

Regular Expressions

Data Wrangling, Session 5

Kieran Healy
Code Horizons

January 2026

A brief introduction to regular expressions

Load the packages, as always

```
library(here)      # manage file paths  
library(socviz)    # data and some useful functions
```

```
library(tidyverse) # your friend and mine  
library(gapminder) # gapminder data  
library(stringr)
```

Regular Expressions

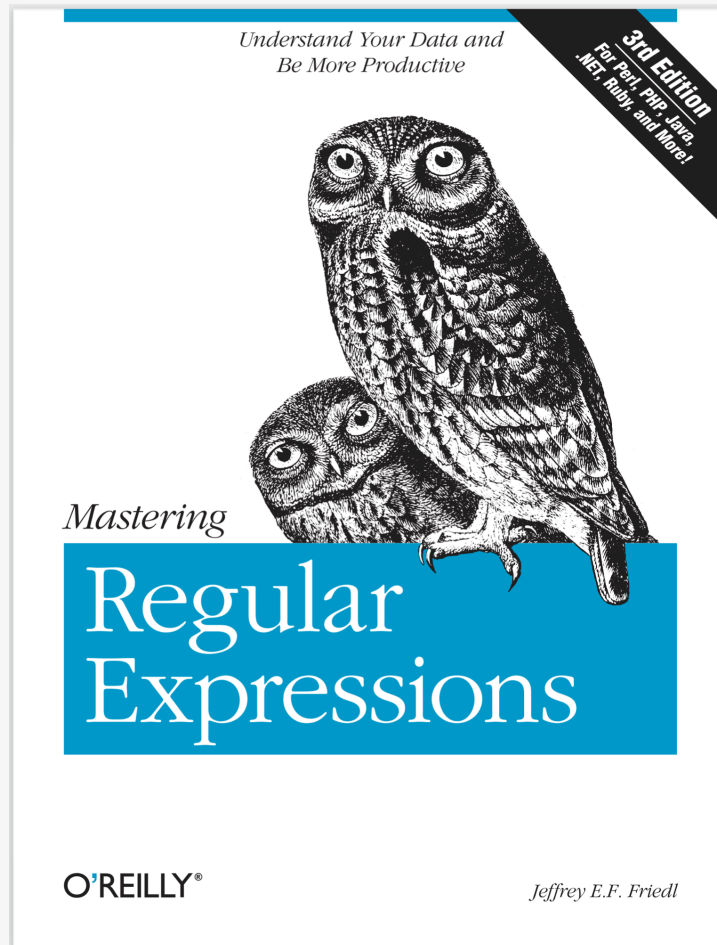
Or, waiter, there appears to be a language inside my language

stringr is your gateway to regexps

```
library(stringr) # It's loaded by default with library(tidyverse)
```

regexps are their own whole world

This book is a thing of beauty.



Searching for patterns

A regular expression is a way of searching for a piece of text, or *pattern*, inside some larger body of text, called a *string*.

Searching for patterns

A regular expression is a way of searching for a piece of text, or *pattern*, inside some larger body of text, called a *string*.

The simplest sort of search is like the “Find” functionality in a Word Processor. The pattern is a literal letter, number, punctuation mark, word or series of words; the text is a document searched one line at a time. The next step up is “Find and Replace”.

Searching for patterns

A regular expression is a way of searching for a piece of text, or *pattern*, inside some larger body of text, called a *string*.

The simplest sort of search is like the “Find” functionality in a Word Processor. The pattern is a literal letter, number, punctuation mark, word or series of words; the text is a document searched one line at a time. The next step up is “Find and Replace”.

Every pattern-searching function in `stringr` has the same basic form:

```
str_view(<STRING>, <PATTERN>, [...]) # where [...] means "maybe some options"
```

Searching for patterns

A regular expression is a way of searching for a piece of text, or *pattern*, inside some larger body of text, called a *string*.

The simplest sort of search is like the “Find” functionality in a Word Processor. The pattern is a literal letter, number, punctuation mark, word or series of words; the text is a document searched one line at a time. The next step up is “Find and Replace”.

