Join together for fun

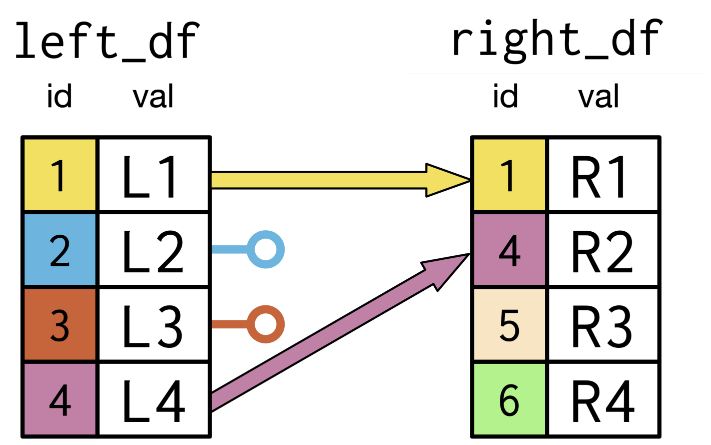
PROGRAMMING WITH DPLYR

Dr. Chester Ismay

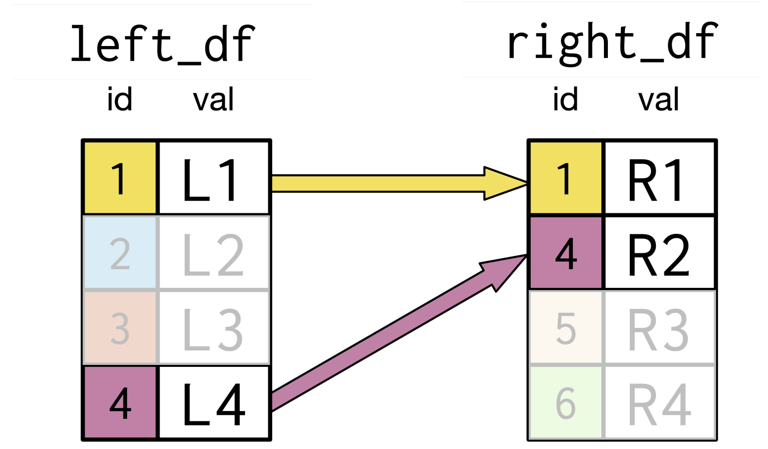
Educator, Data Scientist, and R/Python Consultant

dplyr join diagrams

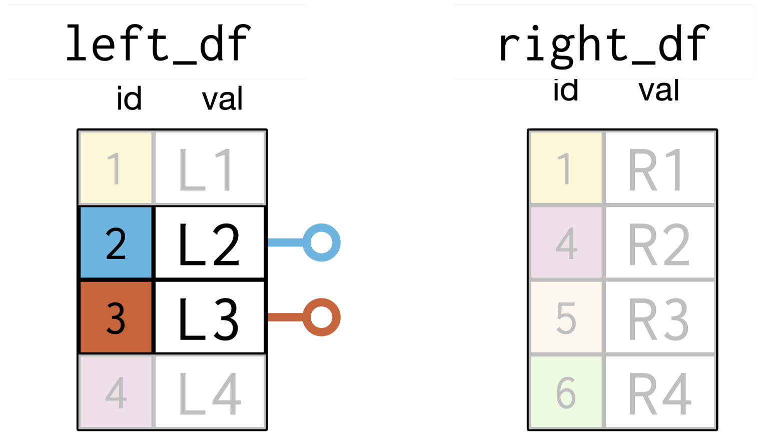
Left join



Inner join



Anti join



Some IMF data for Uruguay

```r
uruguay_imf <- imf_data %>%
  select(iso,
         country,
         year,
         consumer_price_index) %>%
  filter(country == "Uruguay", year > 2010)
uruguay_imf
```

```
# A tibble: 9 x 4
  iso   country  year consumer_price_index
  <chr> <chr>   <int>                <dbl>
1 URY   Uruguay  2011                 105.
2 URY   Uruguay  2012                 114.
3 URY   Uruguay  2013                 123.
4 URY   Uruguay  2014                 134.
5 URY   Uruguay  2015                 146.
6 URY   Uruguay  2016                 160.
7 URY   Uruguay  2017                 170.
8 URY   Uruguay  2018                 183.
9 URY   Uruguay  2019                 197.
```

