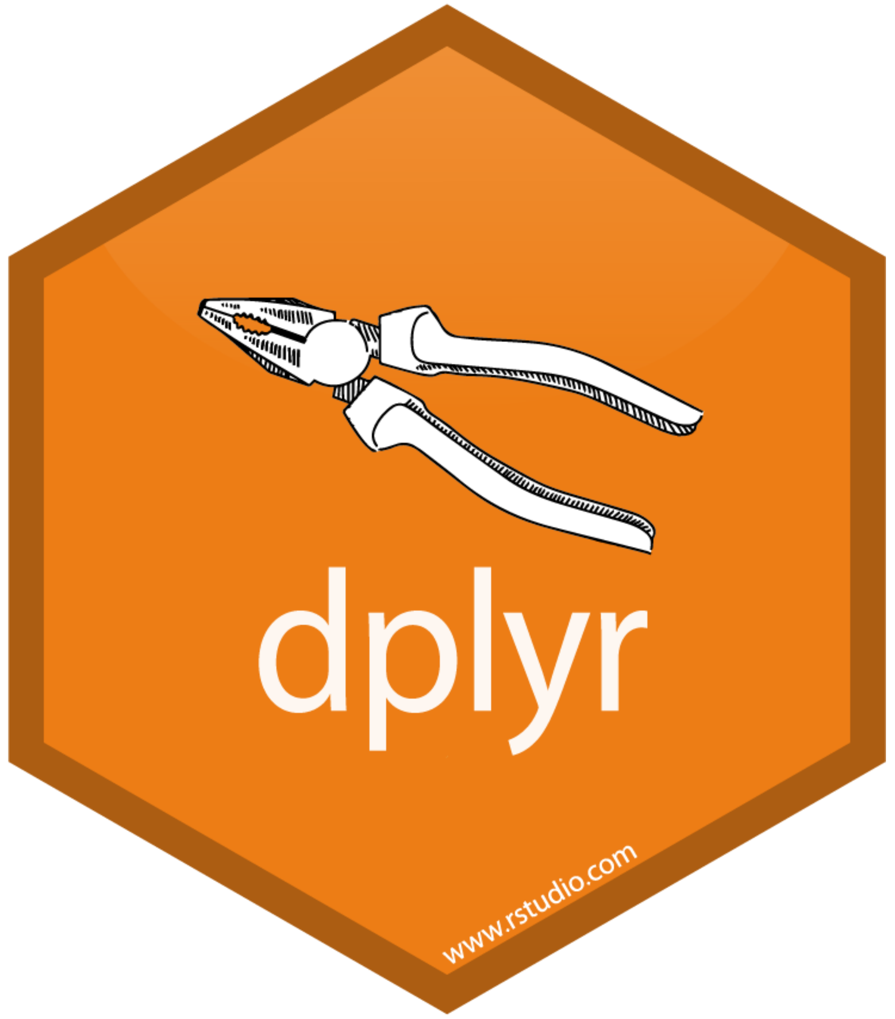
## Find-and-replace

```
bakeoff %>%
    distinct(result)

# A tibble: 6 x 1
  result
  <fct>
1 IN
2 OUT
3 RUNNER UP
4 WINNER
5 SB
6 LEFT
```

```
bakeoff %>%
    distinct(result)

# A tibble: 6 x 1
  result
  <fct>
1 IN
2 OUT
3 RUNNER UP
4 WINNER
5 STAR BAKER
6 LEFT
```

