Pivot longer

wider vs. longer

wider

	id	city	hwy
1	car1	19	24
2	car2	20	30
3	car3	29	35

goal: lengthen

longer

	id	roadtype	mpg
1	car1	city	19
2	car2	city	20
3	car3	city	29
4	car1	hwy	24
5	car2	hwy	30
6	car3	hwy	35

Why?

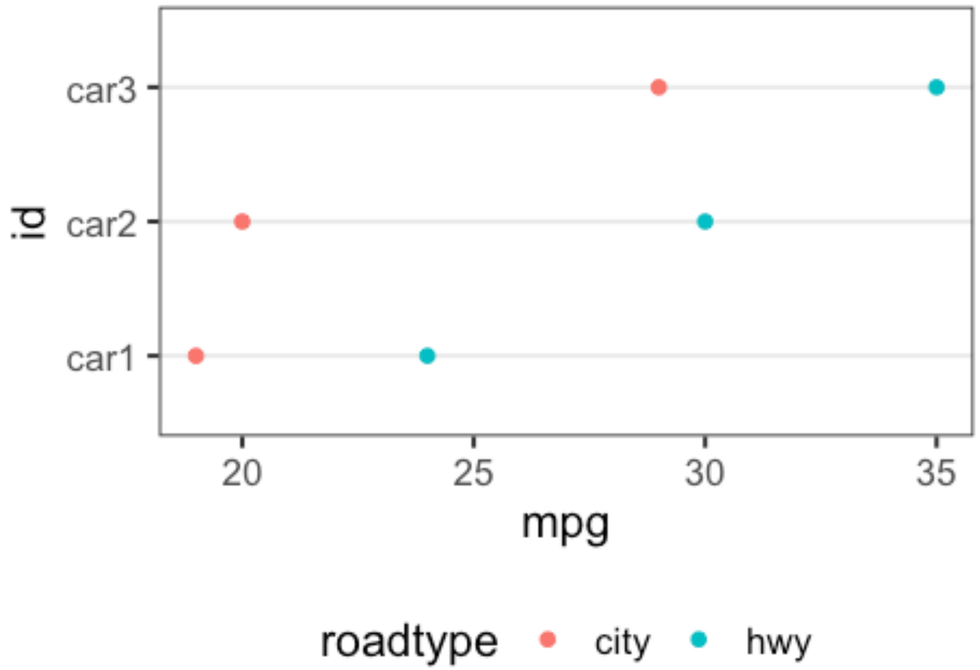
Because we want to create a graph in which "city" and "hwy" are different colors.

longer

	id	roadtype	mpg
1	car1	city	19
2	car2	city	20
3	car3	city	29
4	car1	hwy	24
5	car2	hwy	30
6	car3	hwy	35

Why?

```
1 ggplot(df, aes(x = mpg, y = id, color = roadtype)) +
2   geom_point() + ...
```



wider vs. longer

wider

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goal: lengthen

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3	car3	city	29
4	car1	hwy	24
5	car2	hwy	30
6	car3	hwy	35

Step 1: picture the new data frame

What columns should the new data frame have?

id	city	hwy
car1	19	24
car2	20	30
car3	29	35

id	name	value
car1	city	19
car2	city	20
car3	city	29
car1	hwy	24
car2	hwy	30
car3	hwy	35

Step 2: identify the columns to be pivoted

city and hwy will become values of a new column

id	city	hwy
car1	19	24
car2	20	30
car3	29	35

id	name	value
car1	city	19
car2	city	20
car3	city	29
car1	hwy	24
car2	hwy	30
car3	hwy	35

That's it!

tidyr code

df

id	city	hwy
car1	19	24
car2	20	30
car3	29	35

```
library(tidyr)
pivot_longer(df, cols = city:hwy))
```

tidyr code

```
library(tidyr)
pivot_longer(df, cols = city:hwy)
#> # A tibble: 6 × 3
#>   id    name  value
#>   <chr> <chr> <dbl>
#> 1 car1  city     19
#> 2 car1  hwy      24
#> 3 car2  city     20
#> 4 car2  hwy      30
#> 5 car3  city     29
#> 6 car3  hwy      35
```

Optional: choose names for the new columns

```
pivot_longer(df, cols = city:hwy,
             names_to = "roadtype", values_to = "mpg")
#> # A tibble: 6 × 3
#>   id    roadtype   mpg
#>   <chr> <chr>    <dbl>
#> 1 car1  city        19
#> 2 car1  hwy         24
#> 3 car2  city        20
#> 4 car2  hwy         30
#> 5 car3  city        29
#> 6 car3  hwy         35
```