Some World Bank data for Uruguay

```r
uruguay_wb <- world_bank_data %>%
  select(iso, country, year, perc_rural_pop) %>%
  filter(country == "Uruguay")
uruguay_wb
```

```
# A tibble: 4 x 4
  iso   country  year perc_rural_pop
  <chr> <chr>   <dbl>          <dbl>
1 URY   Uruguay  2013           5.16
2 URY   Uruguay  2014           5.06
3 URY   Uruguay  2015           4.96
4 URY   Uruguay  2016           4.86
```

```r
uruguay_imf %>%
    left_join(uruguay_wb)
```

```
Joining, by = c("iso", "country", "year")
# A tibble: 9 x 5
  iso   country  year consumer_price_index perc_rural_pop
  <chr> <chr>   <dbl>                <dbl>          <dbl>
1 URY   Uruguay  2011                 105.          NA
2 URY   Uruguay  2012                 114.          NA
3 URY   Uruguay  2013                 123.           5.16
4 URY   Uruguay  2014                 134.           5.06
5 URY   Uruguay  2015                 146.           4.96
6 URY   Uruguay  2016                 160.           4.86
7 URY   Uruguay  2017                 170.          NA
8 URY   Uruguay  2018                 183.          NA
9 URY   Uruguay  2019                 197.          NA
```

Inner join on Uruguayan tibbles

```
uruguay_imf %>%
    inner_join(uruguay_wb,
               by = c("iso", "country", "year"))
```

```
# A tibble: 4 x 5
  iso   country  year consumer_price_index perc_rural_pop
  <chr> <chr>   <dbl>                <dbl>          <dbl>
1 URY   Uruguay  2013                 123.           5.16
2 URY   Uruguay  2014                 134.           5.06
3 URY   Uruguay  2015                 146.           4.96
4 URY   Uruguay  2016                 160.           4.86
```

Anti join on Uruguayan tibbles

```
uruguay_imf %>%
    anti_join(uruguay_wb,
              by = c("iso", "country", "year"))
```

```
# A tibble: 5 x 4
  iso   country   year consumer_price_index
  <chr> <chr>    <int>                <dbl>
1 URY   Uruguay   2011                 105.
2 URY   Uruguay   2012                 114.
3 URY   Uruguay   2017                 170.
4 URY   Uruguay   2018                 183.
5 URY   Uruguay   2019                 197.
```

Let's practice!

PROGRAMMING WITH DPLYR

Lines that intersect are without parallel

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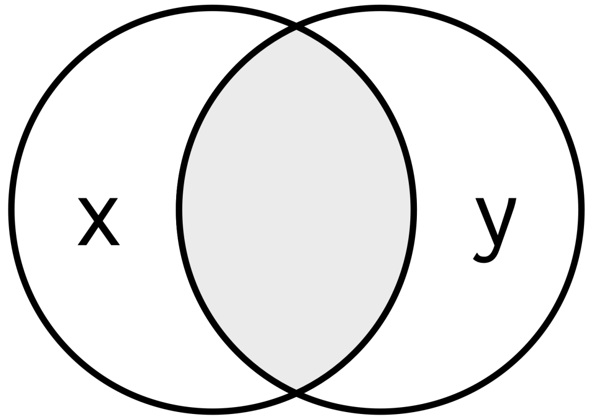
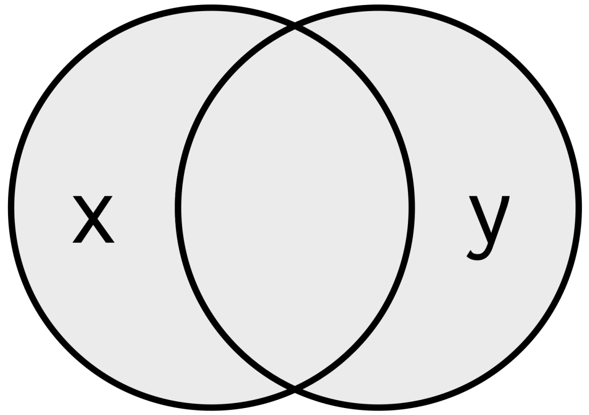
Set theory clauses