## The dplyr package

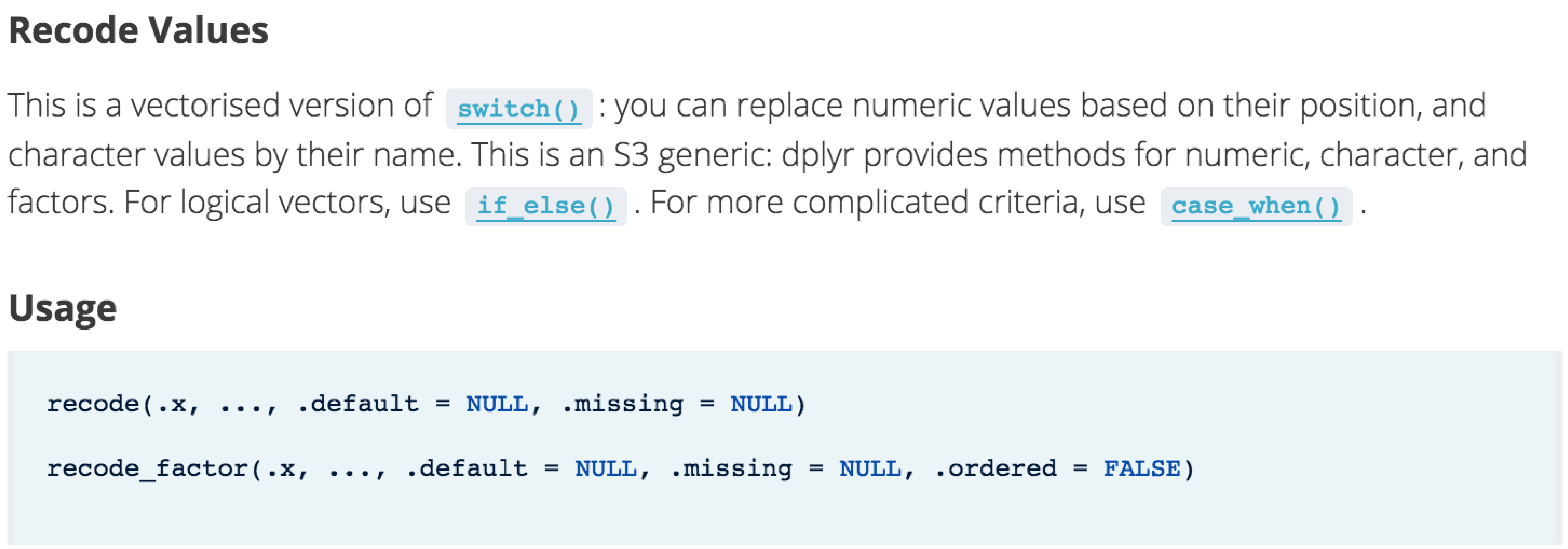
```
library(dplyr) # once per work session
```



[1] http://dplyr.tidyverse.org

## Recode: Usage

```
?recode
```



### Recode Values

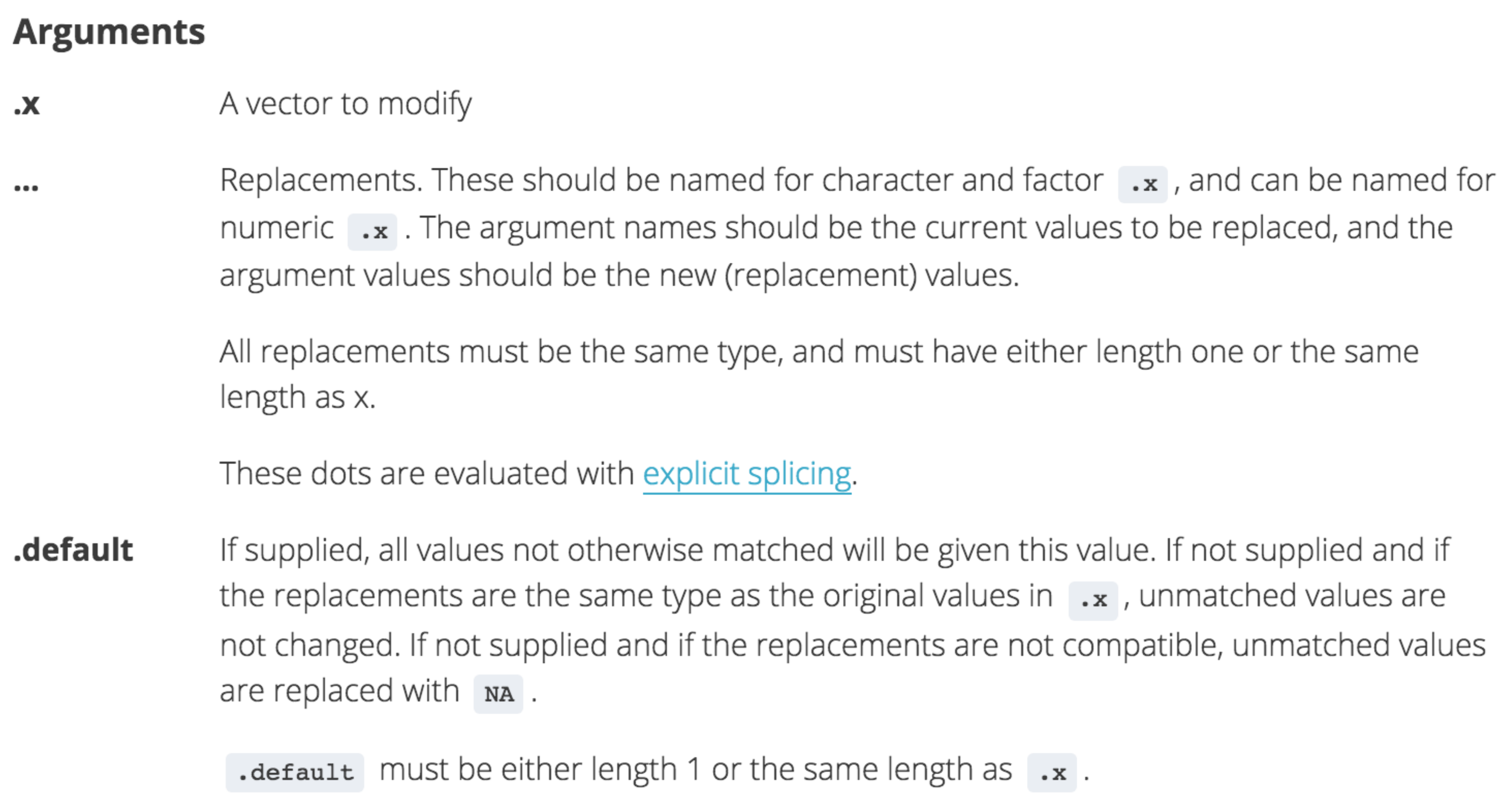
This is a vectorised version of `switch()`: you can replace numeric values based on their position, and character values by their name. This is an S3 generic: dplyr provides methods for numeric, character, and factors. For logical vectors, use `if_else()`. For more complicated criteria, use `case_when()`.