Every pattern-searching function in `stringr` has the same basic form:

```
str_view(<STRING>, <PATTERN>, [...]) # where [...] means "maybe some options"
```

Functions that *replace* as well as *detect* strings all have this form:

```
str_replace(<STRING>, <PATTERN>, <REPLACEMENT>)
```

Searching for patterns

A regular expression is a way of searching for a piece of text, or *pattern*, inside some larger body of text, called a *string*.

The simplest sort of search is like the “Find” functionality in a Word Processor. The pattern is a literal letter, number, punctuation mark, word or series of words; the text is a document searched one line at a time. The next step up is “Find and Replace”.

Every pattern-searching function in `stringr` has the same basic form:

```
str_view(<STRING>, <PATTERN>, [...]) # where [...] means "maybe some options"
```

Functions that *replace* as well as *detect* strings all have this form:

```
str_replace(<STRING>, <PATTERN>, <REPLACEMENT>)
```

(If you think about it, `<STRING>`, `<PATTERN>` and `<REPLACEMENT>` above are all kinds of pattern: they are meant to “stand for” all kinds of text, not be taken literally.)

Searching for patterns

Here I'll follow the exposition in Wickham & Grolemund (2017).

```
x ← c("apple", "banana", "pear")  
str_view(x, "an", html=FALSE)
```

```
[2] | b<an><an>a
```

Searching for patterns

Searching for patterns

Searching for patterns

Regular expressions get their real power from *wildcards*, i.e. tokens that match more than just literal strings, but also more general and more complex patterns.

Searching for patterns

Regular expressions get their real power from *wildcards*, i.e. tokens that match more than just literal strings, but also more general and more complex patterns.

The most general pattern-matching token is, “Match everything!” This is represented by the period, or .

Searching for patterns

Regular expressions get their real power from *wildcards*, i.e. tokens that match more than just literal strings, but also more general and more complex patterns.

The most general pattern-matching token is, “Match everything!” This is represented by the period, or `.`

But ... if `.` matches any character, how do you specifically match the literal character `.`?

Escaping

Escaping

You have to “escape” the period to tell the regex you want to match it exactly, rather than interpret it as meaning “match anything”.

Escaping

You have to “escape” the period to tell the regex you want to match it exactly, rather than interpret it as meaning “match anything”.

regexs use the backslash, \, to signal “escape the next character”.

Escaping

You have to “escape” the period to tell the regex you want to match it exactly, rather than interpret it as meaning “match anything”.

regexs use the backslash, `\`, to signal “escape the next character”.

To match a `.`, you need the regex `\.`

Hang on, I see a further problem

We use strings to represent regular expressions. `\` is also used as an escape symbol in strings. So to create the regular expression `\.` we need the string `\\.`

```
# To create the regular expression, we need \\  
dot ← "\\."
```

```
# But the expression itself only contains one:  
writeLines(dot)
```

```
\\.
```

```
# And this tells R to look for an explicit .  
str_view(c("abc", "a.c", "bef"), "a\\.c")
```

```
[2] | <a.c>
```

But ... how do you match a **literal** \?

```
x ← "a\\b"  
writeLines(x)
```

```
a\b
```

```
#> a\b
```

```
str_view(x, "\\") # you need four!
```

```
[1] | a<\>b
```

But ... how do you match a **literal** \?

This is the price we pay for having to express searches for patterns using a language containing these same characters, which we may also want to search for.

**I *promise* this will
pay off**

Matching start and end

Use **^** to match the start of a string.

```
x ← c("apple", "banana", "pear")  
str_view(x, "^a")
```

```
[1] | <a>pple
```

Matching start and end

Use **^** to match the start of a string.

```
x ← c("apple", "banana", "pear")  
str_view(x, "^a")
```

```
[1] | <a>pple
```

Use **\$** to match the end of a string.

```
str_view(x, "a$")
```

```
[2] | banan<a>
```

Matching start and end

To force a regular expression to only match a complete string, anchor it with both **^** and **\$**

```
x ← c("apple pie", "apple", "apple cake")  
str_view(x, "apple")
```

```
[1] | <apple> pie  
[2] | <apple>  
[3] | <apple> cake
```

```
str_view(x, "^apple$")
```

```
[2] | <apple>
```

Matching character classes

`\d` matches any digit.

