R you ready?
IntRo to RStudio and R Markdown
for open data and reproducibility

Unit 4:

The tidier the better: Basics of coding with the `Tidyverse`

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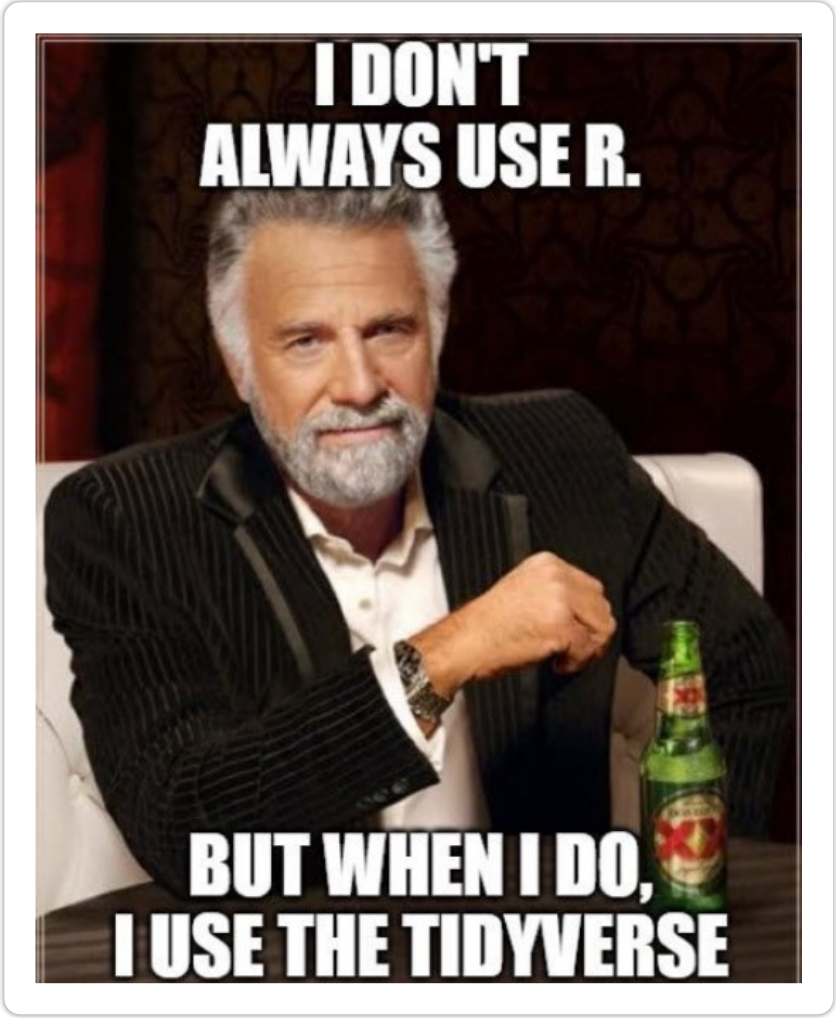
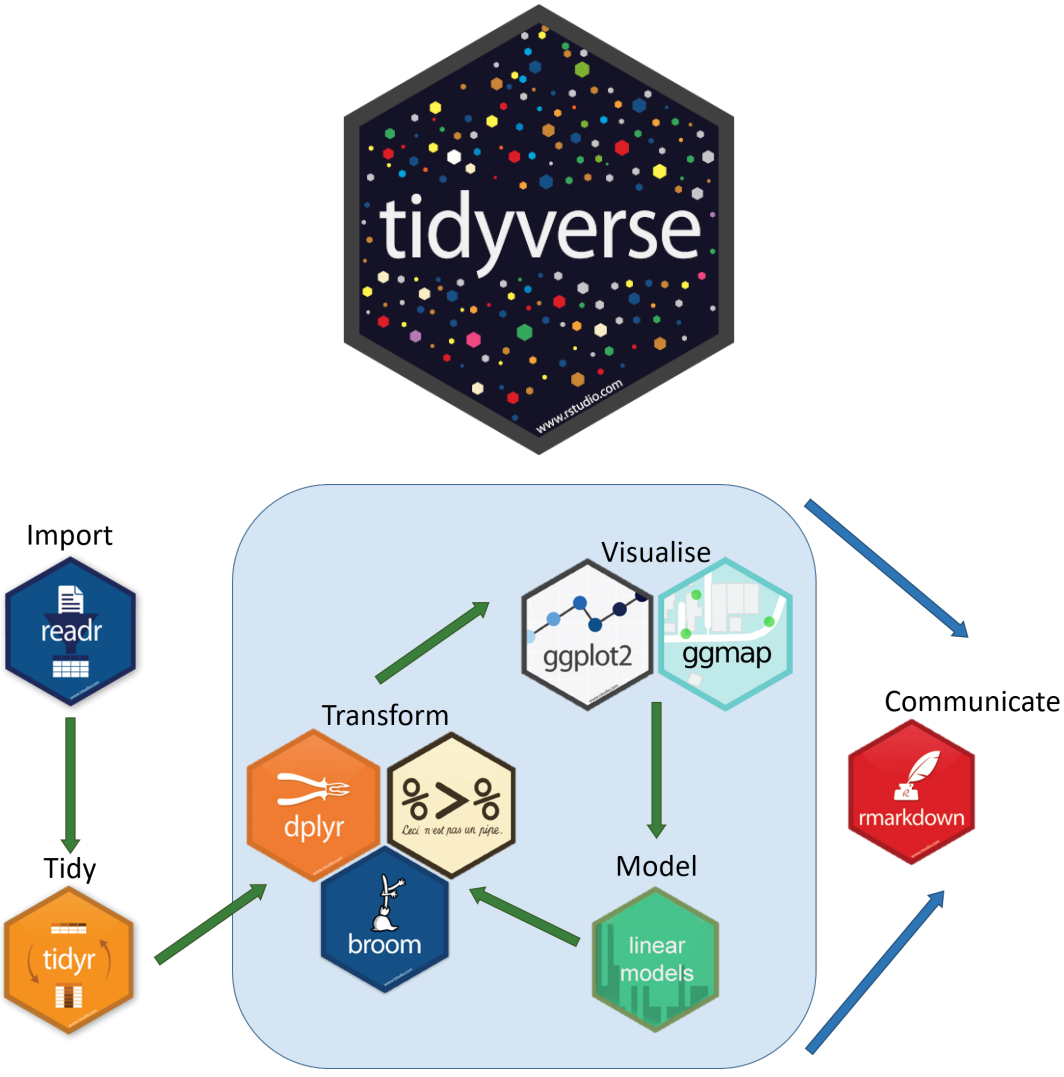
@WirtzMason