### Usage

```
recode(.x, ..., .default = NULL, .missing = NULL)

recode_factor(.x, ..., .default = NULL, .missing = NULL, .ordered = FALSE)
```

## Recode: Arguments

```
?recode
```



### Arguments

| | |
|---|---|
| **.x** | A vector to modify |
| **...** | Replacements. These should be named for character and factor `.x`, and can be named for numeric `.x`. The argument names should be the current values to be replaced, and the argument values should be the new (replacement) values.<br><br>All replacements must be the same type, and must have either length one or the same length as x.<br><br>These dots are evaluated with explicit splicing. |
| **.default** | If supplied, all values not otherwise matched will be given this value. If not supplied and if the replacements are the same type as the original values in `.x`, unmatched values are not changed. If not supplied and if the replacements are not compatible, unmatched values are replaced with `NA`.<br><br>`.default` must be either length 1 or the same length as `.x`. |

## Youngest bakers

```
young_bakers

# A tibble: 10 x 4
   baker       age occupation                            student
   <chr>     <dbl> <chr>                                   <dbl>
 1 Flora       19. art gallery assistant                      0.
 2 Julia       21. aviation broker                            0.
 3 Benjamina   23. teaching assistant                         0.
 4 Martha      17. student                                    1.
 5 Jason       19. civil engineering student                  1.
 6 Liam        19. student                                    1.
 7 Ruby        20. history of art and philosophy student      1.
 8 Michael     20. student                                    1.
 9 James       21. medical student                            2.
10 John        23. law student                                2.
```

## Recode student

```
young_bakers %>%
  mutate(stu_label = recode(student, `0` = "other",
                                  .default = "student"))

# A tibble: 10 x 5
   baker       age occupation                            student stu_label
   <chr>      <dbl> <chr>                                  <dbl> <chr>
 1 Flora       19. art gallery assistant                      0. other
 2 Julia       21. aviation broker                            0. other
 3 Benjamina   23. teaching assistant                         0. other
 4 Martha      17. student                                    1. student
 5 Jason       19. civil engineering student                  1. student
 6 Liam        19. student                                    1. student
 7 Ruby        20. history of art and philosophy student      1. student
 8 Michael     20. student                                    1. student
 9 James       21. medical student                            2. student
10 John        23. law student                                2. student
```

## Recode with NA

```
young_bakers %>%
  mutate(stu_label = recode(student, `0` = NA_character_,
                                .default = "student"))

# A tibble: 10 x 5
   baker        age occupation                              student stu_label
   <chr>      <dbl> <chr>                                     <dbl> <chr>
 1 Flora        19. art gallery assistant                        0. NA
 2 Julia        21. aviation broker                              0. NA
 3 Benjamina    23. teaching assistant                           0. NA
 4 Martha       17. student                                      1. student
 5 Jason        19. civil engineering student                    1. student
 6 Liam         19. student                                      1. student
 7 Ruby         20. history of art and philosophy student        1. student
 8 Michael      20. student                                      1. student
 9 James        21. medical student                              2. student
10 John         23. law student                                  2. student
```

## Recode multiple values

```
young_bakers %>%
  mutate(stu_label = recode(student, `0` = NA_character_,
                            `2` = "law/med",
                            .default = "student"))

# A tibble: 10 x 5
   baker       age occupation                             student stu_label
   <chr>     <dbl> <chr>                                    <dbl> <chr>
 1 Flora       19. art gallery assistant                       0. NA
 2 Julia       21. aviation broker                             0. NA
 3 Benjamina   23. teaching assistant                          0. NA
 4 Martha      17. student                                     1. student
 5 Jason       19. civil engineering student                   1. student
 6 Liam        19. student                                     1. student
 7 Ruby        20. history of art and philosophy student       1. student
 8 Michael     20. student                                     1. student
 9 James       21. medical student                             2. law/med
10 John        23. law student                                 2. law/med
```