`\s` matches any whitespace (e.g. space, tab, newline).

`abc` matches a, b, or c.

`^abc` matches anything except a, b, or c.

Matching the *special* characters

Look for a literal character that normally has special meaning in a regex:

```
str_view(c("abc", "a.c", "a*c", "a c"), "a[.]c")
```

```
[2] | <a.c>
```

```
str_view(c("abc", "a.c", "a*c", "a c"), "a[*]c")
```

```
[3] | <a*c>
```

This works for most (but not all) regex metacharacters: `$.|?*+()[]`.

Unfortunately, a few characters have special meaning even inside a character class and must be handled with backslash escapes. These are `]`, `\`, `^` and `-`.

Alternation

Use parentheses to make the precedence of the 'or' operator **|** clear:

```
str_view(c("groy", "grey", "griy", "gray"), "gr(ela)y")
```

```
[2] | <grey>
```

```
[4] | <gray>
```

Repeated patterns

? is 0 or 1

+ is 1 or more

* is 0 or more

```
x ← "1888 is the longest year in Roman numerals: MDCCCLXXXVIII"  
str_view(x, "CC?")
```

```
[1] | 1888 is the longest year in Roman numerals: MD<CC><C>LXXXVIII
```

Repeated patterns

? is 0 or 1

+ is 1 or more

* is 0 or more

```
str_view(x, "CC+")
```

```
[1] | 1888 is the longest year in Roman numerals: MD<CCC>LXXXVIII
```


Repeated patterns

? is 0 or 1

+ is 1 or more

* is 0 or more

```
x ← "1888 is the longest year in Roman numerals: MDCCCLXXXVIII"  
str_view(x, 'C[LX]+')
```

```
[1] | 1888 is the longest year in Roman numerals: MDCC<CLXXX>VIII
```

Exact numbers of repetitions

`{n}` is exactly n

`{n,}` is n or more

`{,m}` is at most m

`{n,m}` is between n and m

```
str_view(x, "C{2}")
```

```
[1] | 1888 is the longest year in Roman numerals: MD<CC>CLXXXVIII
```

Exact numbers of repetitions

`{n}` is exactly n

`{n,}` is n or more

`{,m}` is at most m

`{n,m}` is between n and m

```
str_view(x, "C{2,}")
```

```
[1] | 1888 is the longest year in Roman numerals: MD<CCC>LXXXVIII
```

Exact numbers of repetitions

`{n}` is exactly n

`{n,}` is n or more

`{,m}` is at most m

`{n,m}` is between n and m

```
str_view(x, "C{2,3}")
```

```
[1] | 1888 is the longest year in Roman numerals: MD<CCC>LXXXVIII
```

Exact numbers of repetitions

`{n}` is exactly n

`{n,}` is n or more

`{,m}` is at most m

`{n,m}` is between n and m

By default regexps use *greedy* matches. You can make them match the *shortest* string possible by putting a `?` after them. **This is often very useful!**

```
str_view(x, 'C{2,3}?')
```

```
[1] | 1888 is the longest year in Roman numerals: MD<CC>CLXXXVIII
```

Exact numbers of repetitions

$\{n\}$ is exactly n

$\{n,\}$ is n or more

$\{,m\}$ is at most m

$\{n,m\}$ is between n and m

By default these are *greedy* matches. You can make them “lazy”, matching the shortest string possible by putting a $?$ after them. **This is often very useful!**

```
str_view(x, 'C[LX]+?')
```

```
[1] | 1888 is the longest year in Roman numerals: MDCC<CL>XXXVIII
```