I DON'T
ALWAYS USE R.
BUT WHEN I DO,
I USE THE TIDYVERSE


tidyverse
www.rstudio.com
Import
readr
Tidy
tidyr
Transform
dplyr
%>%
broom
Visualise
ggplot2
ggmap
Model
linear models
Communicate
rmarkdown

Installing the `tidyverse`

Let's go ahead and install the package `tidyverse`

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

The `tidyverse` package is a handy way of installing and loading a lot of different packages at the same time

You could also just load in the individual packages from the `tidyverse` package, like so

```
> library(tibble)
> library(readr)
> library(dplyr)
> library(magrittr)
> library(ggplot2)
```

Why `tidyverse`?

Stuff we need to do with data (frames)

- tidy up a data frame
- create new variables
- calculate summary statistics
- extract model outputs


tidyverse
www.rstudio.com

Tibbles

Load in the data frame `Vampires`

```
> Vampires = read.csv("Vampires.csv")
> Vampires
```

```
> Vampires
   idVampire gender ageOfVampire deadOrAlive hasFangs       bornIn visitedCities numberOfChildren
1          1   Male           85        Dead      Yes South America          107                1
2          2 Female           73       Alive       No     Australia           66                3
3          3   Male          100       Alive      Yes     Australia           15                8
4          4 Female           75       Alive       No    Antarctica           11                2
5          5   Male          101       Alive      Yes     Australia           11                2
6          6 Female           87        Dead      Yes North America           19                4
7          7   Male           82       Alive       No North America           83                6
8          8 Female           68        Dead      Yes     Australia           50                5
9          9 Female           99        Dead       No     Australia            7                5
10        10 Female           44       Alive      Yes     Australia           66                1
```