## Convert to NA only

```
young_bakers %>%
  mutate(student = na_if(student, 0))

# A tibble: 10 x 4
   baker       age occupation                              student
   <chr>     <dbl> <chr>                                     <dbl>
 1 Flora       19. art gallery assistant                       NA
 2 Julia       21. aviation broker                             NA
 3 Benjamina   23. teaching assistant                          NA
 4 Martha      17. student                                      1.
 5 Jason       19. civil engineering student                    1.
 6 Liam        19. student                                      1.
 7 Ruby        20. history of art and philosophy student        1.
 8 Michael     20. student                                      1.
 9 James       21. medical student                              2.
10 John        23. law student                                  2.
```

WORKING WITH DATA IN THE TIDYVERSE

# Let's practice!

WORKING WITH DATA IN THE TIDYVERSE

## Select Variables

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Professor & Data Scientist

## Youngest bakers

```
young_bakers2

# A tibble: 5 x 5
  baker   star_baker technical_winner series_winner series_runner_up
  <chr>        <dbl>            <dbl>         <dbl>            <dbl>
1 Martha          0.               2.            0.               0.
2 Flora           0.               1.            0.               0.
3 Jason           2.               1.            0.               0.
4 Ruby            3.               2.            0.               1.
5 John            1.               1.            1.               0.
```