- Compare and combine data from two sources
- `dplyr` has several functions to perform set theory clauses on tibbles

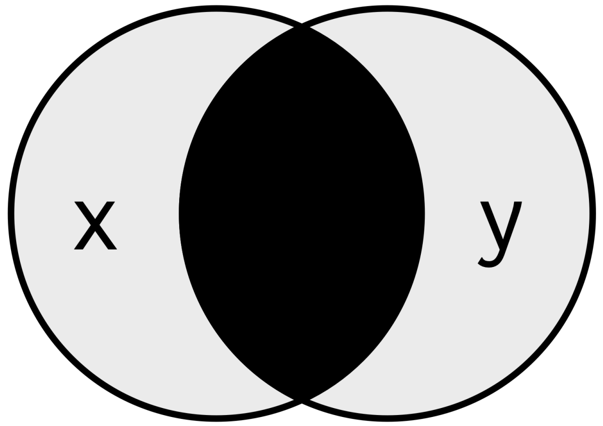
Venn diagrams for set theory



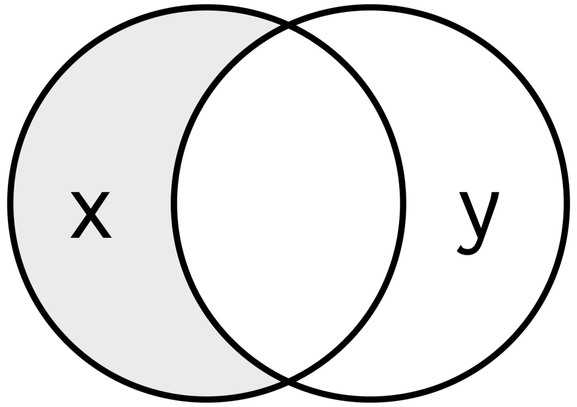
`intersect(x, y)`



`union(x, y)`

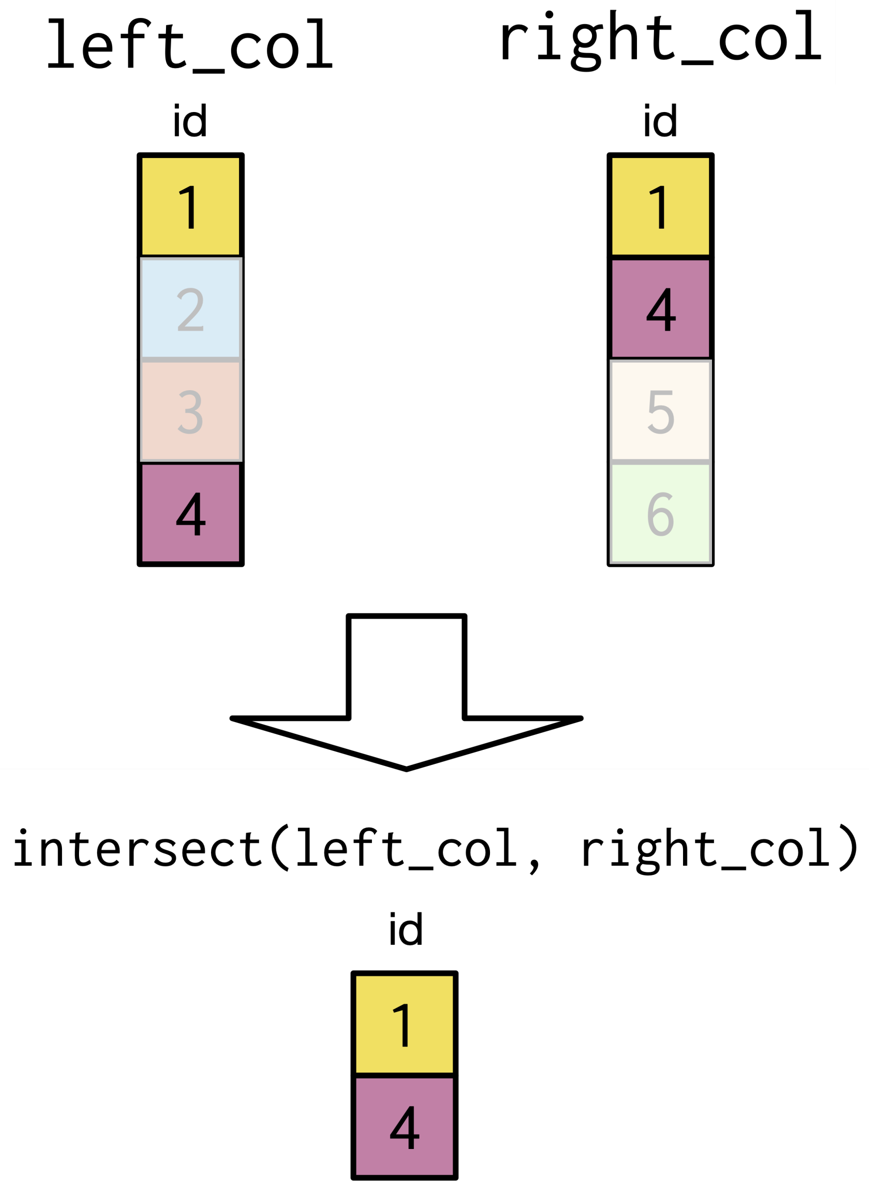


`union_all(x, y)`



`setdiff(x,y)`

intersect diagram



Uruguay tibbles

```
uruguay_imf
```

```
# A tibble: 9 x 4
  iso   country  year consumer_price_index
  <chr> <chr>   <int>                <dbl>
1 URY   Uruguay  2011                 105.
2 URY   Uruguay  2012                 114.