Tibbles

And then coerce it into a tibble

```
> tibble(Vampires)
```

```
> tibble(Vampires)
# A tibble: 100 × 9
   idVampire gender ageOfVampire deadOrAlive hasFangs bornIn       visitedCities numberOfChildren numberChangedToVamp
   <fct>     <chr>          <dbl> <chr>       <chr>    <chr>                <dbl>            <dbl>               <dbl>
 1 1         Male              85 Dead        Yes      South America          107                1                  16
 2 2         Female            73 Alive       No       Australia               66                3                   6
 3 3         Male             100 Alive       Yes      Australia               15                8                   4
 4 4         Female            75 Alive       No       Antarctica              11                2                   4
 5 5         Male             101 Alive       Yes      Australia               11                2                   7
 6 6         Female            87 Dead        Yes      North America           19                4                  10
 7 7         Male              82 Alive       No       North America           83                6                   9
 8 8         Female            68 Dead        Yes      Australia               50                5                  16
 9 9         Female            99 Dead        No       Australia                7                5                  11
10 10        Female            44 Alive       Yes      Australia               66                1                   3
# … with 90 more rows
```

```
> Vampires
    idVampire gender ageOfVampire deadOrAlive hasFangs        bornIn visitedCities numberOfChildren
1           1   Male           85        Dead      Yes South America           107                1
2           2 Female           73       Alive       No     Australia            66                3
3           3   Male          100       Alive      Yes     Australia            15                8
4           4 Female           75       Alive       No    Antarctica            11                2
5           5   Male          101       Alive      Yes     Australia            11                2
6           6 Female           87        Dead      Yes North America            19                4
7           7   Male           82       Alive       No North America            83
8           8 Female           68        Dead      Yes     Australia
9           9 Female           99        Dead       No     Austr
10         10 Female           44       Alive      Yes     Austr
```

What differences do we see?

```
> tibble(Vampires)
# A tibble: 100 × 9
   idVampire gender ageOfVampire deadOrAlive hasFangs bornIn       visitedCiti          numberChangedToVamp
   <fct>     <chr>         <dbl> <chr>       <chr>    <chr>              <dbl>                <dbl>
 1 1         Male             85 Dead        Yes      South America        107                    1                   16
 2 2         Female           73 Alive       No       Australia             66                    3                    6
 3 3         Male            100 Alive       Yes      Australia             15                    8                    4
 4 4         Female           75 Alive       No       Antarctica            11                    2                    4
 5 5         Male            101 Alive       Yes      Australia             11                    2                    7
 6 6         Female           87 Dead        Yes      North America         19                    4                   10
 7 7         Male             82 Alive       No       North America         83                    6                    9
 8 8         Female           68 Dead        Yes      Australia             50                    5                   16
 9 9         Female           99 Dead        No       Australia              7                    5                   11
10 10        Female           44 Alive       Yes      Australia             66                    1                    3
# … with 90 more rows
```

Tibbles

These are some small changes, but they save you a lot of time and typing in the long run.

Modern take on data frames:

- Tibbles default to character vectors (rather than factor vectors) → character vectors easier to manipulate
- Only first 10 rows are displayed, saving `head()` function calling time
- Tibbles display row and column numbers (saves `nrow()` and `ncol()` function calls
- Tibble automatically displays how each column is coded

Loading in tibbles from the getgo

Save yourself turning each data frame into a tibble:

Use the `read_csv()` function from the `readr` package.

```
> Vampires = read_csv("Vampires.csv")
```

Manipulating data (the good kind)

Useful functions in `dplyr`

```
filter()
select()
mutate()
group_by()
summarize()
summarize_at()
```