# Select

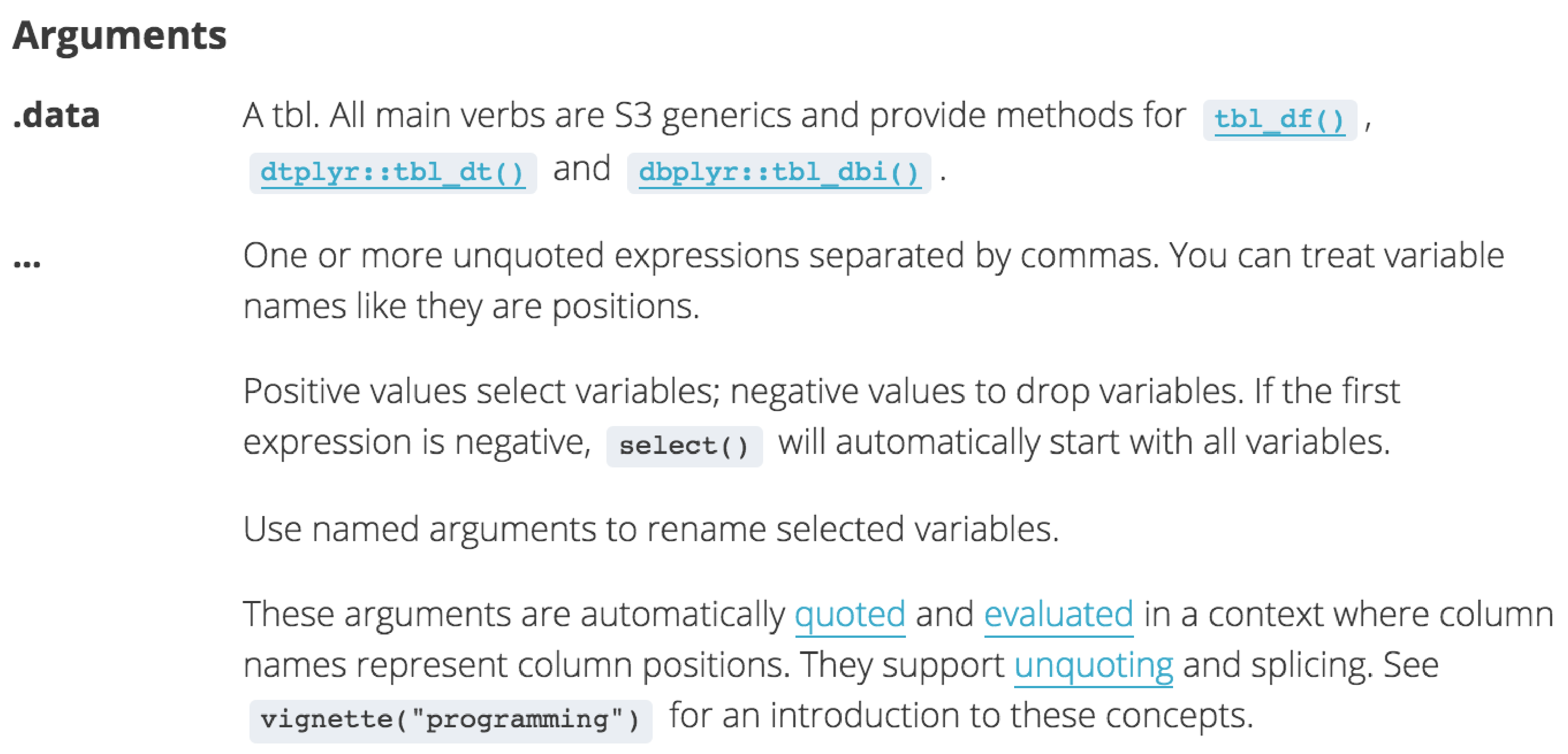
```
?select
```

## Usage

```
select(.data, ...)
```

## Select: arguments

```
?select
```



**Arguments**

**.data** A tbl. All main verbs are S3 generics and provide methods for `tbl_df()`, `dtplyr::tbl_dt()` and `dbplyr::tbl_dbi()`.

**...** One or more unquoted expressions separated by commas. You can treat variable names like they are positions.

Positive values select variables; negative values to drop variables. If the first expression is negative, `select()` will automatically start with all variables.

Use named arguments to rename selected variables.

These arguments are automatically quoted and evaluated in a context where column names represent column positions. They support unquoting and splicing. See `vignette("programming")` for an introduction to these concepts.

## Select variables

```
young_bakers2

# A tibble: 5 x 5
  baker  star_baker technical_winner series_winner series_runner_up
  <chr>       <dbl>            <dbl>         <dbl>            <dbl>
1 Martha         0.               2.            0.               0.
2 Flora          0.               1.            0.               0.
3 Jason          2.               1.            0.               0.
4 Ruby           3.               2.            0.               1.
5 John           1.               1.            1.               0.
```

```
young_bakers2 %>%
   select(baker, series_winner)

# A tibble: 5 x 2
  baker  series_winner
  <chr>          <dbl>
1 Martha            0.
2 Flora             0.
3 Jason             0.
4 Ruby              0.
5 John              1.
```

## Select a range of variables

```
young_bakers2

# A tibble: 5 x 5
  baker   star_baker technical_winner series_winner series_runner_up
  <chr>        <dbl>            <dbl>         <dbl>            <dbl>
1 Martha          0.               2.            0.               0.
2 Flora           0.               1.            0.               0.
3 Jason           2.               1.            0.               0.
4 Ruby            3.               2.            0.               1.
5 John            1.               1.            1.               0.
```

```
young_bakers2 %>%
   select(baker:technical_winner)

# A tibble: 5 x 3
  baker   star_baker technical_winner
  <chr>        <dbl>            <dbl>
1 Martha          0.               2.
2 Flora           0.               1.
3 Jason           2.               1.
4 Ruby            3.               2.
5 John            1.               1.
```

## Drop variables

```
young_bakers2

# A tibble: 5 x 5
  baker  star_baker technical_winner series_winner series_runner_up
  <chr>       <dbl>            <dbl>         <dbl>            <dbl>
1 Martha         0.               2.            0.               0.
2 Flora          0.               1.            0.               0.
3 Jason          2.               1.            0.               0.
4 Ruby           3.               2.            0.               1.
5 John           1.               1.            1.               0.
```

```
young_bakers2 %>%
   select(-technical_winner)

# A tibble: 5 x 4
  baker  star_baker series_winner series_runner_up
  <chr>       <dbl>         <dbl>            <dbl>
1 Martha         0.            0.               0.
2 Flora          0.            0.               0.
3 Jason          2.            0.               0.
4 Ruby           3.            0.               1.
5 John           1.            1.               0.
```

## Select helpers: starts_with()

```
young_bakers2

# A tibble: 5 x 5
  baker   star_baker technical_winner series_winner series_runner_up
  <chr>        <dbl>            <dbl>         <dbl>            <dbl>
1 Martha          0.               2.            0.               0.
2 Flora           0.               1.            0.               0.
3 Jason           2.               1.            0.               0.
4 Ruby            3.               2.            0.               1.
5 John            1.               1.            1.               0.
```

```
young_bakers2 %>%
   select(baker, starts_with("series"))

# A tibble: 5 x 3
  baker   series_winner series_runner_up
  <chr>           <dbl>            <dbl>
1 Martha             0.               0.
2 Flora              0.               0.
3 Jason              0.               0.
4 Ruby               0.               1.
5 John               1.               0.
```

