

Preparado para:



# REFORM/SC2022/126 DELIVERABLE 4 **MÓDULO 2** **GESTÃO E TRATAMENTO DE DADOS EM R**

DESIGNING A NEW VALUATION MODEL  
FOR RURAL PROPERTIES IN PORTUGAL

## Parte I

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*Lisboa, 5 maio 2023*



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AARC

**NOVA**  
NOVA SCHOOL OF  
BUSINESS & ECONOMICS

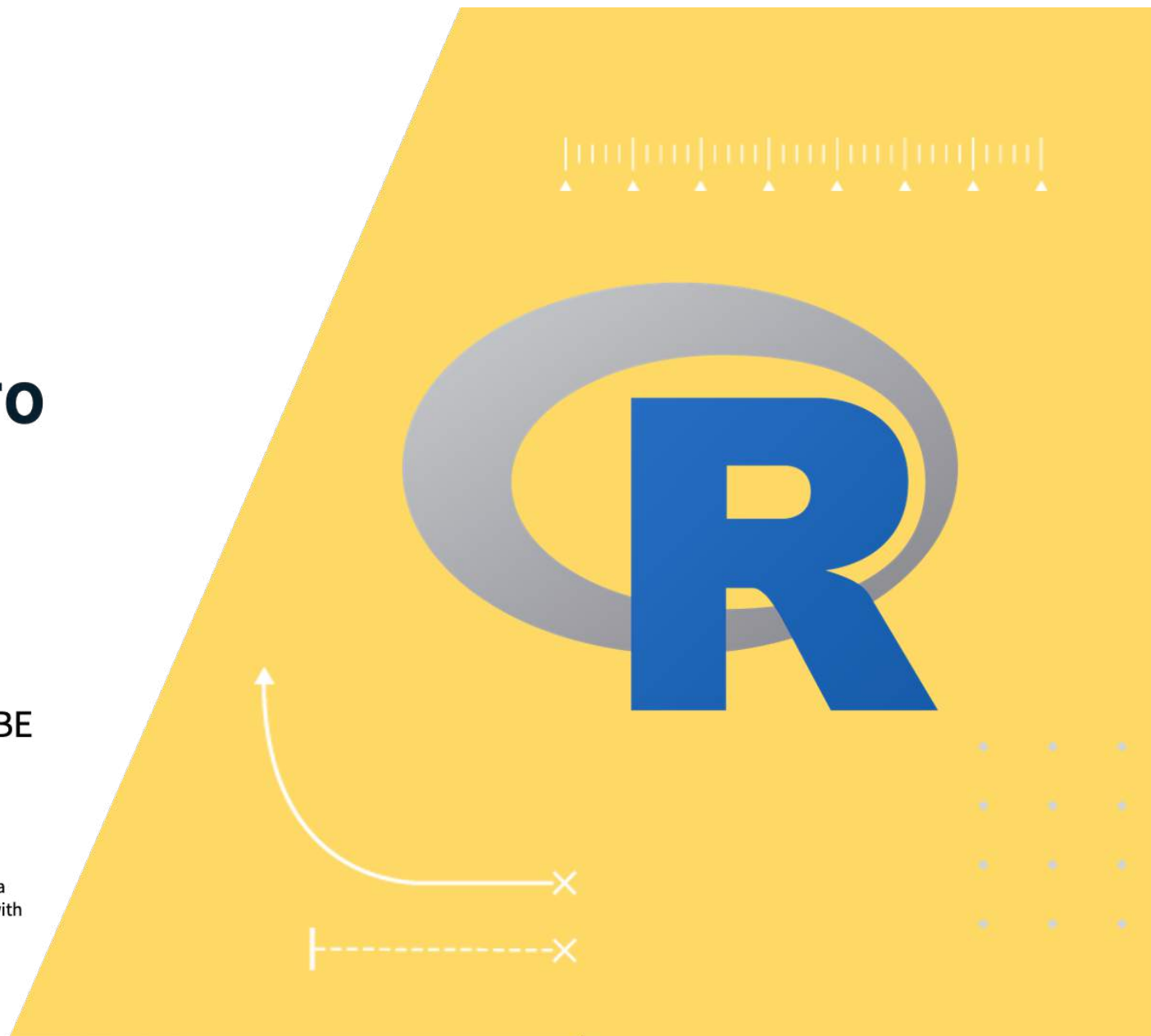
LOBO VASQUES



**esri**



INNERLANDS



# Programa

MÓDULOS	DURAÇÃO
<b>Módulo 1 – Introdução ao R:</b> <ul style="list-style-type: none"> <li>- O que é o R?</li> <li>- Como instalar e configurar o R.</li> <li>- Sintaxe básica e comandos.</li> <li>- Tipos de dados, objetos e classes.</li> </ul>	4 Horas
<b>Módulo 2 – Gestão e tratamento de dados em R:</b> <ul style="list-style-type: none"> <li>- Carregar dados no R.</li> <li>- Perceber as estruturas de dados e <i>subsetting</i>.</li> <li>- Limpeza de dados: <i>missing values</i>, <i>outliers</i> e transformações</li> <li>- Juntar bases de dados</li> </ul>	8 Horas
<b>Módulo 3 – Estatística básica em R:</b> <ul style="list-style-type: none"> <li>- Estatísticas descritivas: medidas de dispersão central e variação.</li> <li>- Distribuições probabilísticas: variáveis discretas e contínuas.</li> <li>- Testes de hipóteses.</li> </ul>	8 Horas

MÓDULOS	DURAÇÃO
<b>Módulo 4 – Regressão Linear:</b> <ul style="list-style-type: none"> <li>- O modelo classico linear.</li> <li>- Estimação de parametros segundo o MMQ.</li> <li>- Testes de hipóteses: significância estatística e ajuste do modelo.</li> <li>- Modelo de regressão múltipla.</li> <li>- Testar as premissas: multicolinearidade, heteroscedasticidade e normalidade dos resíduos.</li> <li>- Critérios de seleção dos modelos.</li> </ul>	12 Horas
<b>Módulo 5 – O modelo:</b> <ul style="list-style-type: none"> <li>- Estrutura do modelo e premissas – Perceber o modelo (4 Hours).</li> <li>- Uso e tratamento dos dados (4 Hours).</li> <li>- Descrição do modelo (4 Hours).</li> <li>- Aplicação do modelo a cada piloto (12 Hours).</li> <li>- Aplicação autónoma do modelo a uma região (8 Hours).</li> </ul>	32 Horas



# Vamos a isso

Aceda a este link para começar já

<https://posit.cloud/content/5906356>



# Quiz 1

**slido.com**

**#3915775**

# **Importar dados no R**

# Ciência de dados

**Importar**

Organizar  
(*Tidy*)