And **finally** ... backreferences

fruit # built into stringr

[1] "apple"	"apricot"	"avocado"
[4] "banana"	"bell pepper"	"bilberry"
[7] "blackberry"	"blackcurrant"	"blood orange"
[10] "blueberry"	"boysenberry"	"breadfruit"
[13] "canary melon"	"cantaloupe"	"cherimoya"
[16] "cherry"	"chili pepper"	"clementine"
[19] "cloudberry"	"coconut"	"cranberry"
[22] "cucumber"	"currant"	"damson"
[25] "date"	"dragonfruit"	"durian"
[28] "eggplant"	"elderberry"	"feijoa"
[31] "fig"	"goji berry"	"gooseberry"
[34] "grape"	"grapefruit"	"guava"
[37] "honeydew"	"huckleberry"	"jackfruit"
[40] "jambul"	"jujube"	"kiwi fruit"
[43] "kumquat"	"lemon"	"lime"
[46] "loquat"	"lychee"	"mandarine"
[49] "mango"	"mulberry"	"nectarine"
[52] "nut"	"olive"	"orange"
[55] "pamelo"	"papaya"	"passionfruit"

Grouping and backreferences

Find all fruits that have a repeated pair of letters:

```
str_view(fruit, "(..)\1", match = TRUE)
```

```
[4] | b<anan>a  
[20] | <coco>nut  
[22] | <cucu>mber  
[41] | <juju>be  
[56] | <papa>ya  
[73] | s<alal> berry
```


Grouping and backreferences

Backreferences and grouping will be very useful for string *replacements*.

OK that was a lot



Learning and testing regexps

Practice with a tester like <https://regexr.com> or <https://regex101.com>

Or an app like [Patterns](#)

The regex engine or “flavor” used by [stringr](#) is Perl- or PCRE2-like.

Regexps in practice

Example: Politics and Placenames

```
library(ukelection2019)
```

Example: Politics and Placenames

```
library(ukelection2019)
```

```
ukvote2019
```

```
# A tibble: 3,320 × 13
  cid constituency electorate party_name candidate
votes vote_share_percent
<chr> <chr> <int> <chr> <chr>
<int> <dbl>
1 W07000... Aberavon 50747 Labour Stephen ...
17008 53.8
2 W07000... Aberavon 50747 Conservat... Charlott...
6518 20.6
3 W07000... Aberavon 50747 The Brexi... Glenda D...
3108 9.8
4 W07000... Aberavon 50747 Plaid Cym... Nigel Hu...
2711 8.6
5 W07000... Aberavon 50747 Liberal D... Sheila K...
1072 3.4
6 W07000... Aberavon 50747 Independe... Captain ...
731 2.3
7 W07000... Aberavon 50747 Green Giorgia ...
450 1.4
8 W07000... Aberconwy 44699 Conservat... Robin Mi...
14687 46.1
9 W07000... Aberconwy 44699 Labour Emily Ow...
12653 39.7
10 W07000... Aberconwy 44699 Plaid Cym... Lisa Goo...
2704 8.5
```

Example: Politics and Placenames

```
library(ukelection2019)

ukvote2019 >
  group_by(constituency)
```

```
# A tibble: 3,320 × 13
# Groups:   constituency [650]
  cid constituency electorate party_name candidate
votes vote_share_percent
  <chr>    <chr>          <int> <chr>      <chr>
<int>          <dbl>
1 W07000... Aberavon          50747 Labour      Stephen ...
17008          53.8
2 W07000... Aberavon          50747 Conservat... Charlott...
6518          20.6
3 W07000... Aberavon          50747 The Brexi... Glenda D...
3108          9.8
4 W07000... Aberavon          50747 Plaid Cym... Nigel Hu...
2711          8.6
5 W07000... Aberavon          50747 Liberal D... Sheila K...
1072          3.4
6 W07000... Aberavon          50747 Independe... Captain ...
731          2.3
7 W07000... Aberavon          50747 Green        Giorgia ...
450          1.4
8 W07000... Aberconwy          44699 Conservat... Robin Mi...
14687          46.1
9 W07000... Aberconwy          44699 Labour      Emily Ow...
12653          39.7
10 W07000... Aberconwy          44699 Plaid Cym... Lisa Goo...
```