3 URY   Uruguay  2013                 123.
4 URY   Uruguay  2014                 134.
5 URY   Uruguay  2015                 146.
6 URY   Uruguay  2016                 160.
7 URY   Uruguay  2017                 170.
8 URY   Uruguay  2018                 183.
9 URY   Uruguay  2019                 197.
```

```
uruguay_wb
```

```
# A tibble: 4 x 4
  iso   country  year perc_rural_pop
  <chr> <chr>   <dbl>          <dbl>
1 URY   Uruguay  2013           5.16
2 URY   Uruguay  2014           5.06
3 URY   Uruguay  2015           4.96
4 URY   Uruguay  2016           4.86
```

Trying out intersect()

```
intersect(uruguay_imf, uruguay_wb)
```

```
Error: not compatible:
not compatible:
- Cols in y but not x: `perc_rural_pop`.
- Cols in x but not y: `consumer_price_index`.
```

```
intersect(uruguay_imf$year, uruguay_wb$year)
```

```
[1] 2013 2014 2015 2016
```

Difference between intersect() and a join

- `intersect()` looks for **rows** in common
- `inner_join()` looks for individual key entries matching

This is an important distinction.

Let's practice!

PROGRAMMING WITH DPLYR

Deliver the state of the union

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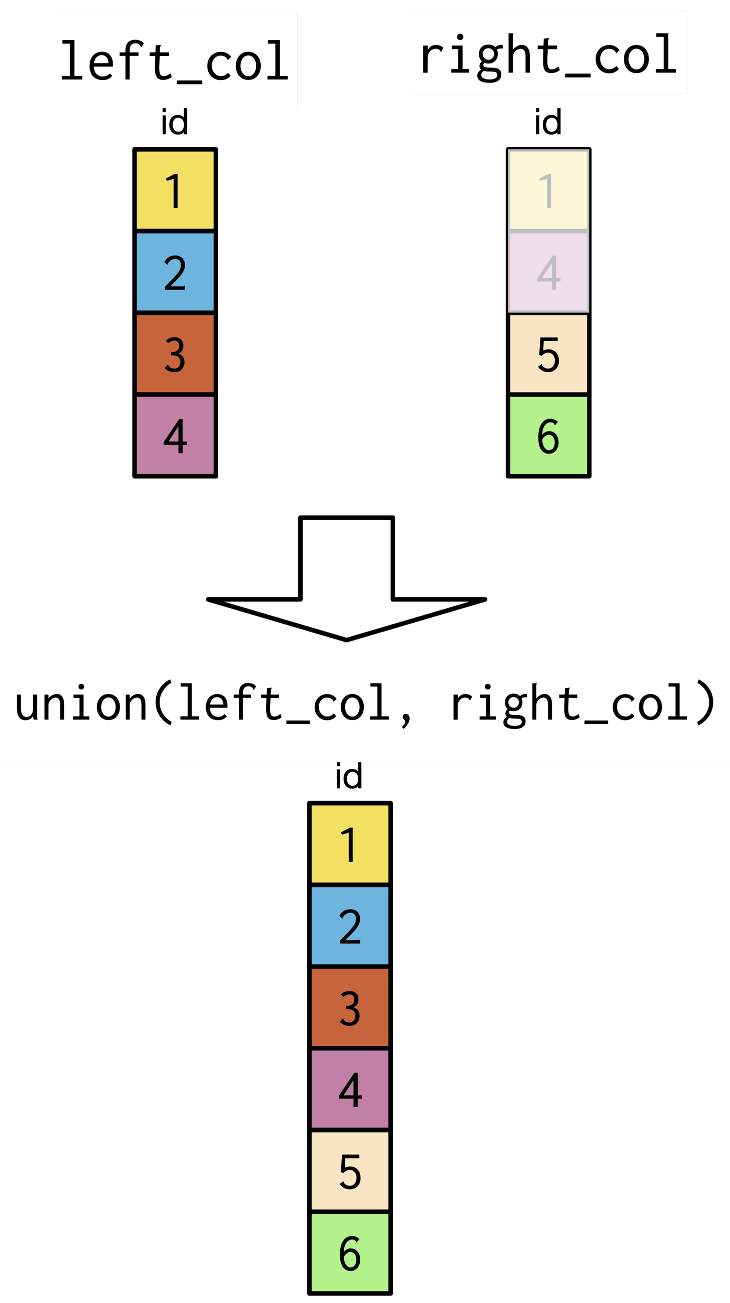
union diagram