Visualizar  
Transformar

Modelizar

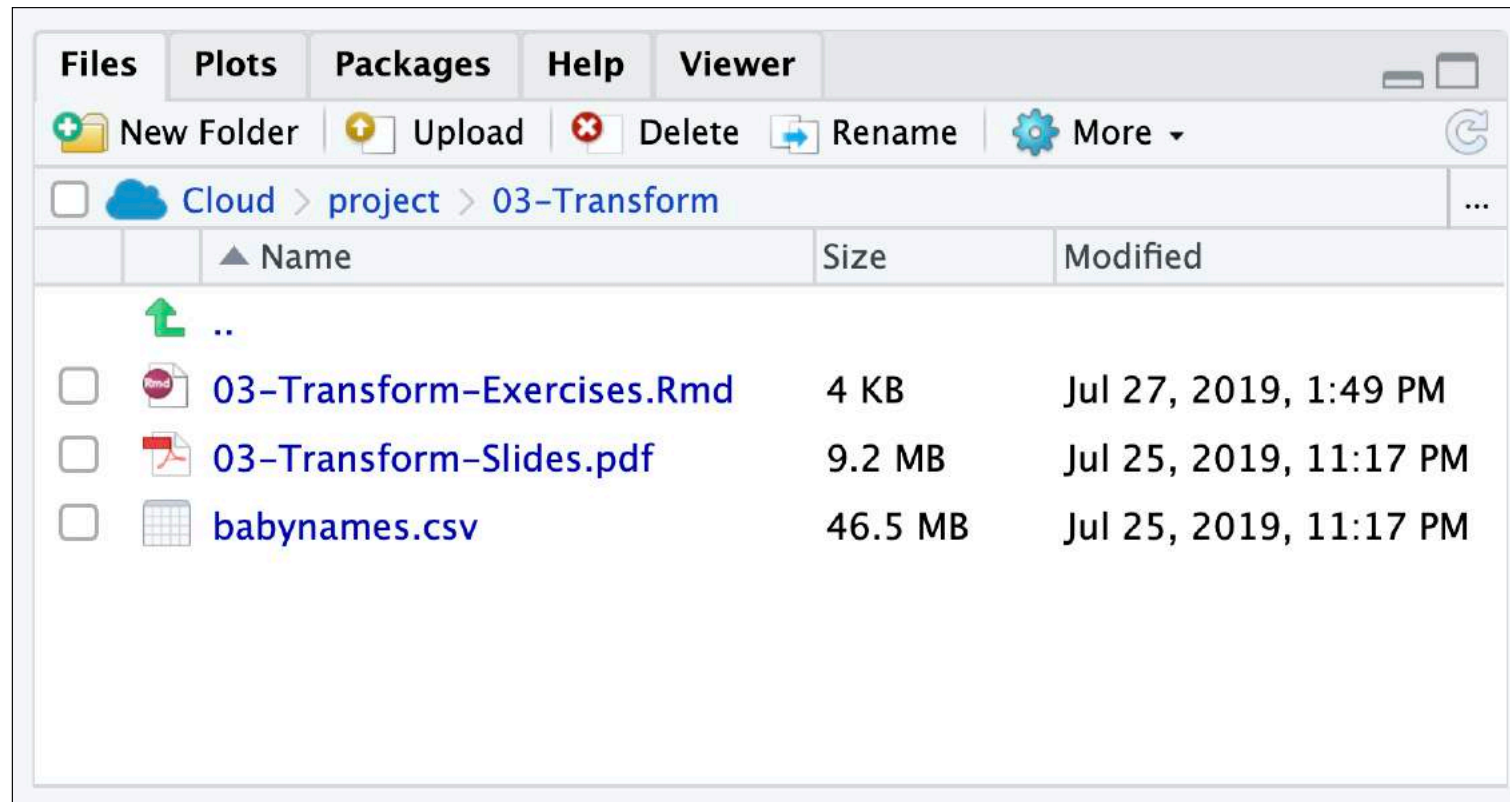
Comunicar

**Programar**

```
graph LR; Importar[Importar] --> Organizar[Organizar (Tidy)]; Organizar --> Visualizar[Visualizar]; Organizar --> Transformar[Transformar]; Visualizar --> Modelizar[Modelizar]; Transformar --> Modelizar; Modelizar --> Comunicar[Comunicar];
```

# babynames.csv

Nomes e sexo dos bebês nascidos nos EUA de 1880 a 2017. 1.9M de observações.





# babynames.csv

```
year,sex,name,n,prop
1880,F,Mary,7065,0.07238359
1880,F,Anna,2604,0.02667896
1880,F,Emma,2003,0.02052149
1880,F,Elizabeth,1939,0.01986579
1880,F,Minnie,1746,0.01788843
1880,F,Margaret,1578,0.0161672
1880,F,Ida,1472,0.01508119
1880,F,Alice,1414,0.01448696
```



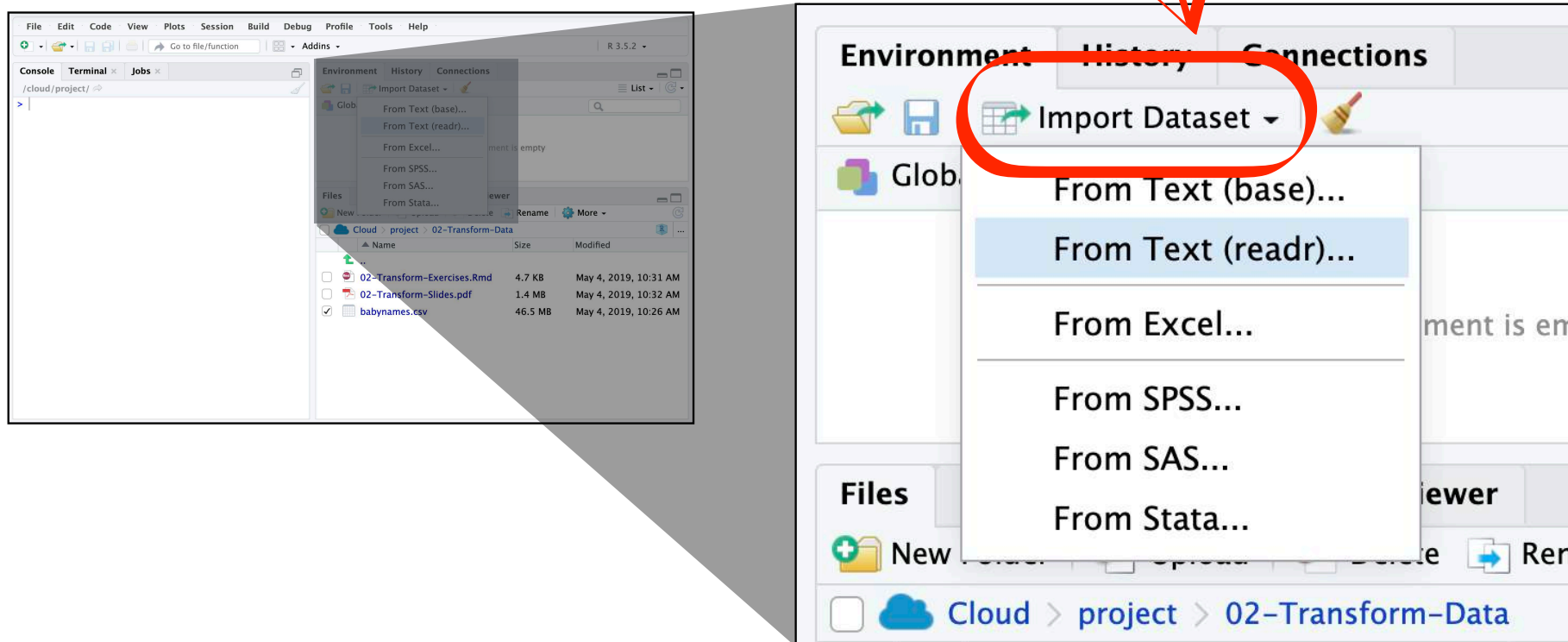
# babynames.csv

```
year,sex,name,n,prop
1880,F,Mary,7065,0.07238359
1880,F,Anna,2604,0.02667896
1880,F,Emma,2003,0.02052149
1880,F,Elizabeth,1939,0.01986579
1880,F,Minnie,1746,0.01788843
1880,F,Margaret,1578,0.0161672
1880,F,Ida,1472,0.01508119
1880,F,Alice,1414,0.01448696
```



# Importar

Import Dataset From Text (readr)...





Import Text Data

File/URL:

/cloud/project/02-Transform-Data/babynames.csv

Browse...

Data Preview:

year (double)	sex (logical)	name (character)	n (double)	prop (double)
1880	FALSE	Mary	7065	0.07238359
1880	FALSE	Anna	2604	0.02667896
1880	FALSE	Emma	2003	0.02052149
1880	FALSE	Elizabeth	1939	0.01986579

Previewing first 50 entries.

Import Options:

Name: babynames

Skip: 0

☒ First Row as Names

☒ Trim Spaces

☒ Open Data Viewer

Delimiter: Comma

Quotes: Default

Locale: Configure...

Escape: None

Comment: Default

NA: Default

Code Preview:

```
library(readr)
babynames <- read_csv("02-Transform-Data/babynames.csv")
View(babynames)
```

? Reading rectangular data using readr

Import

Cancel



## babynames

<b>year</b> <dbl>	<b>sex</b> <chr>	<b>name</b> <chr>	<b>n</b> <dbl>	<b>prop</b> <dbl>
1880	F	Mary	7065	0.07238359
1880	F	Anna	2604	0.02667896
1880	F	Emma	2003	0.02052149
1880	F	Elizabeth	1939	0.01986579
1880	F	Minnie	1746	0.01788843
1880	F	Margaret	1578	0.01616720
1880	F	Ida	1472	0.01508119
1880	F	Alice	1414	0.01448696
1880	F	Bertha	1320	0.01352390
1880	F	Sarah	1288	0.01319605