Operators in data manipulation

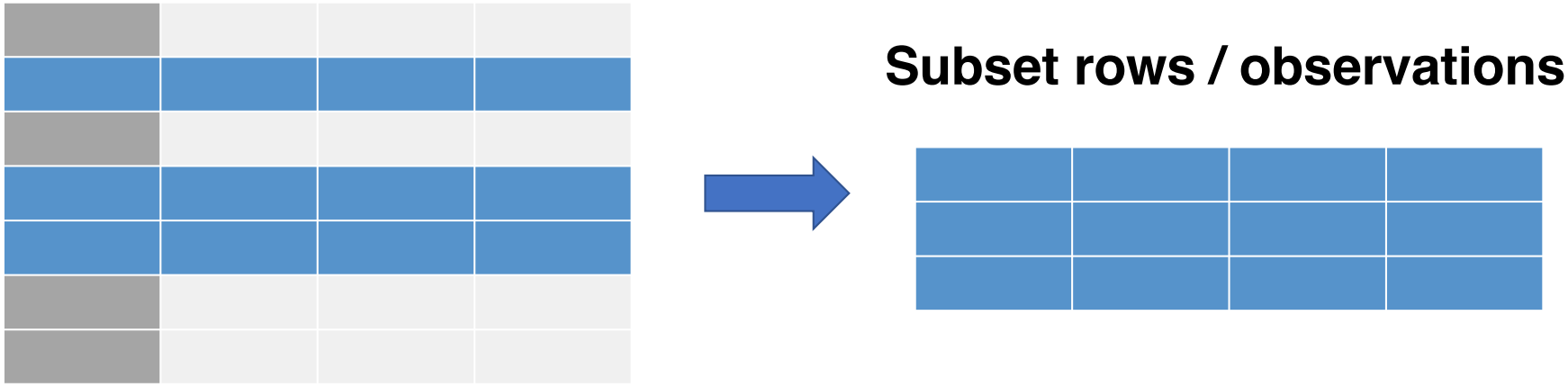
Operator	Description
<	Less than
>	Greater than
<=	Less than or equal to
>=	Greater than or equal to
==	Equal to
!=	Not equal to

These operators are useful when manipulating data

NOT to be confused with the assignment operator (only one =)