Example: Politics and Placenames

```
library(ukelection2019)
```

```
ukvote2019 >  
  group_by(constituency) >  
  slice_max(votes)
```

```
# A tibble: 650 × 13  
# Groups:   constituency [650]  
   cid      constituency electorate party_name candidate  
votes vote_share_percent  
  <chr>      <chr>          <int> <chr>      <chr>  
<int>          <dbl>  
  1 W07000... Aberavon          50747 Labour      Stephen ...  
17008          53.8  
  2 W07000... Aberconwy          44699 Conservat... Robin Mi...  
14687          46.1  
  3 S14000... Aberdeen No...          62489 Scottish ... Kirsty B...  
20205          54  
  4 S14000... Aberdeen So...          65719 Scottish ... Stephen ...  
20388          44.7  
  5 S14000... Aberdeenshi...          72640 Conservat... Andrew B...  
22752          42.7  
  6 S14000... Airdrie & S...          64008 Scottish ... Neil Gray  
17929          45.1  
  7 E14000... Aldershot          72617 Conservat... Leo Doch...  
27980          58.4  
  8 E14000... Aldridge-Br...          60138 Conservat... Wendy Mo...  
27850          70.8  
  9 E14000... Altrincham ...          73096 Conservat... Graham B...  
26311          48  
10 W07000... Alyn & Dees...          62783 Labour      Mark Tami
```


Example: Politics and Placenames

```
library(ukelection2019)
```

```
ukvote2019 >  
  group_by(constituency) >  
  slice_max(votes) >  
  ungroup()
```

```
# A tibble: 650 × 13  
  cid constituency electorate party_name candidate  
  votes vote_share_percent  
  <chr>    <chr>          <int> <chr>    <chr>  
  <int>          <dbl>  
1 W07000... Aberavon          50747 Labour    Stephen ...  
17008          53.8  
2 W07000... Aberconwy          44699 Conservat... Robin Mi...  
14687          46.1  
3 S14000... Aberdeen No...          62489 Scottish ... Kirsty B...  
20205          54  
4 S14000... Aberdeen So...          65719 Scottish ... Stephen ...  
20388          44.7  
5 S14000... Aberdeenshi...          72640 Conservat... Andrew B...  
22752          42.7  
6 S14000... Airdrie & S...          64008 Scottish ... Neil Gray  
17929          45.1  
7 E14000... Aldershot          72617 Conservat... Leo Doch...  
27980          58.4  
8 E14000... Aldridge-Br...          60138 Conservat... Wendy Mo...  
27850          70.8  
9 E14000... Altrincham ...          73096 Conservat... Graham B...  
26311          48  
10 W07000... Alyn & Dees...          62783 Labour    Mark Tami  
18271          42.5
```

Example: Politics and Placenames

```
library(ukelection2019)

ukvote2019 >
  group_by(constituency) >
  slice_max(votes) >
  ungroup() >
  select(constituency, party_name)
```

```
# A tibble: 650 × 2
  constituency party_name
  <chr>         <chr>
1 Aberavon     Labour
2 Aberconwy    Conservative
3 Aberdeen North Scottish National
Party
4 Aberdeen South Scottish National
Party
5 Aberdeenshire West & Kincardine Conservative
6 Airdrie & Shotts Scottish National
Party
7 Aldershot    Conservative
8 Aldridge-Brownhills Conservative
9 Altrincham & Sale West Conservative
10 Alyn & Deeside Labour
# i 640 more rows
```