## Select helper: ends_with()

```
young_bakers2

# A tibble: 5 x 5
  baker  star_baker technical_winner series_winner series_runner_up
  <chr>       <dbl>            <dbl>         <dbl>            <dbl>
1 Martha         0.               2.            0.               0.
2 Flora          0.               1.            0.               0.
3 Jason          2.               1.            0.               0.
4 Ruby           3.               2.            0.               1.
5 John           1.               1.            1.               0.
```

```
young_bakers2 %>%
   select(ends_with("winner"), baker)

# A tibble: 5 x 3
  technical_winner series_winner baker
             <dbl>         <dbl> <chr>
1               2.            0. Martha
2               1.            0. Flora
3               1.            0. Jason
4               2.            0. Ruby
5               1.            1. John
```

## Select helper: contains()

```
young_bakers2

# A tibble: 5 x 5
  baker  star_baker technical_winner series_winner series_runner_up
  <chr>       <dbl>            <dbl>         <dbl>            <dbl>
1 Martha         0.               2.            0.               0.
2 Flora          0.               1.            0.               0.
3 Jason          2.               1.            0.               0.
4 Ruby           3.               2.            0.               1.
5 John           1.               1.            1.               0.
```

```
young_bakers2 %>%
   select(contains("bake"))

# A tibble: 5 x 2
  baker  star_baker
  <chr>       <dbl>
1 Martha         0.
2 Flora          0.
3 Jason          2.
4 Ruby           3.
5 John           1.
```

## Combine helper functions

```
young_bakers2

# A tibble: 5 x 5
  baker  star_baker technical_winner series_winner series_runner_up
  <chr>       <dbl>            <dbl>         <dbl>            <dbl>
1 Martha         0.               2.            0.               0.
2 Flora          0.               1.            0.               0.
3 Jason          2.               1.            0.               0.
4 Ruby           3.               2.            0.               1.
5 John           1.               1.            1.               0.
```

```
young_bakers2 %>%
   select(contains("bake"), starts_with("series"))

# A tibble: 5 x 4
  baker  star_baker series_winner series_runner_up
  <chr>       <dbl>         <dbl>            <dbl>
1 Martha         0.            0.               0.
2 Flora          0.            0.               0.
3 Jason          2.            0.               0.
4 Ruby           3.            0.               1.
5 John           1.            1.               0.
```

# Filter versus select

```
young_bakers2 %>%
   filter(series_winner == 1 | series_runner_up == 1)

# A tibble: 2 x 5
  baker star_baker technical_winner series_winner series_runner_up
  <chr>      <dbl>            <dbl>         <dbl>            <dbl>
1 Ruby          3.               2.            0.               1.
2 John          1.               1.            1.               0.

young_bakers2 %>%
   select(baker, starts_with("series"))

# A tibble: 5 x 3
  baker  series_winner series_runner_up
  <chr>          <dbl>            <dbl>
1 Martha            0.               0.
2 Flora             0.               0.
3 Jason             0.               0.
4 Ruby              0.               1.
5 John              1.               0.
```