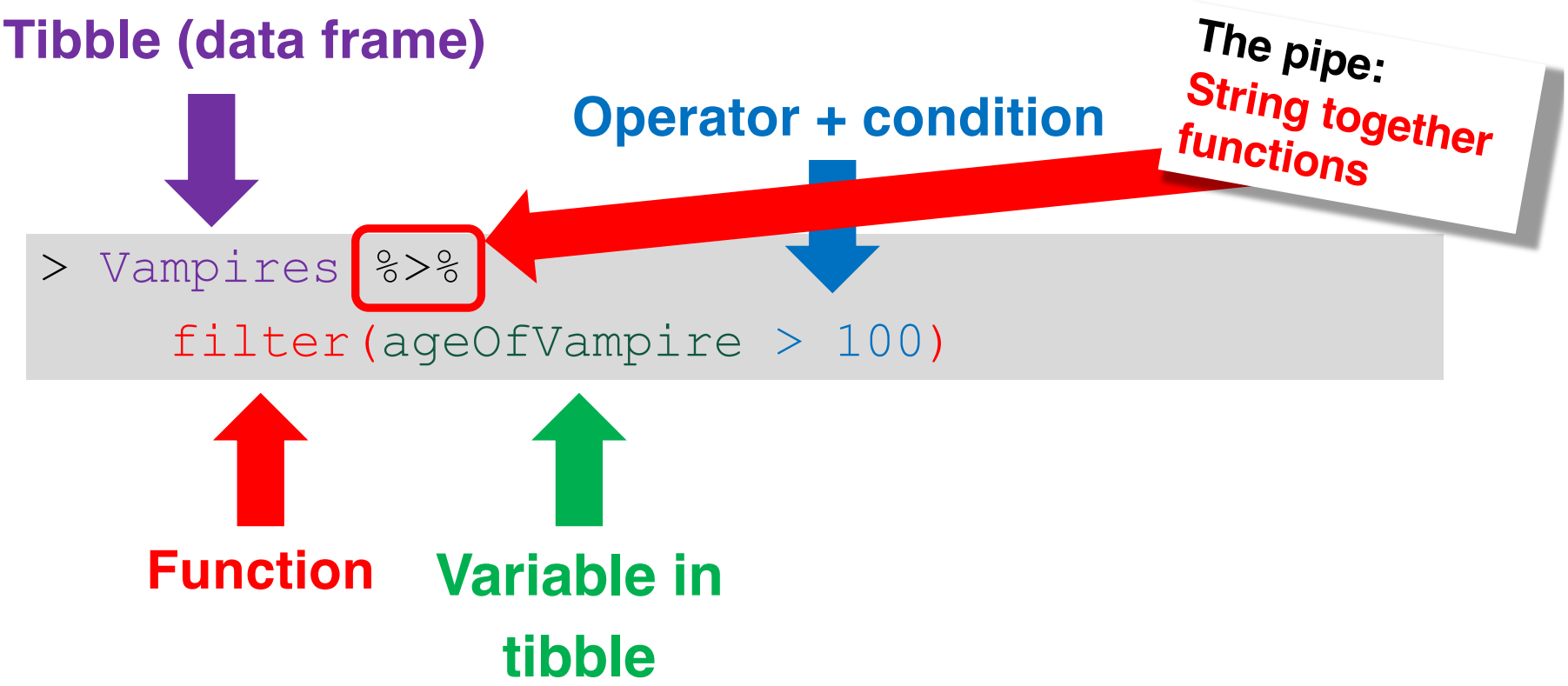
Manipulating data: `filter()`

Imagine we are working with our Vampires data frame and we want to take a closer look at all the vampires who are older than 100




```
> Vampires %>%
    filter(ageOfVampire > 100)
```

Manipulating data: `filter()`



Manipulating data: `filter()`

We can also filter the data frame according to two terms:

We want a data frame of vampires who are older than 100 AND still alive

```
> Vampires %>%
      filter(ageOfVampire > 100, deadOrAlive == "Alive")
```

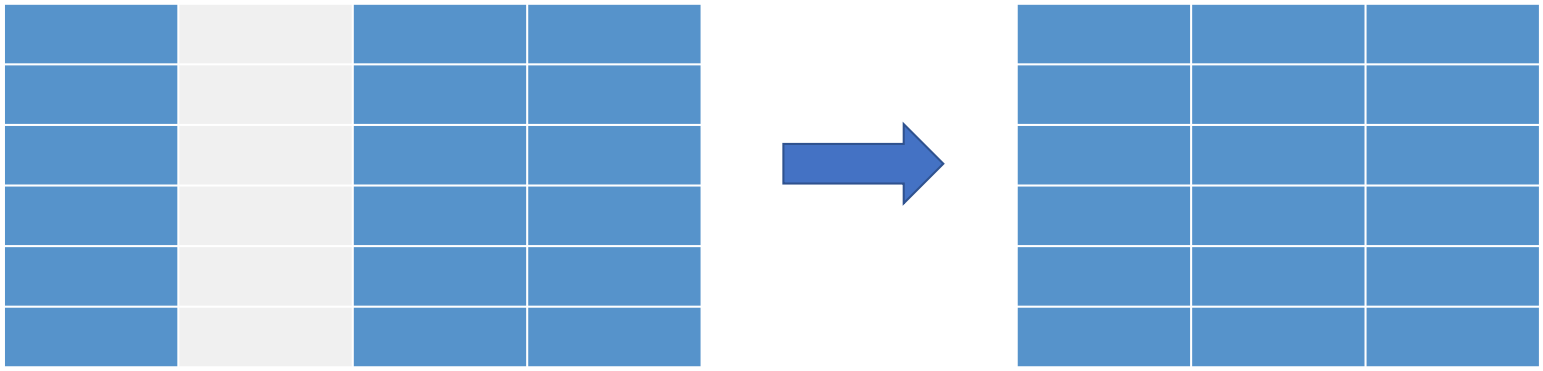
When subsetting CHARACTER vectors, make sure to put the condition in quotation marks!!