Example: Politics and Placenames

```
library(ukelection2019)

ukvote2019 >
  group_by(constituency) >
  slice_max(votes) >
  ungroup() >
  select(constituency, party_name) >
  mutate(shire = str_detect(constituency, "shire"),
         field = str_detect(constituency, "field"),
         dale = str_detect(constituency, "dale"),
         pool = str_detect(constituency, "pool"),
         ton = str_detect(constituency, "(ton$)|(ton )"),
         wood = str_detect(constituency, "(wood$)|(wood )"),
         saint = str_detect(constituency, "(St )|(Saint)"),
         port = str_detect(constituency, "(Port)|(port)"),
         ford = str_detect(constituency, "(ford$)|(ford )"),
         by = str_detect(constituency, "(by$)|(by )"),
         boro = str_detect(constituency, "(boro$)|(boro )|(borough$)|(borough )"),
         ley = str_detect(constituency, "(ley$)|(ley )|(leigh$)|(leigh )"))
```

```
# A tibble: 650 × 14
  constituency party_name shire field dale pool ton
wood saint port ford
  <chr>          <chr>      <lgl> <lgl> <lgl> <lgl> <lgl>
<lgl> <lgl> <lgl> <lgl>
1 Aberavon      Labour      FALSE FALSE FALSE FALSE FALSE
FALSE FALSE FALSE FALSE
2 Aberconwy     Conservat... FALSE FALSE FALSE FALSE FALSE
FALSE FALSE FALSE FALSE
3 Aberdeen No... Scottish ... FALSE FALSE FALSE FALSE FALSE
FALSE FALSE FALSE FALSE
4 Aberdeen So... Scottish ... FALSE FALSE FALSE FALSE FALSE
FALSE FALSE FALSE FALSE
5 Aberdeenshi... Conservat... TRUE  FALSE FALSE FALSE FALSE
FALSE FALSE FALSE FALSE
6 Airdrie & S... Scottish ... FALSE FALSE FALSE FALSE FALSE
FALSE FALSE FALSE FALSE
7 Aldershot     Conservat... FALSE FALSE FALSE FALSE FALSE
FALSE FALSE FALSE FALSE
8 Aldridge-Br... Conservat... FALSE FALSE FALSE FALSE FALSE
FALSE FALSE FALSE FALSE
9 Altrincham ... Conservat... FALSE FALSE FALSE FALSE FALSE
FALSE FALSE FALSE FALSE
10 Alyn & Dees... Labour      FALSE FALSE FALSE FALSE FALSE
FALSE FALSE FALSE FALSE
```

Example: Politics and Placenames

```
library(ukelection2019)

ukvote2019 >
  group_by(constituency) >
  slice_max(votes) >
  ungroup() >
  select(constituency, party_name) >
  mutate(shire = str_detect(constituency, "shire"),
         field = str_detect(constituency, "field"),
         dale = str_detect(constituency, "dale"),
         pool = str_detect(constituency, "pool"),
         ton = str_detect(constituency, "(ton$)|(ton )"),
         wood = str_detect(constituency, "(wood$)|(wood )"),
         saint = str_detect(constituency, "(St )|(Saint)"),
         port = str_detect(constituency, "(Port)|(port)"),
         ford = str_detect(constituency, "(ford$)|(ford )"),
         by = str_detect(constituency, "(by$)|(by )"),
         boro = str_detect(constituency, "(boro$)|(boro )|(borough$)|(borough )"),
         ley = str_detect(constituency, "(ley$)|(ley )|(leigh$)|(leigh )")) >
  pivot_longer(shire:ley, names_to = "toponym")
```

```
# A tibble: 7,800 × 4
  constituency party_name toponym value
  <chr>         <chr>      <chr> <lgl>
1 Aberavon     Labour     shire FALSE
2 Aberavon     Labour     field FALSE
3 Aberavon     Labour     dale  FALSE
4 Aberavon     Labour     pool  FALSE
5 Aberavon     Labour     ton   FALSE
6 Aberavon     Labour     wood  FALSE
7 Aberavon     Labour     saint FALSE
8 Aberavon     Labour     port  FALSE
9 Aberavon     Labour     ford  FALSE
10 Aberavon    Labour     by     FALSE
# i 7,790 more rows
```

Example: Politics and Placenames

```
place_tab ← ukvote2019 ▷
  group_by(constituency) ▷
  slice_max(votes) ▷
  ungroup() ▷
  select(constituency, party_name) ▷
  mutate(shire = str_detect(constituency, "shire"),
         field = str_detect(constituency, "field"),
         dale = str_detect(constituency, "dale"),
         pool = str_detect(constituency, "pool"),
         ton = str_detect(constituency, "(ton$)|(ton )"),
         wood = str_detect(constituency, "(wood$)|(wood )"),
         saint = str_detect(constituency, "(St )|(Saint)"),
         port = str_detect(constituency, "(Port)|(port)"),
         ford = str_detect(constituency, "(ford$)|(ford )"),
         by = str_detect(constituency, "(by$)|(by )"),
         boro = str_detect(constituency, "(boro$)|(boro )|(borough$)|(borough )"),
         ley = str_detect(constituency, "(ley$)|(ley )|(leigh$)|(leigh )")) ▷
  pivot_longer(shire:ley, names_to = "toponym")
```