WORKING WITH DATA IN THE TIDYVERSE

# Let's practice!

WORKING WITH DATA IN THE TIDYVERSE

# Tame Variable Names

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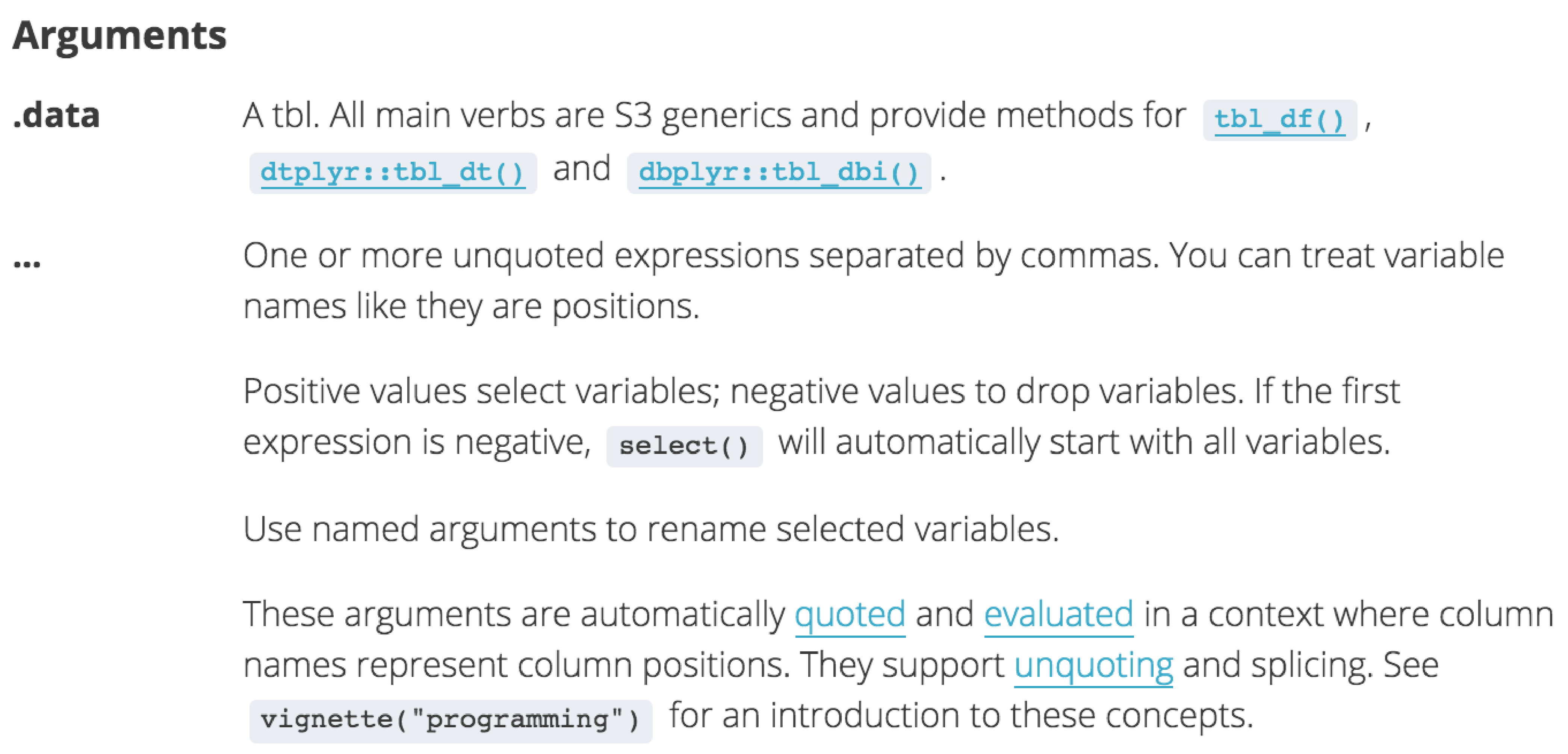
Professor & Data Scientist

## Select: arguments

```
?select
```



### Arguments

| | |
|---|---|
| **.data** | A tbl. All main verbs are S3 generics and provide methods for `tbl_df()`, `dtplyr::tbl_dt()` and `dbplyr::tbl_dbi()`. |
| **...** | One or more unquoted expressions separated by commas. You can treat variable names like they are positions.<br><br>Positive values select variables; negative values to drop variables. If the first expression is negative, `select()` will automatically start with all variables.<br><br>Use named arguments to rename selected variables.<br><br>These arguments are automatically quoted and evaluated in a context where column names represent column positions. They support unquoting and splicing. See `vignette("programming")` for an introduction to these concepts. |

## Select & change variable names

```
young_bakers3

# A tibble: 4 x 6
  baker     student   age  tre1  tre2  tre3
  <chr>       <dbl> <dbl> <dbl> <dbl> <dbl>
1 Ruby           1.   20.   12.    3.    3.
2 Julia          0.   21.    3.    4.    2.
3 Benjamina      0.   23.    6.    3.    6.
4 John           2.   23.   11.    1.    6.
```

```
young_bakers3 %>%
   select(baker, tech_1 = tre1)

# A tibble: 4 x 2
  baker     tech_1
  <chr>      <dbl>
1 Ruby         12.
2 Julia         3.
3 Benjamina     6.
4 John         11.
```

## Select & change variable names

```
young_bakers3

# A tibble: 4 x 6
  baker     student   age  tre1  tre2  tre3
  <chr>       <dbl> <dbl> <dbl> <dbl> <dbl>
1 Ruby           1.   20.   12.    3.    3.
2 Julia          0.   21.    3.    4.    2.
3 Benjamina      0.   23.    6.    3.    6.
4 John           2.   23.   11.    1.    6.
```

```
young_bakers3 %>%
   select(baker, tech_ = tre1:tre3)

# A tibble: 4 x 4
  baker     tech_1 tech_2 tech_3
  <chr>      <dbl>  <dbl>  <dbl>
1 Ruby         12.     3.     3.
2 Julia         3.     4.     2.
3 Benjamina     6.     3.     6.
4 John         11.     1.     6.
```