Manipulating data: `select()`

If we want only select COLUMNS in a data frame

Say we want to select ONLY `idVampire`, `gender` and `ageOfVampire`

Subset columns



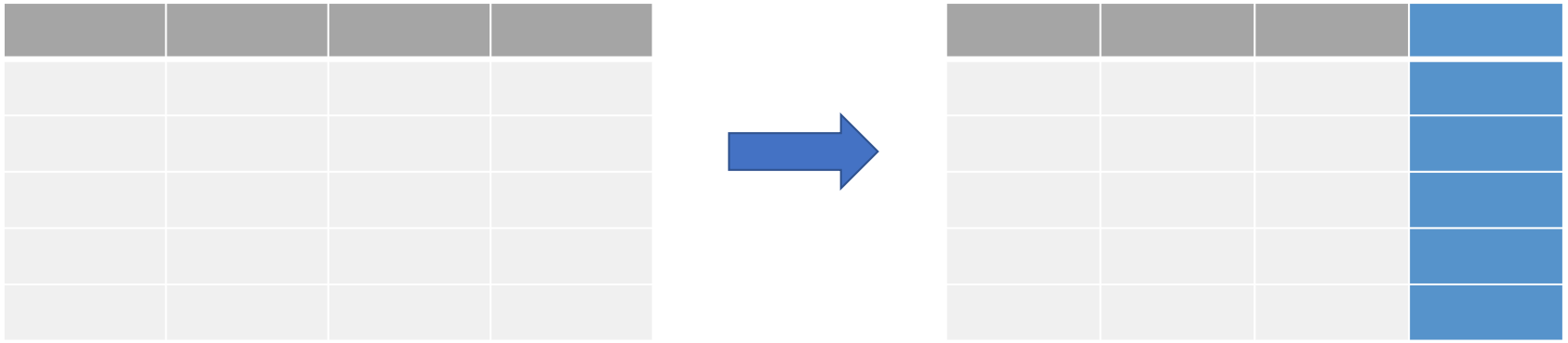
```
> Vampires %>%
    select(idVampire, gender, ageOfVampire)
```

Manipulating data: `mutate()`

Create new variables that are functions of existing variable(s)