1-10 of 1,924,665 rows

Previous 1 2 3 4 5 6 ... 100 Next

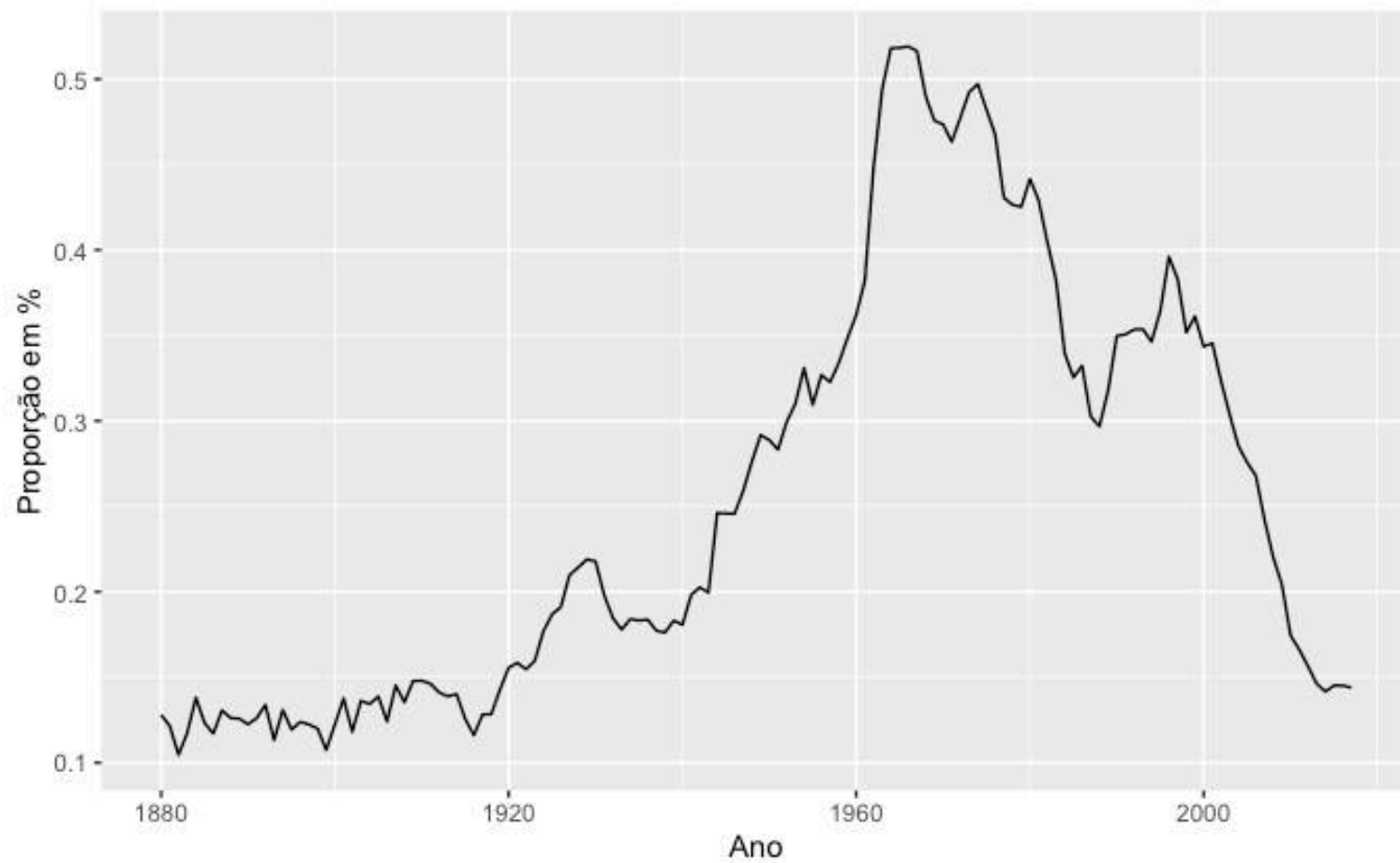


# **Transformação de dados (II)**

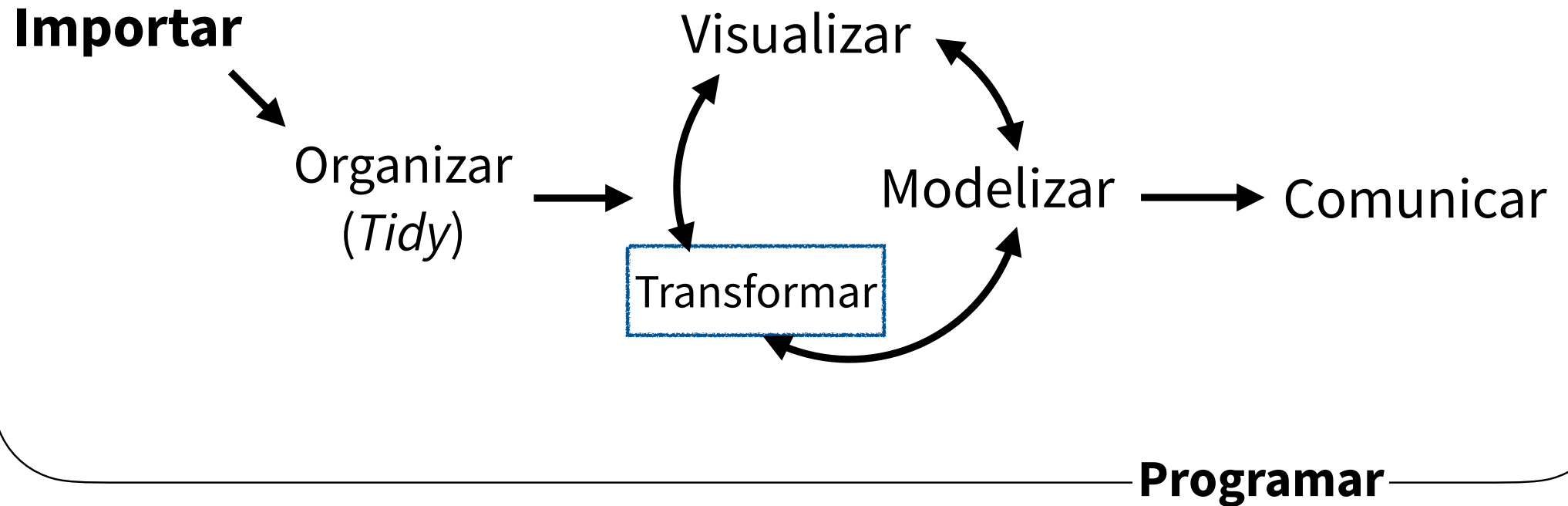
Estruturar e filtrar

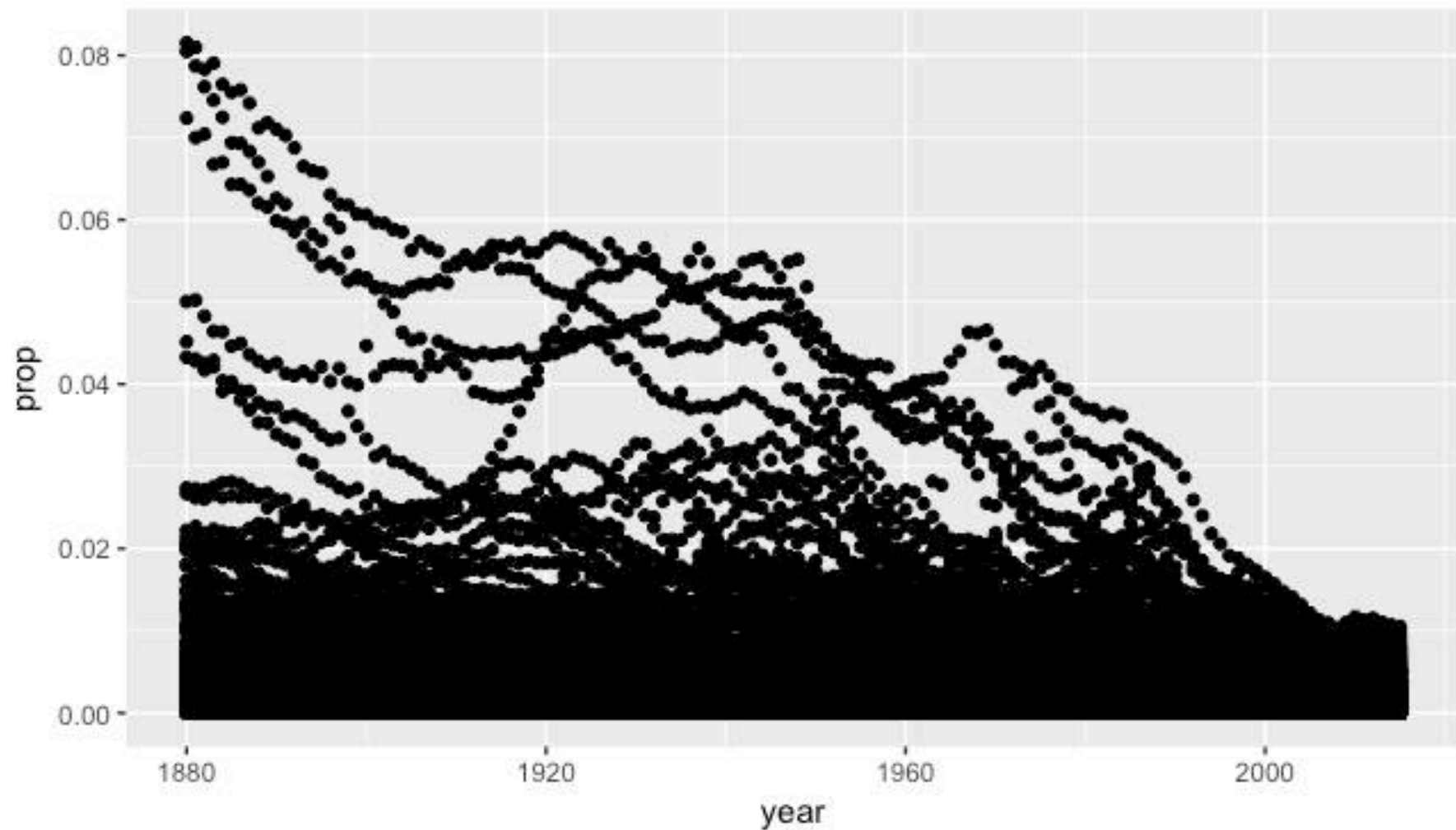


## Percentagem de recém-nascidas com o nome Maria 🇵🇹 nos EUA 🇺🇸



# Ciência de dados

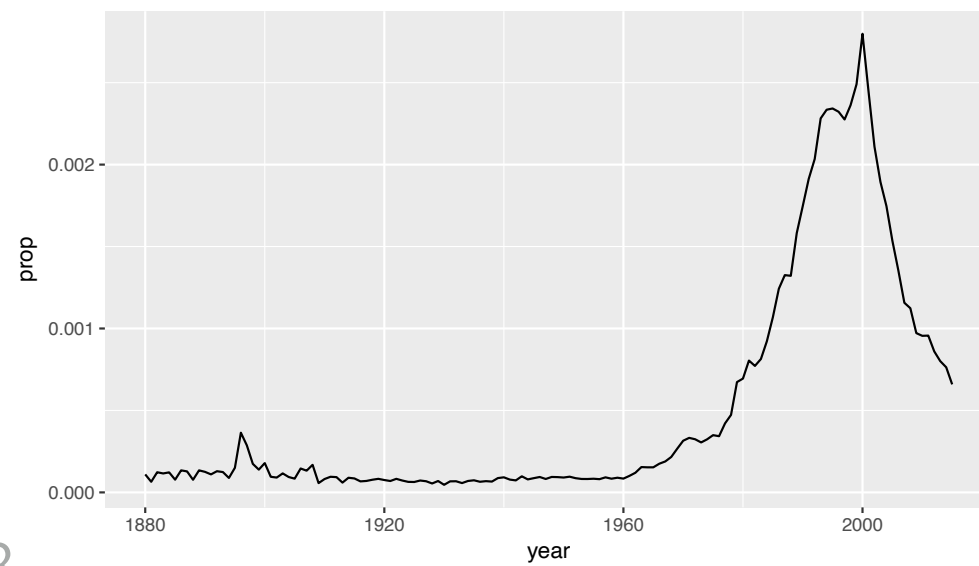
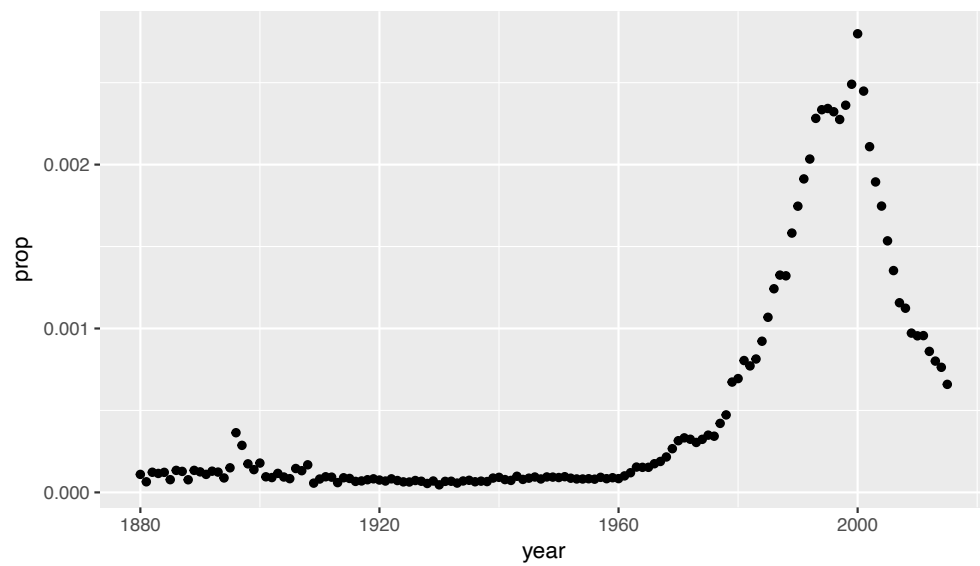
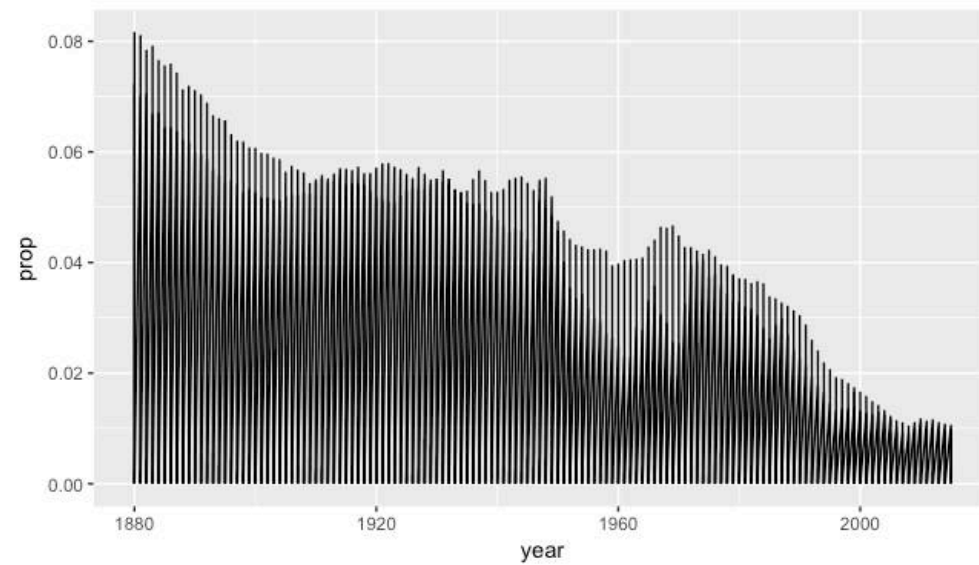
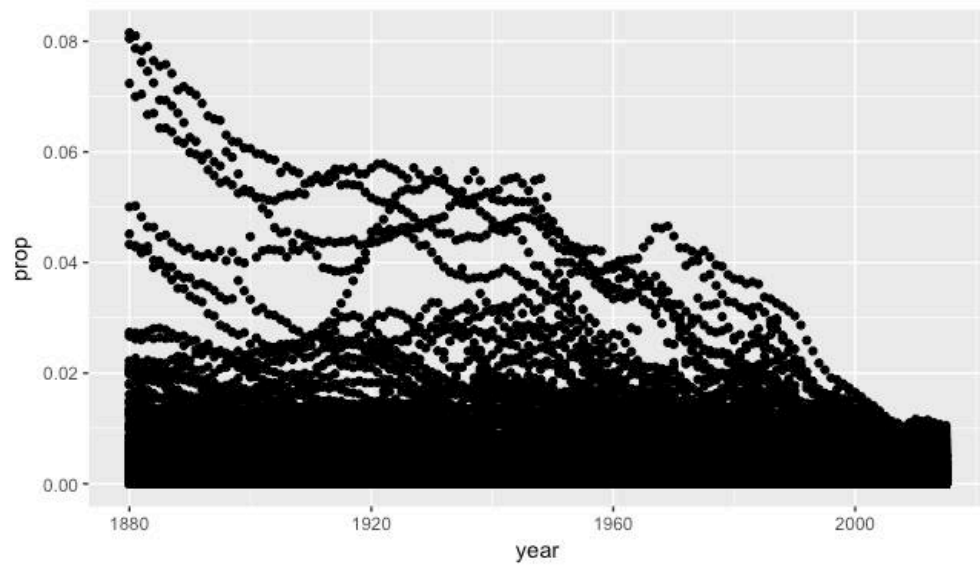




```
ggplot(data = babynames) +  
  geom_point(mapping = aes(x = year, y = prop))
```







## Como isolar as observações de interesse?

	year	sex	name	n	prop
1	1880	F	Mary	7065	0.0724
2	1880	F	Margar	1578	0.0162
3	1880	F	Martha	1040	0.0107
4	1880	F	Marie	471	0.00483
5	1880	F	Maria	125	0.00128
1	1881	F	Mary	6919	0.0700
2	1881	F	Margar	1658	0.0168
3	1881	F	Martha	1044	0.0106
4	1881	F	Marie	499	0.00505
5	1881	F	Maria	120	0.00121
	1881	M	Gideon	7	0.0001



year	sex	name	n	prop
1880	F	Maria	125	0.00128
1881	F	Maria	120	0.00121
...	...	Maria	...	...