## Change names for a variable range

```
young_bakers3

# A tibble: 4 x 9
  baker        age student  tre1 rse1   tre2 rse2   tre3 rse3
  <chr>      <dbl>   <dbl> <dbl> <chr> <dbl> <chr> <dbl> <chr>
1 Ruby         20.      1.   12. IN       3. SB       3. IN
2 Julia        21.      0.    3. IN       4. IN       2. SB
3 Benjamina    23.      0.    6. IN       3. IN       6. IN
4 John         23.      2.   11. IN       1. SB       6. IN
```

```
young_bakers3 %>%
   select(baker, tech_ = starts_with("tr"),
          result_ = starts_with("rs"))

# A tibble: 4 x 7
  baker      tech_1 tech_2 tech_3 result_1 result_2 result_3
  <chr>       <dbl>  <dbl>  <dbl> <chr>    <chr>    <chr>
1 Ruby          12.     3.     3. IN       SB       IN
2 Julia          3.     4.     2. IN       IN       SB
3 Benjamina      6.     3.     6. IN       IN       IN
4 John          11.     1.     6. IN       SB       IN
```

## Change names without reordering

```
young_bakers3

# A tibble: 4 x 9
  baker        age student  tre1 rse1   tre2 rse2   tre3 rse3
  <chr>      <dbl>   <dbl> <dbl> <chr> <dbl> <chr> <dbl> <chr>
1 Ruby         20.      1.   12. IN       3. SB       3. IN
2 Julia        21.      0.    3. IN       4. IN       2. SB
3 Benjamina    23.      0.    6. IN       3. IN       6. IN
4 John         23.      2.   11. IN       1. SB       6. IN
```

```
young_bakers3 %>%
   rename(tech_1 = t_first, result_1 = r_first)

# A tibble: 4 x 9
  baker        age student tech_1 result_1  tre2 rse2   tre3 rse3
  <chr>      <dbl>   <dbl>  <dbl> <chr>    <dbl> <chr> <dbl> <chr>
1 Ruby         20.      1.    12. IN          3. SB       3. IN
2 Julia        21.      0.     3. IN          4. IN       2. SB
3 Benjamina    23.      0.     6. IN          3. IN       6. IN
4 John         23.      2.    11. IN          1. SB       6. IN
```

## Select & change names without reordering

```
young_bakers3

# A tibble: 4 x 9
  baker       age student  tre1 rse1   tre2 rse2   tre3 rse3
  <chr>     <dbl>   <dbl> <dbl> <chr> <dbl> <chr> <dbl> <chr>
1 Ruby        20.      1.   12. IN       3. SB       3. IN
2 Julia       21.      0.    3. IN       4. IN       2. SB
3 Benjamina   23.      0.    6. IN       3. IN       6. IN
4 John        23.      2.   11. IN       1. SB       6. IN
```

```
young_bakers3 %>%
   select(everything(), tech_ = starts_with("tr"),
          result_ = starts_with("rs"))

# A tibble: 4 x 9
  baker       age student tech_1 result_1 tech_2 result_2 tech_3 result_3
  <chr>     <dbl>   <dbl>  <dbl> <chr>     <dbl> <chr>     <dbl> <chr>
1 Ruby        20.      1.    12. IN           3. SB           3. IN
2 Julia       21.      0.     3. IN           4. IN           2. SB
3 Benjamina   23.      0.     6. IN           3. IN           6. IN
4 John        23.      2.    11. IN           1. SB           6. IN
```

## What's in a name?

```
i_use_snake_case
otherPeopleUseCamelCase
some.people.use.periods
And_aFew.People_RENOUNCEconvention
```

[1] R for Data Science (http://r4ds.had.co.nz/workflow-basics.html#whats-in-a-name)

## Clean all variable names

```
young_bakers3

# A tibble: 4 x 9
  Baker       Age `Student #` `Tr E1` `Rs E1` `Tr E2` `Rs E2` `Tr E3` `Rs E3`
  <chr>     <dbl>       <dbl>   <dbl> <chr>     <dbl> <chr>     <dbl> <chr>
1 Ruby        20.          1.     12. IN           3. SB           3. IN
2 Julia       21.          0.      3. IN           4. IN           2. SB
3 Benjamina   23.          0.      6. IN           3. IN           6. IN
4 John        23.          2.     11. IN           1. SB           6. IN
```

```
library(janitor)
young_bakers3 %>%
   clean_names()

# A tibble: 4 x 9
  baker       age student_number tr_e1 rs_e1 tr_e2 rs_e2 tr_e3 rs_e3
  <chr>     <dbl>          <dbl> <dbl> <chr> <dbl> <chr> <dbl> <chr>
1 Ruby        20.             1.   12. IN       3. SB       3. IN
2 Julia       21.             0.    3. IN       4. IN       2. SB
3 Benjamina   23.             0.    6. IN       3. IN       6. IN
4 John        23.             2.   11. IN       1. SB       6. IN
```

WORKING WITH DATA IN THE TIDYVERSE

## Let's practice!