"roadtype" and "mpg" do not exist as columns in the original data frame

What happened?

id	city	hwy
car1	19	24
car2	20	30
car3	29	35

id	name	value
car1	city	19
car2	city	20
car3	city	29
car1	hwy	24
car2	hwy	30
car3	hwy	35

old column names become *values of* name

old cell values move to single value column

No id column


```
df <- data.frame(city = c(19, 20, 29),
                 hwy = c(24, 30, 35))
df
#>   city hwy
#> 1   19  24
#> 2   20  30
#> 3   29  35
```

No id column


```
pivot_longer(df, cols = city:hwy)
#> # A tibble: 6 × 2
#>   name  value
#>   <chr> <dbl>
#> 1 city     19
#> 2 hwy      24
#> 3 city     20
#> 4 hwy      30
#> 5 city     29
#> 6 hwy      35
```

We have no way of knowing which rows are connected

Solution: turn the rownames into a column

```
df <- data.frame(city = c(19, 20, 29),
                 hwy = c(24, 30, 35))
df$id <- rownames(df)
df
#>   city hwy id
#> 1   19  24  1
#> 2   20  30  2
#> 3   29  35  3
```

id column from rownames

```
pivot_longer(df, cols = city:hwy)
#> # A tibble: 6 × 3
#>   id    name  value
#>   <chr> <chr> <dbl>
#> 1 1     city     19
#> 2 1     hwy      24
#> 3 2     city     20
#> 4 2     hwy      30
#> 5 3     city     29
#> 6 3     hwy      35
```

EXERCISE

```
library(MASS)
head(painters)
#>                Composition Drawing Colour Expression School
#> Da Udine                10       8     16          3      A
#> Da Vinci                15      16      4         14      A
#> Del Piombo               8      13     16          7      A
#> Del Sarto               12      16      9          8      A
#> Fr. Penni                0      15      8          0      A
#> Guilio Romano           15      16      4         14      A
```

Look at the data

```
library(MASS)
str(painters)
#> 'data.frame':    54 obs. of  5 variables:
#>  $ Composition: int  10 15 8 12 0 15 8 15 4 17 ...
#>  $ Drawing    : int  8 16 13 16 15 16 17 16 12 18 ...
#>  $ Colour     : int  16 4 16 9 8 4 4 7 10 12 ...
#>  $ Expression : int  3 14 7 8 0 14 8 6 4 18 ...
#>  $ School     : Factor w/ 8 levels
"A","B","C","D",..: 1 1 1 1 1 1 1 1 1 1 ...
```

What should the new columns be?

Current columns:

Composition | Colour | Drawing | Expression | School

New columns:

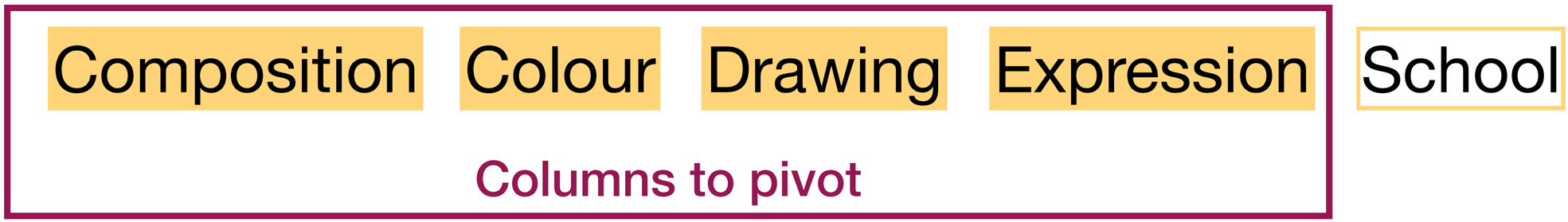
(rownames) → Name | School | Skill (name) | Score (value)

What will the longer data frame look like?

(rownames) →	Name	School	(name) Skill	(value) Score
Da Udine		A	Composition	10
Da Vinci		A	Composition	15
Del Piombo		A	Composition	8
Del Sarto		A	Composition	12

What should the new columns be?

Current columns:



New columns:

tidyr code

```
painters$Name <- rownames(painters)
pivot_longer(painters,
    cols = Composition:Expression,
    names_to = "Skill", values_to = "Score")
#> # A tibble: 216 × 4
#>    School Name       Skill       Score
#>    <fct>  <chr>      <chr>       <int>
#>  1 A      Da Udine   Composition    10
#>  2 A      Da Udine   Drawing         8
#>  3 A      Da Udine   Colour         16
#>  4 A      Da Udine   Expression      3
```