## *Subsetting* - subconjuntos de interesse

**select()** - extrair **variáveis**

**filter()** - extrair **observações**

**arrange()** - reordenar **observações**



# select()

Extrair determinadas variáveis (colunas)

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

**conjunto de dados  
a transformar**  
(data.frame/tibble)

**nome das variáveis a extrair**  
(ou função que selecione  
variáveis)

# select()

Extrair determinadas variáveis (colunas)

```
select(babynames, name, prop)
```

babynames

year	sex	name	n	prop
1880	M	John	9655	0.0815
1880	M	William	9532	0.0805
1880	M	James	5927	0.0501
1880	M	Charles	5348	0.0451
1880	M	Garrett	13	0.0001
1881	M	John	8769	0.081



name	prop
John	0.0815
William	0.0805
James	0.0501
Charles	0.0451
Garrett	0.0001
John	0.081



Como seleccionar a columna **n**?

Como seleccionar a columna **n**?

```
select(babynames, n)
```

```
select(babynames, n)
```

```
#      n  
#  <int>  
# 1  7065  
# 2  2604  
# 3  2003  
# 4  1939  
# 5  1746  
# ...  ...
```

Que tipo de objeto é este?



# select()

Extrair determinadas variáveis (colunas)

```
select(babynames, n)
```

babynames

year	sex	name	n	prop
1880	M	John	9655	0.0815
1880	M	William	9532	0.0805
1880	M	James	5927	0.0501
1880	M	Charles	5348	0.0451
1880	M	Garrett	13	0.0001
1881	M	John	8769	0.081



n
9655
9532
5927
5348
13
8769

**TIBBLE**



\$

Extrair *conteúdo* de uma variável (como um vector)

```
babynames$n
```

babynames

year	sex	name	n	prop
1880	M	John	9655	0.0815
1880	M	William	9532	0.0805
1880	M	James	5927	0.0501
1880	M	Charles	5348	0.0451
1880	M	Garrett	13	0.0001
1881	M	John	8769	0.081

→ 9655 9532 5927 5348 ...



\$

Extraire *conteúdo* de uma variável (como um vector)

```
babynames$n
```

**data  
frame**

\$

**nome da variável  
(sem plicas)**

# select() helpers - seleção de variáveis

- Selecionar intervalo de várias colunas

```
select(mpg, cty:class)
```

- - Todas as colunas exceto

```
select(mpg, -c(cty, hwy))
```

**starts\_with()** - Colunas cujo nome começa por...


```
select(mpg, starts_with("c"))
```

**ends\_with()** - Colunas cujo nome acaba em...

```
select(mpg, ends_with("y"))
```

etc.

## Data Transformation with dplyr : : CHEAT SHEET



**dplyr** functions work with pipes and expect **tidy data**. In tidy data:

- Each **variable** is in its own **column**
- Each **observation**, or **case**, is in its own **row**
- $x \%>\% f(y)$  becomes  $f(x, y)$

**pipes**

These apply **summary functions** to columns to create a new table of summary statistics. Summary functions take vectors as input and return one value (see back).

**summary function**

**summarise(data, ...)**  
Compute table of summaries.  
`summarise(mpg, avg = mean(mpg))`

**count(x, ...)** (`wt = NULL`, `sort = FALSE`)  
Count number of rows in each group defined by the variables in ... Also **tally()**.  
`count(iris, Species)`

**VARIATIONS**

- summarise\_all()** - Apply funs to every column.
- summarise\_at()** - Apply funs to specific columns.
- summarise\_if()** - Apply funs to all cols of one type.

**Group Cases**

Use **group\_by()** to create a "grouped" copy of a table. dplyr functions will manipulate each "group" separately and then combine the results.

`mtcars %>%  
group_by(cyl) %>%  
summarise(avg = mean(mpg))`

**group\_by(data, ...)**, `add = FALSE`  
Returns copy of table grouped by ...  
`g_cyls = group_by(iris, Species)`

**ungroup(x, ...)**  
Returns ungrouped copy of table.  
`ungroup(g_iris)`

**Logical and boolean operators to use with filter()**

See **base::logic** and **?Comparison** for help.

**ARRANGE CASES**

**arrange(data, ...)** Order rows by values of a column or columns (low to high). Use with **desc()** to order from high to low.  
`arrange(mtcars, mpg)`  
`arrange(mtcars, desc(mpg))`

**ADD CASES**

**add\_row(data, ...)**, `before = NULL`, `after = NULL`  
Add one or more rows to a table.  
`add_row(mtcars, displations = 1, waiting = 1)`

**EXTRACT CASES**

Row functions return a subset of rows as a new table.

**filter(data, ...)** Extract rows that meet logical criteria. `filter(iris, Sepal.Length > 7)`

**distinct(data, ...)**, `keep_all = FALSE` Remove rows with duplicate values.  
`distinct(iris, Species)`

**sample\_frac(frac, size = 1, replace = FALSE, weight = NULL, n = parent.frame())** Randomly select fraction of rows.  
`sample_frac(iris, 0.5, replace = TRUE)`

**sample\_n(n, size, replace = FALSE, weight = NULL, n = parent.frame())** Randomly select size rows.  
`sample_n(iris, 10, replace = FALSE)`

**slice(data, ...)** Select rows by position.  
`slice(iris, 10:20)`

**top\_n(x, n, wt)** Select and order top n entries (by group if grouped data).  
`top_n(mtcars, 5, displations)`

**EXTRACT VARIABLES**

Column functions return a set of columns as a new vector or table.

**pull(data, var = 1)** Extract column values as a vector. Choose by name or index.  
`pull(iris, Sepal.Length)`

**select(data, ...)**  
Extract columns as a table. Also **select\_if()**.  
`select(iris, Sepal.Length, Species)`

Use these helpers with **select()**, e.g. `select(iris, starts_with("Sepal"))`

- contains(match)** `num_range(prefix, range)` - e.g. `mpg:cyl`
- ends\_with(match)** **one\_of(...)** -, e.g. `-Species`
- matches(match)** **starts\_with(match)**

**MAKE NEW VARIABLES**

These apply vectors as input (see back).

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Qual destas não seleciona as colunas **name** e **n**?

`select(babynames, -c(year, sex, prop))`

`select(babynames, name:n)`

`select(babynames, starts_with("n"))`

`select(babynames, ends_with("n"))`

Qual destas não seleciona as colunas **name** e **n**?

`select(babynames, -c(year, sex, prop))`

`select(babynames, name:n)`

`select(babynames, starts_with("n"))`

`select(babynames, ends_with("n"))`

## Como isolar as observações de interesse?

	year	sex	name	n	prop
1	1880	F	Mary	7065	0.0724
2	1880	F	Margar	1578	0.0162
3	1880	F	Martha	1040	0.0107
4	1880	F	Marie	471	0.00483
5	1880	F	Maria	125	0.00128
1	1881	F	Mary	6919	0.0700
2	1881	F	Margar	1658	0.0168
3	1881	F	Martha	1044	0.0106
4	1881	F	Marie	499	0.00505
5	1881	F	Maria	120	0.00121
	1881	M	Gideon	7	0.0001



year	sex	name	n	prop
1880	F	Maria	125	0.00128
1881	F	Maria	120	0.00121
...	...	Maria	...	...

# filter()

Extrair observações (linhas) de acordo com critérios lógicos

```
filter(.data, ... )
```

tabela de dados a  
transformar

um ou mais testes de  
lógica (que serão  
avaliados linha a linha)

# filter()

Extrair observações (linhas) de acordo com critérios lógicos

```
filter(babynames, name == "Maria")
```

babynames

year	sex	name	n	prop
1880	F	Mary	7065	0.0724
1880	F	Margaret	1578	0.0162
1880	F	Martha	1040	0.0107
1880	F	Marie	471	0.00483
1880	F	Maria	125	0.00128
1881	F	Mary	6919	0.0700



year	sex	name	n	prop
1880	F	Maria	125	0.00128
1881	F	Maria	120	0.00121
...	...	Maria	...	...