Example: Politics and Placenames

```
place_tab
```

```
# A tibble: 7,800 × 4
  constituency party_name toponym value
  <chr>         <chr>      <chr>  <lgl>
1 Aberavon     Labour     shire  FALSE
2 Aberavon     Labour     field  FALSE
3 Aberavon     Labour     dale   FALSE
4 Aberavon     Labour     pool   FALSE
5 Aberavon     Labour     ton    FALSE
6 Aberavon     Labour     wood   FALSE
7 Aberavon     Labour     saint  FALSE
8 Aberavon     Labour     port   FALSE
9 Aberavon     Labour     ford   FALSE
10 Aberavon    Labour     by     FALSE
# i 7,790 more rows
```

Example: Politics and Placenames

```
place_tab ►  
  group_by(part_name, toponym)
```

```
# A tibble: 7,800 × 4  
# Groups:   party_name, toponym [120]  
  constituency party_name toponym value  
  <chr>         <chr>    <chr>  <lgl>  
1 Aberavon      Labour    shire  FALSE  
2 Aberavon      Labour    field  FALSE  
3 Aberavon      Labour    dale   FALSE  
4 Aberavon      Labour    pool   FALSE  
5 Aberavon      Labour    ton    FALSE  
6 Aberavon      Labour    wood   FALSE  
7 Aberavon      Labour    saint  FALSE  
8 Aberavon      Labour    port   FALSE  
9 Aberavon      Labour    ford   FALSE  
10 Aberavon     Labour    by     FALSE  
# i 7,790 more rows
```

Example: Politics and Placenames

```
place_tab ►  
  group_by(part_name, toponym) ►  
  filter(part_name %in% c("Conservative", "Labour"))
```

```
# A tibble: 6,816 × 4  
# Groups:   part_name, toponym [24]  
  constituency part_name toponym value  
    <chr>        <chr>    <chr>  <lgl>  
1 Aberavon     Labour    shire  FALSE  
2 Aberavon     Labour    field  FALSE  
3 Aberavon     Labour    dale   FALSE  
4 Aberavon     Labour    pool   FALSE  
5 Aberavon     Labour    ton    FALSE  
6 Aberavon     Labour    wood   FALSE  
7 Aberavon     Labour    saint  FALSE  
8 Aberavon     Labour    port   FALSE  
9 Aberavon     Labour    ford   FALSE  
10 Aberavon    Labour    by      FALSE  
# i 6,806 more rows
```


Example: Politics and Placenames

```
place_tab ►  
  group_by(part_name, toponym) ►  
  filter(part_name %in% c("Conservative", "Labour")) ►  
  group_by(toponym, part_name)
```

```
# A tibble: 6,816 × 4  
# Groups:   toponym, part_name [24]  
  constituency part_name toponym value  
  <chr>        <chr>    <chr> <lgl>  
1 Aberavon     Labour    shire  FALSE  
2 Aberavon     Labour    field  FALSE  
3 Aberavon     Labour    dale   FALSE  
4 Aberavon     Labour    pool   FALSE  
5 Aberavon     Labour    ton    FALSE  
6 Aberavon     Labour    wood   FALSE  
7 Aberavon     Labour    saint  FALSE  
8 Aberavon     Labour    port   FALSE  
9 Aberavon     Labour    ford   FALSE  
10 Aberavon    Labour    by     FALSE  
# i 6,806 more rows
```

Example: Politics and Placenames

```
place_tab >
  group_by(party_name, toponym) >
  filter(party_name %in% c("Conservative", "Labour")) >
  group_by(toponym, party_name) >
  summarize(freq = sum(value))
```

```
# A tibble: 24 × 3
# Groups:   toponym [12]
  toponym party_name freq
  <chr>    <chr>    <int>
1 boro     Conservative 7
2 boro     Labour      1
3 by       Conservative 6
4 by       Labour      2
5 dale     Conservative 3
6 dale     Labour      1
7 field    Conservative 10
8 field    Labour      10
9 ford     Conservative 17
10 ford    Labour      12
# i 14 more rows
```