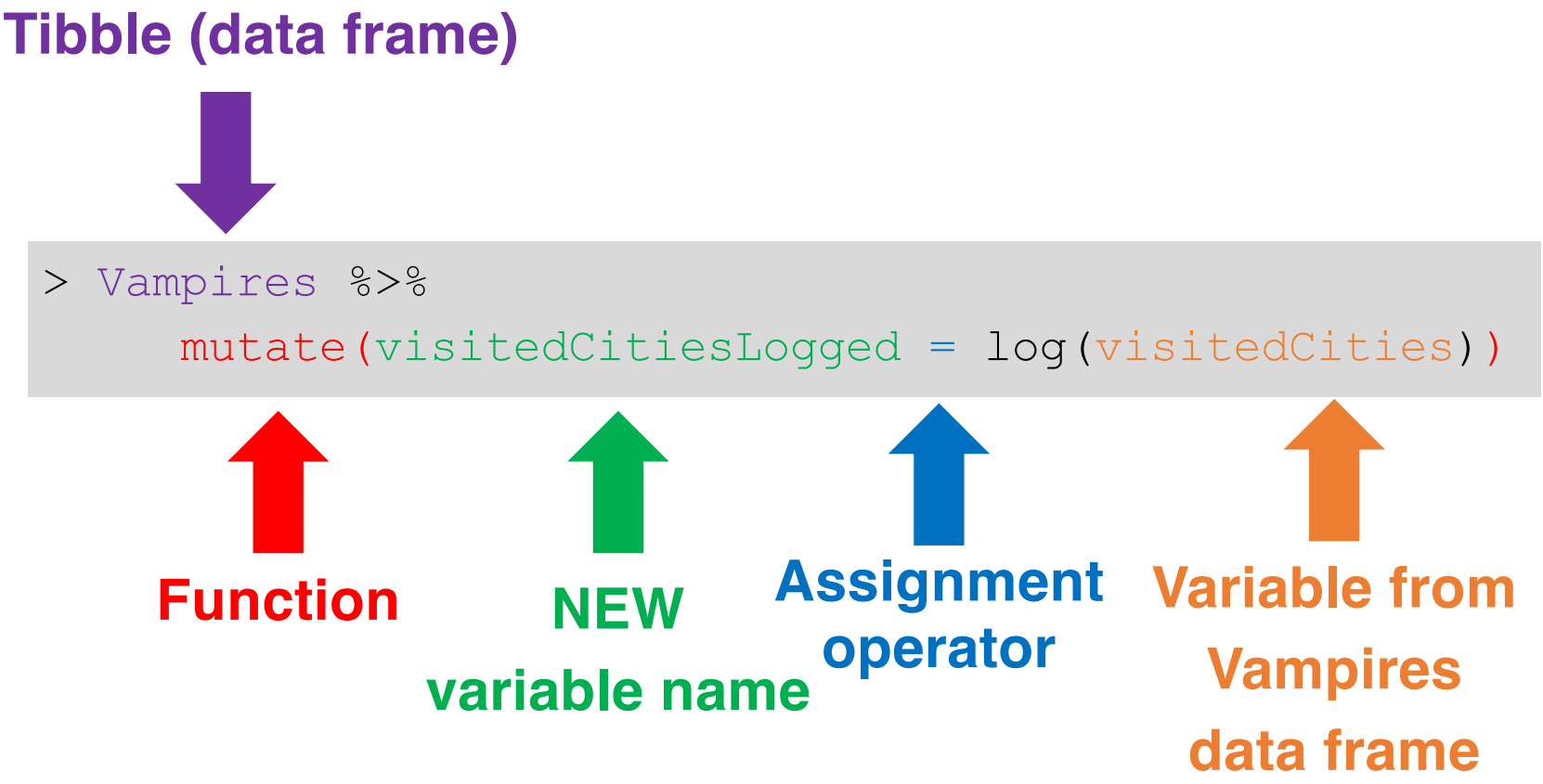
Since the variable `visitedCities` is a count variable, maybe we want to log transform the variable

Create new variable(s)



```
> Vampires %>%
    mutate(visitedCitiesLogged = log(visitedCities))
```

Manipulating data: `filter()`



Manipulating data: `summarize()`

Collapses a data frame to a single row and summarizes it according to the argument we supply it with

Say we want the mean age of all vampires

ageOfVampire
1
2
3
4
5

Summarize a group/variable

mean
3

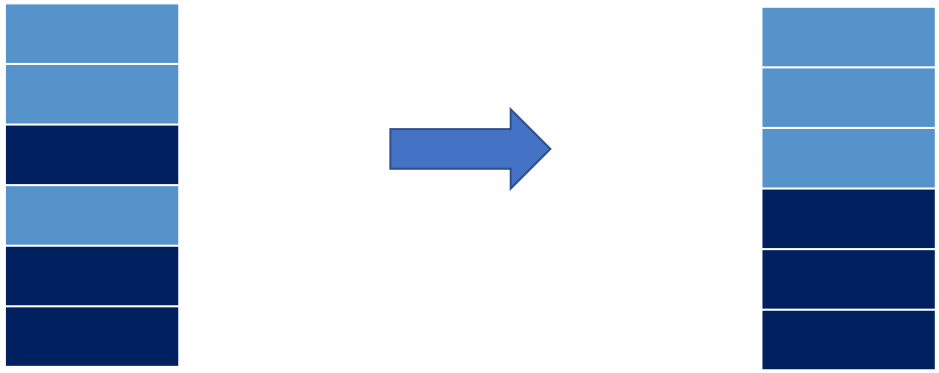
```
> Vampires %>%
    summarize(mean = mean(ageOfVampire))
```

Manipulating data: `group_by()`

Group variables consisting of factors and summarize these grouped factors

We want to know the mean age of the male and female vampires

Group variables by unique values



```
> Vampires %>%
    group_by(gender) %>%
    summarize(mean = mean(ageOfVampire)
```


LET'S GET OUR HANDS DIRTY
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