35



# filter()

Extrair observações (linhas) de acordo com critérios lógicos

```
filter(babynames, name == "Maria")
```

babynames

year	sex	name	n	prop
1880	F	Mary	7065	0.0724
1880	F	Margaret	1578	0.0162
1880	F	Martha	1040	0.0107
1880	F	Marie	471	0.00483
1880	F	Maria	125	0.00128
1881	F	Mary	6919	0.0700

= serve para definir opções etc.

**== para testes de igualdade**  
(TRUE ou FALSE)



# Testes de lógica

<code>x &lt; y</code>	Menor que
<code>x &gt; y</code>	Maior que
<code>x == y</code>	Igual a
<code>x &lt;= y</code>	Menor ou igual a
<code>x &gt;= y</code>	Maior ou igual a
<code>x != y</code>	Não é igual a
<code>x %in% y</code>	Pertence a

O que significa NA?

1

"1"

"one"

NA

Qual é o resultado de:

**1 == 1**

Qual é o resultado de:

**1 == 1**

**TRUE**

Qual é o resultado de:

**1 == NA**

Qual é o resultado de:

**1 == NA**

**NA**



Qual é o resultado de:

**NA == NA**

Qual é o resultado de:

**NA == NA**

**NA**

Qual é o resultado de:

`is.na(NA)`

**TRUE**

# Testes de lógica

## ?Comparison

<code>x &lt; y</code>	Menor que
<code>x &gt; y</code>	Maior que
<code>x == y</code>	Igual a
<code>x &lt;= y</code>	Menor ou igual a
<code>x &gt;= y</code>	Maior ou igual a
<code>x != y</code>	Não é igual a
<code>x %in% y</code>	Pertence a
<code>is.na(x)</code>	Valor não disponível
<code>!is.na(x)</code>	Valor existe

Aplique a função *filter* aos dados *babynames* para extrair:

- As observações onde **prop** é maior ou igual a 0.08
- As observações de crianças chamadas José

```
filter(babynames, prop >= 0.08)
```

#	year	sex	name	n	prop
# 1	1880	M	John	9655	0.08154630
# 2	1880	M	William	9531	0.08049899
# 3	1881	M	John	8769	0.08098299

```
filter(babynames, name == "Jose")
```

	year	sex	name	n	prop
	<dbl>	<chr>	<chr>	<dbl>	<dbl>
1	1880	M	Jose	84	0.000709
2	1881	M	Jose	76	0.000702
3	1882	M	Jose	95	0.000778
4	1883	M	Jose	74	0.000658

1. = em vez de ==

```
filter(babynames, name = "Jose")  
filter(babynames, name == "Jose")
```

2. Esquecer aspas

```
filter(babynames, name == Jose)  
filter(babynames, name == "Jose")
```

3. Caracteres especiais

```
filter(babynames, name == "José")  
filter(babynames, name == "Jose")
```



# filter()

Extrai observações que cumpram todos os critérios fornecidos

```
filter(babynames, name == "Maria", year == 1880)
```

babynames

year	sex	name	n	prop
1880	F	Mary	7065	0.0724
1880	F	Margaret	1578	0.0162
1880	F	Martha	1040	0.0107
1880	F	Marie	471	0.00483
1880	F	Maria	125	0.00128
1881	F	Mary	6919	0.0700



year	sex	name	n	prop
1880	F	Maria	125	0.00128

50



# filter(!is.na())

Remover observações com dados em falta

```
filter(x, !is.na(x2))
```

<sup>x</sup>  
X

x1	x2
A	1
B	NA
C	NA
D	3
E	NA

→

x1	x2
A	1
D	3



# filter()

Extrai observações que cumpram todos os critérios fornecidos

```
filter(babynames, name == "Maria" & year == 1880)
```

babynames

year	sex	name	n	prop
1880	F	Mary	7065	0.0724
1880	F	Margaret	1578	0.0162
1880	F	Martha	1040	0.0107
1880	F	Marie	471	0.00483
1880	F	Maria	125	0.00128
1881	F	Mary	6919	0.0700



year	sex	name	n	prop
1880	F	Maria	125	0.00128

52



# Operadores lógicos

?base::Logic

<code>a &amp; b</code>	e
<code>a   b</code>	ou
<code>xor(a,b)</code>	ou ... ou
<code>!a</code>	não é
<code>( )</code>	agrupar testes

$x \geq 2 \ \& \ x < 3$



TRUE & TRUE



TRUE

# Atenção

3. Testes lógicos de dois lados (intervalos) não funcionam

```
filter(babynames, 10 < n < 20)  
filter(babynames, 10 < n, n < 20)
```

4. Juntar vários testes (em vez de usar %in%)

```
filter(babynames, n == 5 | n == 6 | n == 7 | n == 8)  
filter(babynames, n %in% c(5, 6, 7, 8))
```

# arrange()

Ordenar do mais pequeno para o maior

```
arrange(.data, ...)
```

**variáveis a usar para ordenação**  
(por ordem de prioridade)

# arrange()

Ordenar do mais pequeno para o maior

```
arrange(babynames, n)
```

babynames

year	sex	name	n	prop
1880	M	John	9655	0.0815
1880	M	William	9532	0.0805
1880	M	James	5927	0.0501
1880	M	Charles	5348	0.0451
1880	M	Garrett	13	0.0001
1881	M	John	8769	0.081



57

year	sex	name	n	prop
1880	M	Garrett	13	0.0001
1880	M	Charles	5348	0.0451
1880	M	James	5927	0.0501
1881	M	John	8769	0.081
1880	M	William	9532	0.0805
1880	M	John	9655	0.0815





# desc()

Ordenar do maior para o mais pequeno

```
arrange(babynames, desc(n))
```

babynames

year	sex	name	n	prop
1880	M	John	9655	0.0815
1880	M	William	9532	0.0805
1880	M	James	5927	0.0501
1880	M	Charles	5348	0.0451
1880	M	Garrett	13	0.0001
1881	M	John	8769	0.081



58

year	sex	name	n	prop
1880	M	John	9655	0.0815
1880	M	William	9532	0.0805
1881	M	John	8769	0.081
1880	M	James	5927	0.0501
1880	M	Charles	5348	0.0451
1880	M	Garrett	13	0.0001



Qual é o nome mais raro?  
E o mais frequente?

```
arrange(babynames, n, prop)
```

#		year	sex	name	n	prop
#	1	2007	M	Aaban	5	2.259872e-06
#	2	2007	M	Aareon	5	2.259872e-06
#	3	2007	M	Aaris	5	2.259872e-06
#	4	2007	M	Abd	5	2.259872e-06
#	5	2007	M	Abdulazeez	5	2.259872e-06
#	6	2007	M	Abdulahadi	5	2.259872e-06
#	7	2007	M	Abdulhamid	5	2.259872e-06
#	8	2007	M	Abdulkadir	5	2.259872e-06
#	9	2007	M	Abdulraheem	5	2.259872e-06
#	10	2007	M	Abdulrahim	5	2.259872e-06
#	... with 1,924,655 more rows					

```
arrange(babynames, desc(n))
```

```
#   year sex name    n    prop
# 1 1947  F  Linda 99680 0.05483609
# 2 1948  F  Linda 96211 0.05521159
# 3 1947  M  James 94763 0.05102057
# 4 1957  M Michael 92726 0.04238659
# 5 1947  M  Robert 91646 0.04934237
# 6 1949  F  Linda 91010 0.05184281
# 7 1956  M Michael 90623 0.04225479
# 8 1958  M Michael 90517 0.04203881
# 9 1948  M  James 88588 0.04969679
#10 1954  M Michael 88493 0.04279403
# ... with 1,924,655 more rows
```

# Mini-teste

Qual o nome de menino mais popular em 2015?

```
boys_2015 <- filter(babynames, year == 2015, sex == "M")  
boys_2015 <- select(boys_2015, name, n)  
boys_2015 <- arrange(boys_2015, desc(n))  
boys_2015
```

```
boys_2015 <- filter(babynames, year == 2015, sex == "M")  
boys_2015 <- select(boys_2015, name, n)  
boys_2015 <- arrange(boys_2015, desc(n))  
boys_2015
```

```
arrange(select(filter(babynames, year == 2015,  
  sex == "M"), name, n), desc(n))
```



# sintaxe dplyr de manipulação de dados

Todas as funções têm como primeiro argumento uma tabela de dados e devolvem outra como resultado.