Example: Politics and Placenames

```
place_tab >
  group_by(party_name, toponym) >
  filter(party_name %in% c("Conservative", "Labour")) >
  group_by(toponym, party_name) >
  summarize(freq = sum(value)) >
  mutate(pct = freq/sum(freq))
```

```
# A tibble: 24 × 4
# Groups:   toponym [12]
  toponym party_name    freq  pct
  <chr>    <chr>      <int> <dbl>
1 boro    Conservative     7 0.875
2 boro    Labour           1 0.125
3 by      Conservative     6 0.75
4 by      Labour           2 0.25
5 dale    Conservative     3 0.75
6 dale    Labour           1 0.25
7 field   Conservative    10 0.5
8 field   Labour          10 0.5
9 ford    Conservative    17 0.586
10 ford    Labour          12 0.414
# i 14 more rows
```

Example: Politics and Placenames

```
place_tab >
  group_by(party_name, toponym) >
  filter(party_name %in% c("Conservative", "Labour")) >
  group_by(toponym, party_name) >
  summarize(freq = sum(value)) >
  mutate(pct = freq/sum(freq)) >
  filter(party_name == "Conservative")
```

```
# A tibble: 12 × 4
# Groups:   toponym [12]
  toponym party_name    freq  pct
  <chr>    <chr>      <int> <dbl>
1 boro     Conservative     7 0.875
2 by       Conservative     6 0.75
3 dale     Conservative     3 0.75
4 field    Conservative    10 0.5
5 ford     Conservative    17 0.586
6 ley      Conservative    26 0.722
7 pool     Conservative     2 0.286
8 port     Conservative     3 0.333
9 saint    Conservative     3 0.5
10 shire    Conservative    37 0.974
11 ton      Conservative    37 0.507
12 wood     Conservative     7 0.636
```

Example: Politics and Placenames

```
place_tab >
  group_by(party_name, toponym) >
  filter(party_name %in% c("Conservative", "Labour")) >
  group_by(toponym, party_name) >
  summarize(freq = sum(value)) >
  mutate(pct = freq/sum(freq)) >
  filter(party_name == "Conservative") >
  arrange(desc(pct))
```

```
# A tibble: 12 × 4
# Groups:   toponym [12]
  toponym party_name    freq  pct
  <chr>    <chr>      <int> <dbl>
1 shire    Conservative    37 0.974
2 boro     Conservative     7 0.875
3 by       Conservative     6 0.75
4 dale     Conservative     3 0.75
5 ley      Conservative    26 0.722
6 wood     Conservative     7 0.636
7 ford     Conservative    17 0.586
8 ton      Conservative    37 0.507
9 field    Conservative    10 0.5
10 saint    Conservative     3 0.5
11 port     Conservative     3 0.333
12 pool     Conservative     2 0.286
```

Example: Politics and Placenames

```
place_tab >
  group_by(party_name, toponym) >
  filter(party_name %in% c("Conservative", "Labour")) >
  group_by(toponym, party_name) >
  summarize(freq = sum(value)) >
  mutate(pct = freq/sum(freq)) >
  filter(party_name == "Conservative") >
  arrange(desc(pct))
```

```
# A tibble: 12 × 4
# Groups:   toponym [12]
  toponym party_name    freq  pct
  <chr>    <chr>      <int> <dbl>
1 shire    Conservative    37 0.974
2 boro     Conservative     7 0.875
3 by       Conservative     6 0.75
4 dale     Conservative     3 0.75
5 ley      Conservative    26 0.722
6 wood     Conservative     7 0.636
7 ford     Conservative    17 0.586
8 ton      Conservative    37 0.507
9 field    Conservative    10 0.5
10 saint    Conservative     3 0.5
11 port     Conservative     3 0.333
12 pool     Conservative     2 0.286
```