Prepping for union with Uruguay

```
uruguay_imf_filtered <- imf_data %>%
  select(iso, country, year) %>%
  filter(country == "Uruguay", between(year, 2010, 2014))
```

```
uruguay_wb_filtered <- world_bank_data %>%
  select(iso, country, year) %>%
  filter(country == "Uruguay")
```

The new tibbles

```
uruguay_imf_filtered
```

```
# A tibble: 5 x 3
  iso   country  year
  <chr> <chr>   <int>
1 URY   Uruguay  2010
2 URY   Uruguay  2011
3 URY   Uruguay  2012
4 URY   Uruguay  2013
5 URY   Uruguay  2014
```

```
uruguay_wb_filtered
```

```
# A tibble: 4 x 3
  iso   country  year
  <chr> <chr>   <dbl>
1 URY   Uruguay  2013
2 URY   Uruguay  2014
3 URY   Uruguay  2015
4 URY   Uruguay  2016
```

union()

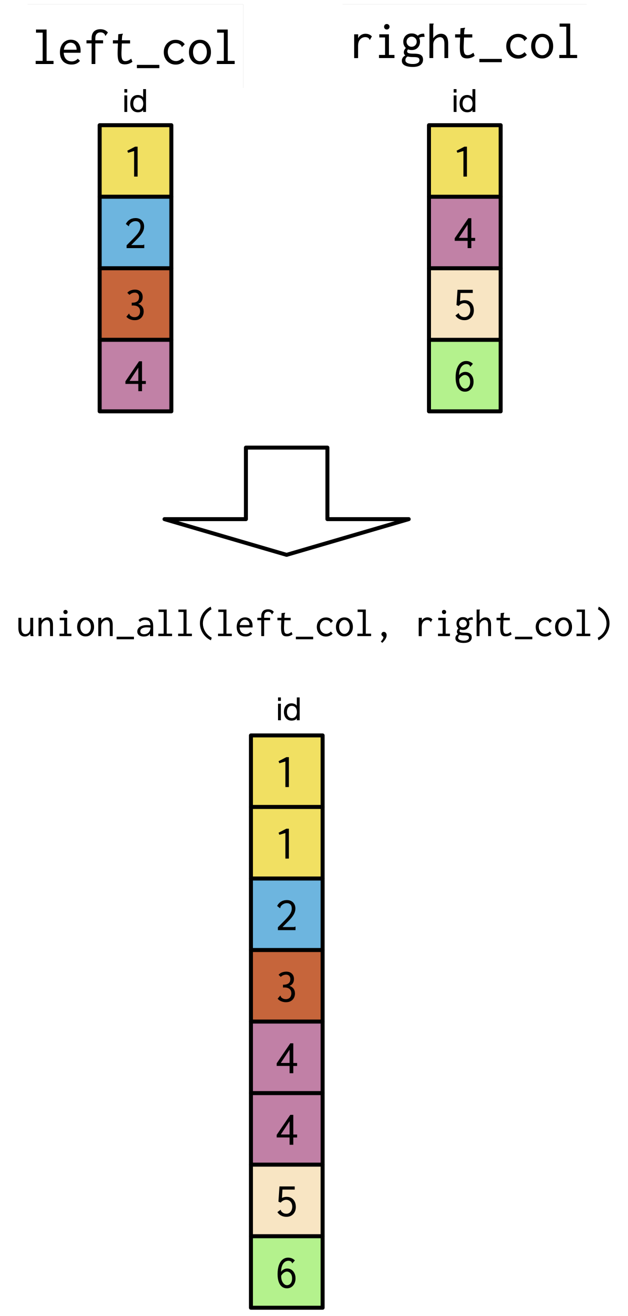
```
union(uruguay_imf_filtered,
      uruguay_wb_filtered)
```

```
# A tibble: 7 x 3
  iso   country   year
  <chr> <chr>    <dbl>
1 URY   Uruguay   2010
2 URY   Uruguay   2011
3 URY   Uruguay   2012
4 URY   Uruguay   2013
5 URY   Uruguay   2014
6 URY   Uruguay   2015
7 URY   Uruguay   2016
```

```
union(uruguay_wb_filtered,
      uruguay_imf_filtered)
```

```
# A tibble: 7 x 3
  iso   country   year
  <chr> <chr>    <dbl>
1 URY   Uruguay   2013
2 URY   Uruguay   2014
3 URY   Uruguay   2015
4 URY   Uruguay   2016
5 URY   Uruguay   2010
6 URY   Uruguay   2011
7 URY   Uruguay   2012
```

union_all diagram



```r
union_all(uruguay_imf_filtered,
          uruguay_wb_filtered)
```

```
# A tibble: 9 x 3
  iso   country  year
  <chr> <chr>   <dbl>
1 URY   Uruguay  2010
2 URY   Uruguay  2011
3 URY   Uruguay  2012
4 URY   Uruguay  2013
5 URY   Uruguay  2014
6 URY   Uruguay  2013
7 URY   Uruguay  2014
8 URY   Uruguay  2015
9 URY   Uruguay  2016
```

```r
union_all(uruguay_wb_filtered,
          uruguay_imf_filtered)
```

```
# A tibble: 9 x 3
  iso   country  year
  <chr> <chr>   <dbl>
1 URY   Uruguay  2013
2 URY   Uruguay  2014
3 URY   Uruguay  2015
4 URY   Uruguay  2016
5 URY   Uruguay  2010
6 URY   Uruguay  2011
7 URY   Uruguay  2012
8 URY   Uruguay  2013
9 URY   Uruguay  2014
```

Let's practice!