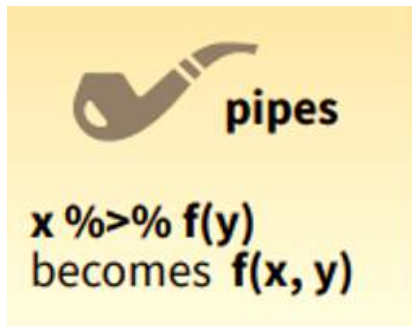
```
filter(.data, ... )
```

**função dplyr**

**data frame a  
transformar**

**outros argumentos  
da função**

# Operador pipe %>%



$\%>\%$

`babynames %>% filter(_____, n == 99680)`

Passa resultado da esquerda à função da direita, para o seu primeiro argumento. Experimente:

```
filter(babynames, n == 99680)  
babynames %>% filter(n == 99680)
```

# Pipes

```
babynames  
boys_2015 <- filter(babynames, year == 2015, sex == "M")  
boys_2015 <- select(boys_2015, name, n)  
boys_2015 <- arrange(boys_2015, desc(n))  
boys_2015
```

```
babynames %>%  
  filter(year == 2015, sex == "M") %>%  
  select(name, n) %>%  
  arrange(desc(n))
```

# Atalho de teclado para %>%

**Ctrl** + **Shift** + **M** (Windows)

e para <-

**Alt** + **-** (Windows)

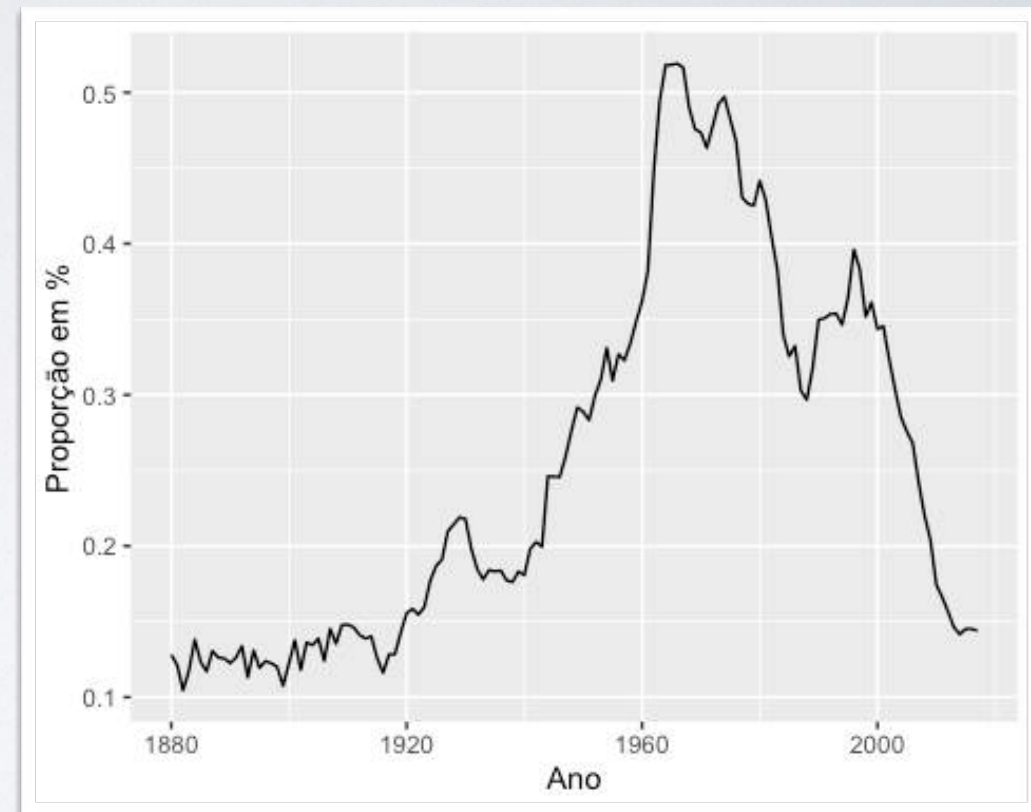
Qual o nome de menina mais popular em 2015?

```
babynames %>%  
  filter(year == 2017, sex == "F") %>%  
  select(name, n) %>%  
  arrange(desc(n))
```

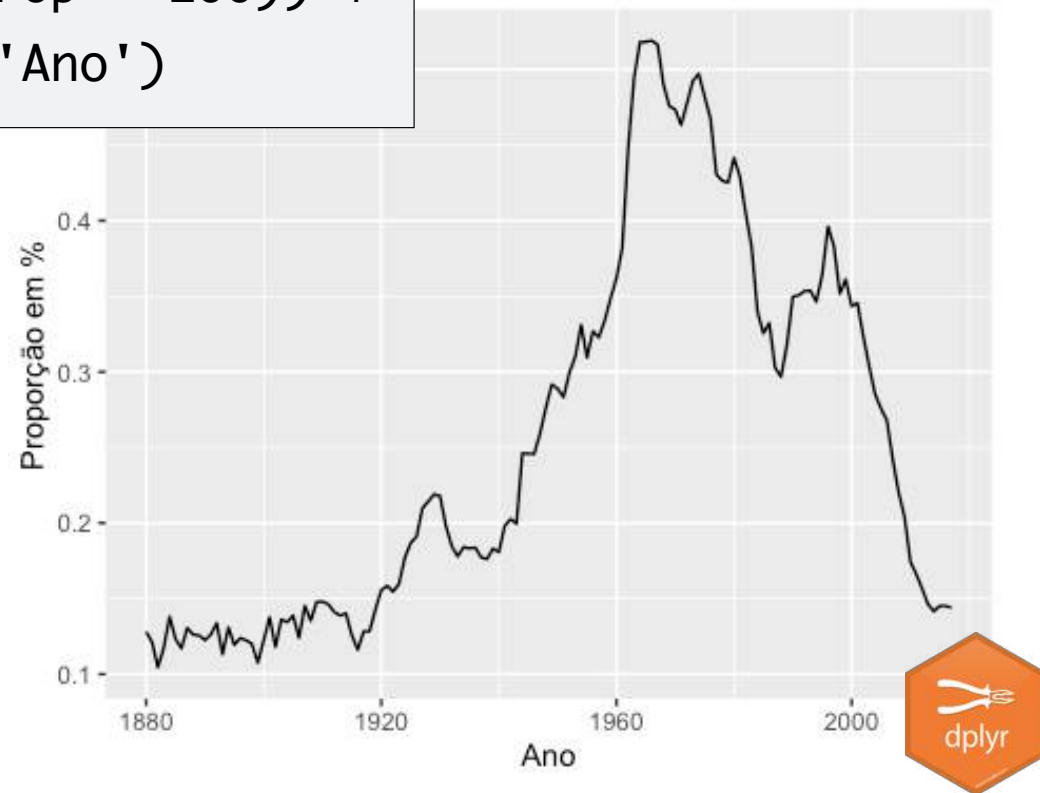
```
#   name      n  
# 1 Emma    19738  
# 2 Olivia  18632  
# 3 Ava     15902  
# 4 Isabella 15100  
# 5 Sophia  14831  
# 6 Mia     13437  
# 7 Charlotte 12893  
# 8 Amelia  11800  
# 9 Evelyn  10675  
## ... with 20,170 more rows
```

# Reproduzir o gráfico

1. Filtrar dados para conter apenas as “Marias”
2. Selecionar apenas as colunas necessárias para o gráfico
3. Construir gráfico de linhas com **year** no eixo do x and **prop** no eixo dos y



```
babynames %>%  
  filter(name == "Maria", sex == "F") %>%  
  select(year, prop) %>%  
  ggplot() +  
    geom_line(mapping = aes(year, prop * 100)) +  
    labs(y = 'Proporção em %', x = 'Ano')
```





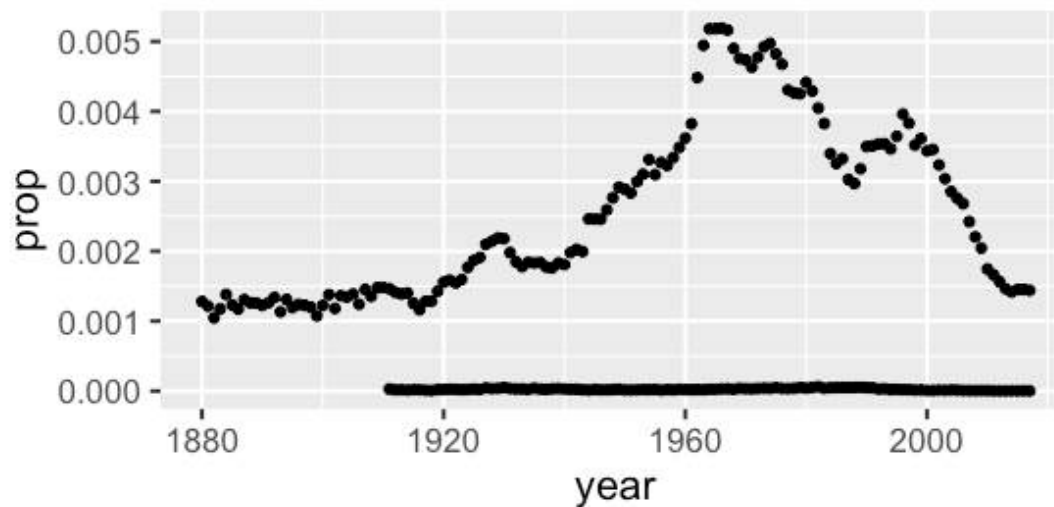
```
babynames %>%
```

```
  filter(name == "Maria") %>%
```

