

reshaping data with `tidyr`

Emily Malcolm-White



The goal of `tidyr` is to help you create tidy data.

Reshaping with Pivoting – Why?

Data frames are often described as wide or long.

Wide when a row has more than one observation, and the units of observation are on one row each

Long when a row has only one observation, but the units of observation are repeated down the column

Credit: datasciencebook.ca

“**TIDY DATA** is a standard way of mapping the meaning of a dataset to its structure.”

—HADLEY WICKHAM

In tidy data:

- each variable forms a column
- each observation forms a row
- each cell is a single measurement

each column a variable

id	name	color
1	floof	gray
2	max	black
3	cat	orange
4	donut	gray
5	merlin	black
6	panda	calico

each row an observation

Wickham, H. (2014). Tidy Data. Journal of Statistical Software 59 (10). DOI: 10.18637/jss.v059.i10

Figure 1: Illustrations from the Openscapes blog Tidy Data for reproducibility, efficiency, and collaboration by Julia Lowndes and Allison Horst

The figure shows three versions of a dataset with columns: country, year, cases, and population. The data rows are: Afghanistan (1999, 2666, 17206362), Afghanistan (2000, 2666, 2095360), Brazil (1999, 37737, 17206362), Brazil (2000, 80488, 174504898), China (1999, 212258, 1272115272), and China (2000, 212266, 128013583).

variables: Vertical double-headed arrows connect the values within each column, emphasizing the relationship between variables.

observations: Horizontal double-headed arrows connect the values within each row, emphasizing the relationship between observations.

values: Each cell in the table is circled, emphasizing the individual data points or values.

Figure 2: <https://r4ds.hadley.nz/data-tidy>

canlang dataset

```
#LOAD PACKAGES
library(tidyverse)

#LOAD DATA
lang_wide <- read.csv("https://raw.githubusercontent.com/UBC-DSCI/introduction-to-datascie
```

Pivot Longer

Credit: datasciencebook.ca

Credit: datasciencebook.ca

```
lang_mother_tidy <- pivot_longer(lang_wide,
  cols = Toronto:Edmonton,
  names_to = "region",
  values_to = "mother_tongue"
)

lang_mother_tidy
```

```
# A tibble: 1,070 x 4
  category                language      region mother_tongue
  <chr>                  <chr>      <chr>      <int>
1 Aboriginal languages  Aboriginal lang~ Toron~         80
2 Aboriginal languages  Aboriginal lang~ Montr~         30
3 Aboriginal languages  Aboriginal lang~ Vanco~         70
4 Aboriginal languages  Aboriginal lang~ Calga~         20
5 Aboriginal languages  Aboriginal lang~ Edmon~         25
6 Non-Official & Non-Aboriginal languages Afrikaans  Toron~        985
7 Non-Official & Non-Aboriginal languages Afrikaans  Montr~         90
8 Non-Official & Non-Aboriginal languages Afrikaans  Vanco~       1435
9 Non-Official & Non-Aboriginal languages Afrikaans  Calga~        960
10 Non-Official & Non-Aboriginal languages Afrikaans  Edmon~        575
# i 1,060 more rows
```

The data above is now tidy because all three criteria for tidy data have now been met:

- All the variables (category, language, region and mother_tongue) are now their own columns in the data frame.
- Each observation, (i.e., each language in a region) is in a single row.
- Each value is a single cell, i.e., its row, column position in the data frame is not shared with another value.

Pivot Wider

```
lang_long <- read.csv("https://raw.githubusercontent.com/UBC-DSCI/introduction-to-datascie
```

Credit: datasciencebook.ca

Credit: datasciencebook.ca

```
lang_home_tidy <- pivot_wider(lang_long,
  names_from = type,
  values_from = count
)
lang_home_tidy
```

A tibble: 1,070 x 5

	region	category	language	most_at_home	most_at_work
	<chr>	<chr>	<chr>	<int>	<int>
1	Montréal	Aboriginal languages	Aborigi~	15	0
2	Toronto	Aboriginal languages	Aborigi~	50	0
3	Calgary	Aboriginal languages	Aborigi~	5	0
4	Edmonton	Aboriginal languages	Aborigi~	10	0
5	Vancouver	Aboriginal languages	Aborigi~	15	0
6	Montréal	Non-Official & Non-Aboriginal l~	Afrikaa~	10	0
7	Toronto	Non-Official & Non-Aboriginal l~	Afrikaa~	265	0
8	Calgary	Non-Official & Non-Aboriginal l~	Afrikaa~	505	15
9	Edmonton	Non-Official & Non-Aboriginal l~	Afrikaa~	300	0
10	Vancouver	Non-Official & Non-Aboriginal l~	Afrikaa~	520	10

i 1,060 more rows

[gif](#)

Gapminder

```
library(gapminder)
data("gapminder")
```

Let's say we'd like to look at LifeExp over time for all the countries in Asia in our dataset.

```
# Create a dataset called asia with the data we need
asia <- gapminder %>%
  filter(continent == "Asia") %>%
  select(country, year, lifeExp)
```

We can create a wide version of our table, where each row is a country and each column a year, with values of lifeExp in each cell of the table.

```
lifeExp_wide <- asia %>%
  pivot_wider(names_from = "year", #<1>
              names_prefix = "yr", #<2>
              values_from = "lifeExp")
lifeExp_wide
```

- ① use pivot_wider to go from long to wide format
- ② Adds the pre-fix “yr” to all the column names – it’s a good idea to avoid column names that start with a number.

```
# A tibble: 33 x 13
  country yr1952 yr1957 yr1962 yr1967 yr1972 yr1977 yr1982 yr1987 yr1992 yr1997
  <fct>    <dbl>  <dbl>  <dbl>  <dbl>  <dbl>  <dbl>  <dbl>  <dbl>  <dbl>  <dbl>
1 Afghan~  28.8   30.3   32.0   34.0   36.1   38.4   39.9   40.8   41.7   41.8
2 Bahrain  50.9   53.8   56.9   59.9   63.3   65.6   69.1   70.8   72.6   73.9
3 Bangla~  37.5   39.3   41.2   43.5   45.3   46.9   50.0   52.8   56.0   59.4
4 Cambod~  39.4   41.4   43.4   45.4   40.3   31.2   51.0   53.9   55.8   56.5
5 China    44     50.5   44.5   58.4   63.1   64.0   65.5   67.3   68.7   70.4
6 Hong K~  61.0   64.8   67.6   70     72     73.6   75.4   76.2   77.6   80
7 India    37.4   40.2   43.6   47.2   50.7   54.2   56.6   58.6   60.2   61.8
8 Indone~  37.5   39.9   42.5   46.0   49.2   52.7   56.2   60.1   62.7   66.0
9 Iran     44.9   47.2   49.3   52.5   55.2   57.7   59.6   63.0   65.7   68.0
10 Iraq    45.3   48.4   51.5   54.5   57.0   60.4   62.0   65.0   59.5   58.8
# i 23 more rows
# i 2 more variables: yr2002 <dbl>, yr2007 <dbl>
```

External Resources

- [R for Data Science, Data Tidying](#)