PROGRAMMING WITH DPLYR

A little too excepting

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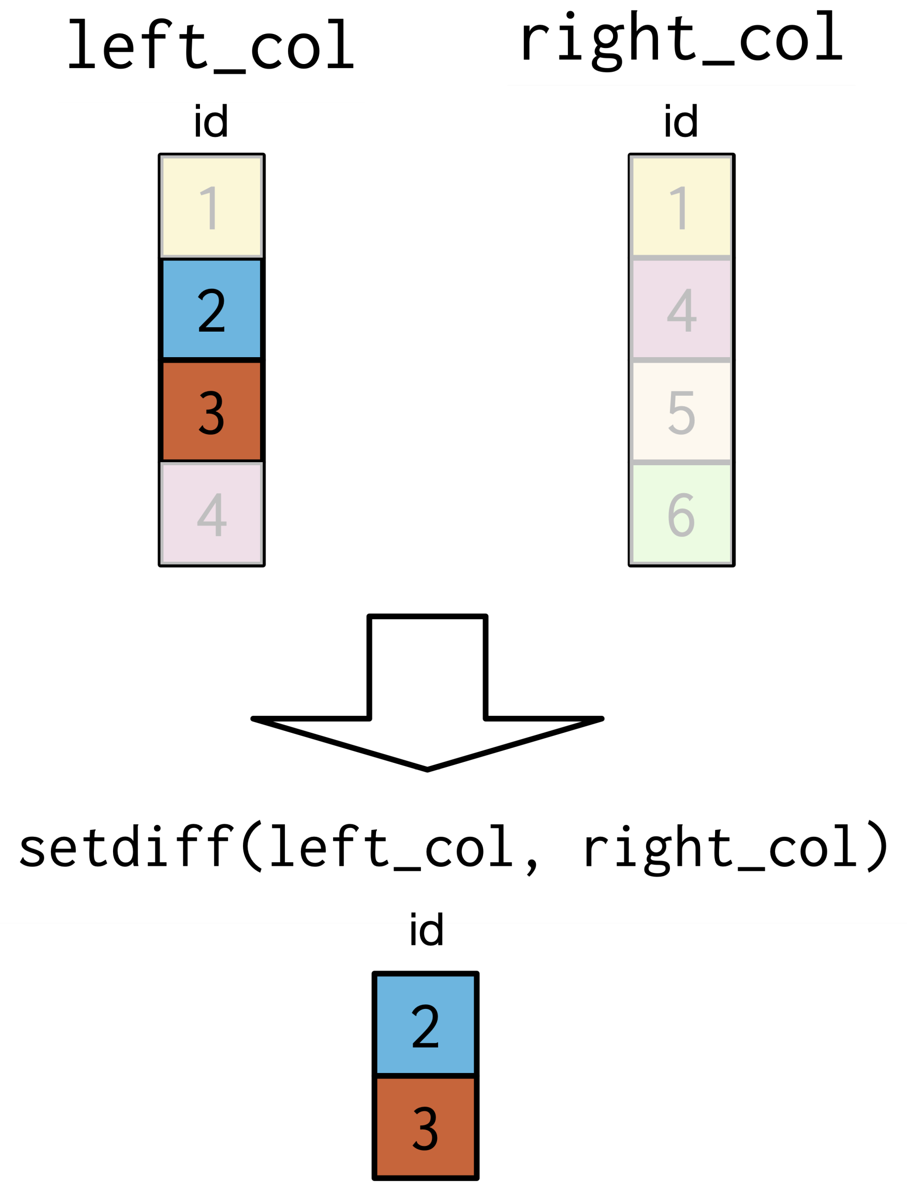
setdiff diagram



The tibbles again

```
uruguay_imf_filtered
```

```
# A tibble: 5 x 3
  iso   country  year
  <chr> <chr>   <int>
1 URY   Uruguay  2010
2 URY   Uruguay  2011
3 URY   Uruguay  2012
4 URY   Uruguay  2013
5 URY   Uruguay  2014
```

```
uruguay_wb_filtered
```

```
# A tibble: 4 x 3
  iso   country  year
  <chr> <chr>   <dbl>
1 URY   Uruguay  2013
2 URY   Uruguay  2014
3 URY   Uruguay  2015
4 URY   Uruguay  2016
```

setdiff()

```
setdiff(uruguay_imf_filtered, uruguay_wb_filtered)
```

```
# A tibble: 3 x 3
  iso   country  year
  <chr> <chr>   <dbl>
1 URY   Uruguay  2010
2 URY   Uruguay  2011
3 URY   Uruguay  2012
```

Previous unions()

```r
union_one_way <- union(uruguay_imf_filtered,
                       uruguay_wb_filtered)
union_one_way
```

```
# A tibble: 7 x 3
  iso   country  year
  <chr> <chr>   <dbl>
1 URY   Uruguay  2010
2 URY   Uruguay  2011
3 URY   Uruguay  2012
4 URY   Uruguay  2013
5 URY   Uruguay  2014
6 URY   Uruguay  2015
7 URY   Uruguay  2016
```

```r
union_other <- union(uruguay_wb_filtered,
                     uruguay_imf_filtered)
union_other
```

```
# A tibble: 7 x 3
  iso   country  year
  <chr> <chr>   <dbl>
1 URY   Uruguay  2013
2 URY   Uruguay  2014
3 URY   Uruguay  2015
4 URY   Uruguay  2016
5 URY   Uruguay  2010
6 URY   Uruguay  2011
7 URY   Uruguay  2012
```

setequal() example

```
setequal(union_one_way, union_other)
```

```
[1] TRUE
```

Let's practice!

PROGRAMMING WITH DPLYR