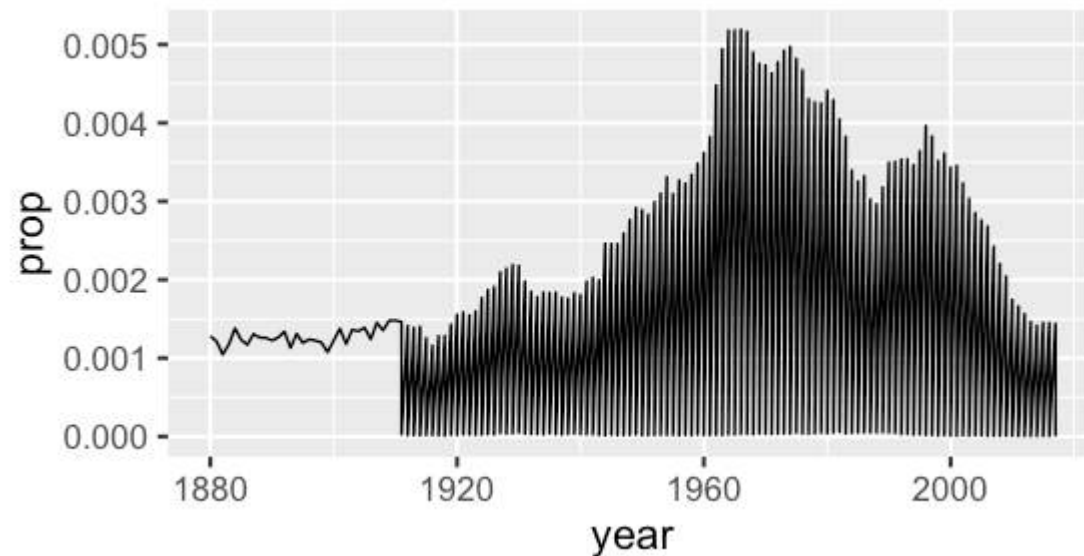
```
  ggplot() +
```

```
    geom_point(mapping = aes(year, prop))
```

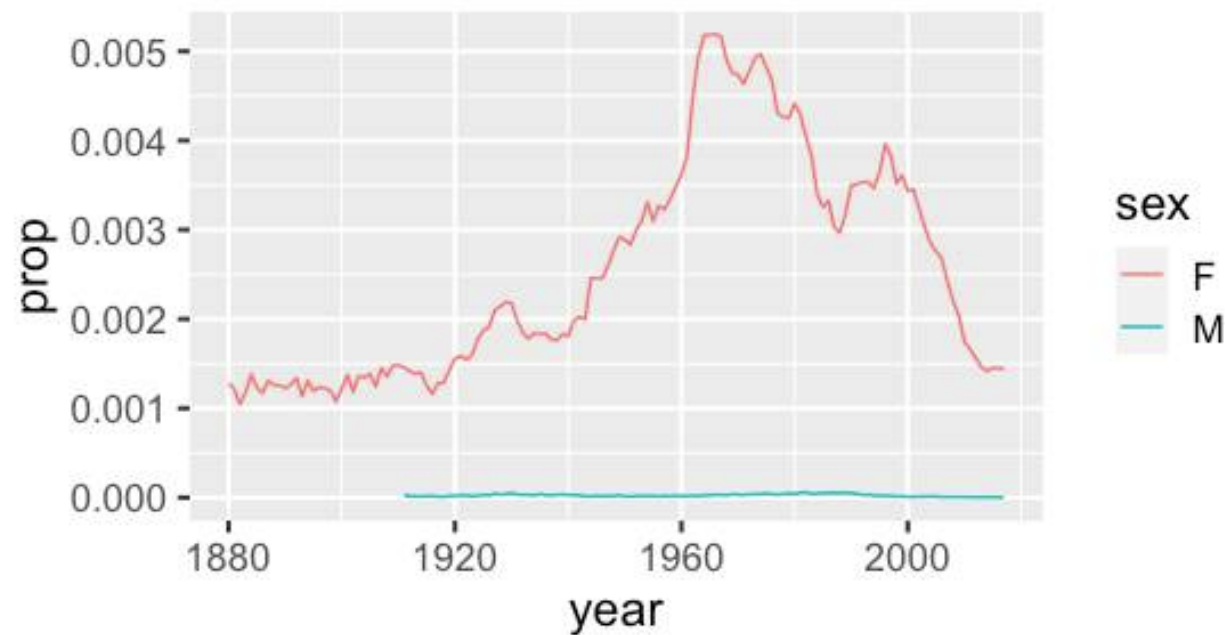
Sem filtrar na  
variável SEX



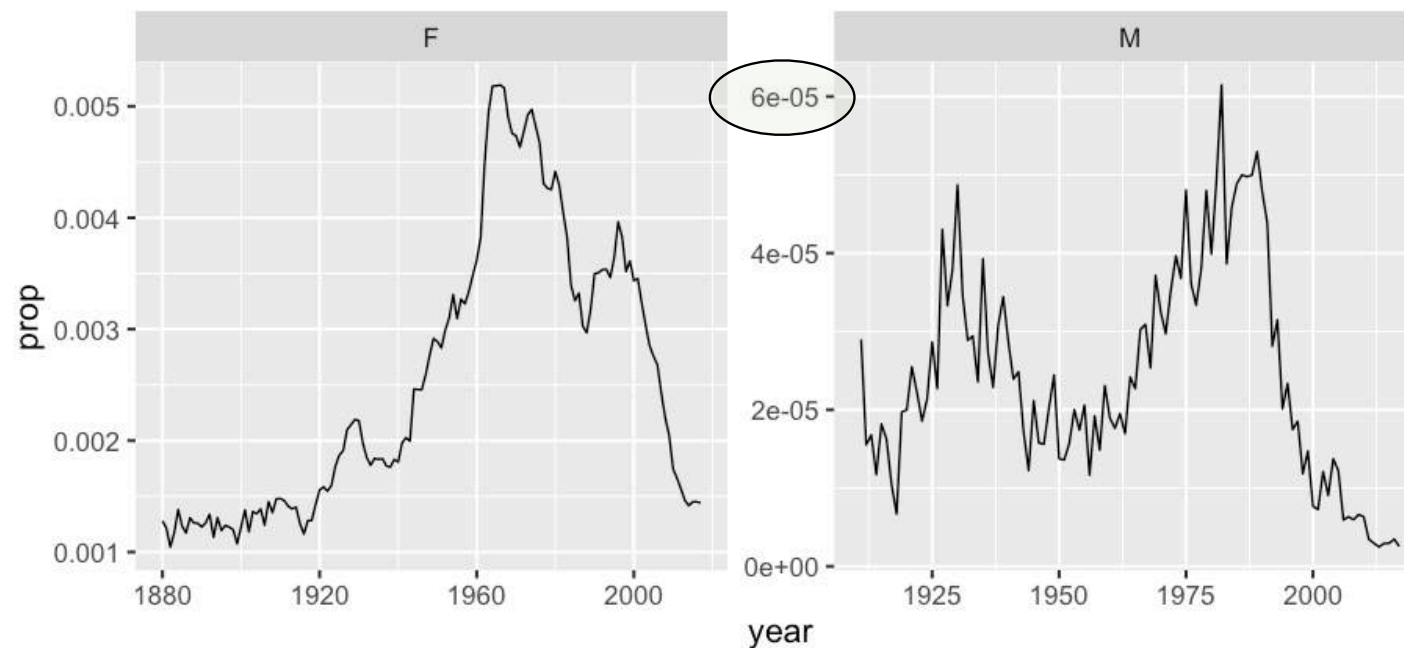
```
babynames %>%  
  filter(name == "Maria") %>%  
  ggplot() +  
    geom_line(mapping = aes(year, prop))
```



```
babynames %>%  
  filter(name == "Maria") %>%  
  ggplot() +  
    geom_line(mapping = aes(year, prop, color = sex))
```



```
babynames %>% filter(name == "Michael") %>%  
  ggplot() +  
    geom_line(mapping = aes(year, prop)) +  
    facet_wrap(~ sex)
```



**Obrigado  
e bom fim-de-semana!**

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