

When pivot-wider goes wrong

Packages

The inevitable:

```
library(tidyverse)
```

Some long data that should be wide

```
d <- tribble(  
  ~obs, ~time, ~y,  
  1, "pre", 19,  
  2, "post", 18,  
  3, "pre", 17,  
  4, "post", 16,  
  5, "pre", 15,  
  6, "post", 14  
)  
d
```

```
# A tibble: 6 x 3  
  obs time      y  
  <dbl> <chr> <dbl>  
1     1 pre    19  
2     2 post    18  
3     3 pre    17  
4     4 post    16
```

What happens here?

```
d
```

```
# A tibble: 6 x 3
  obs time      y
  <dbl> <chr> <dbl>
1     1 pre    19
2     2 post   18
3     3 pre    17
4     4 post   16
5     5 pre    15
6     6 post   14
```

```
d %>% pivot_wider(names_from = time, values_from = y)
```

```
# A tibble: 6 x 3
  obs pre post
  <dbl> <dbl> <dbl>
1     1    19  NA
2     2    NA   18
3     3    17  NA
4     4    16  NA
5     5    15  NA
6     6    14  NA
```

The problem

```
d %>% pivot_wider(names_from = time, values_from = y)
```

```
# A tibble: 6 x 3
```

	obs	pre	post
	<dbl>	<dbl>	<dbl>
1	1	19	NA
2	2	NA	18
3	3	17	NA
4	4	NA	16
5	5	15	NA
6	6	NA	14

- ▶ There are 6 different obs values, so 6 different rows.
- ▶ No data for obs 2 and pre, so that cell missing (NA).
- ▶ Not enough data (6 obs) to fill 12 ($= 2 \times 6$) cells.
- ▶ obs needs to say which subject provided which 2 observations.

Fixing it up

```
d2 <- tribble(
  ~subject, ~time, ~y,
  1, "pre", 19,
  1, "post", 18,
  2, "pre", 17,
  2, "post", 16,
  3, "pre", 15,
  3, "post", 14
)
d2
```

```
# A tibble: 6 x 3
```

	subject	time	y
	<dbl>	<chr>	<dbl>
1	1	pre	19
2	1	post	18
3	2	pre	17
4	2	post	16

Coming out right

```
d2 %>% pivot_wider(names_from = time, values_from = y)
```

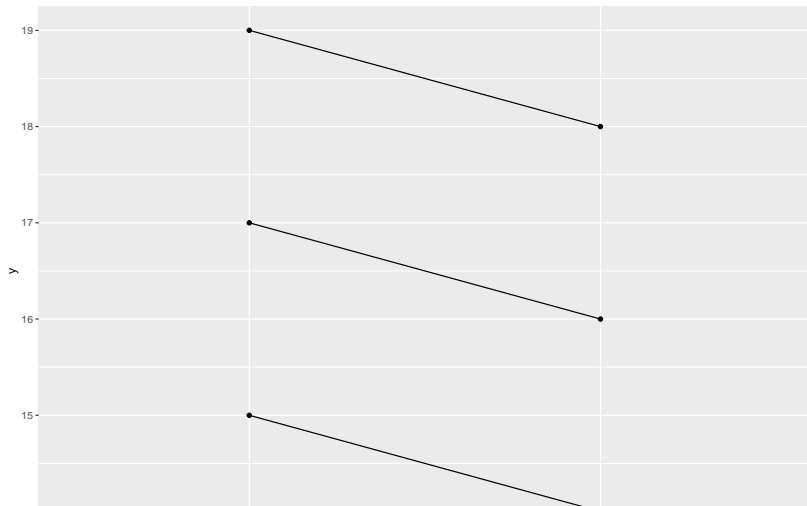
```
# A tibble: 3 x 3
```

	subject	pre	post
	<dbl>	<dbl>	<dbl>
1	1	19	18
2	2	17	16
3	3	15	14

- ▶ row each observation goes to determined by other column subject, and now a pre and post for each subject.
- ▶ right layout for matched pairs t or to make differences for sign test or normal quantile plot.
- ▶ “spaghetti plot” needs data longer, as d2.

Spaghetti plot

```
d2 %>% mutate(time = fct_inorder(time)) %>%  
  ggplot(aes(x = time, y = y, group = subject)) +  
    geom_point() + geom_line()
```



Another example

- ▶ Two independent samples this time

```
# A tibble: 8 x 2
  group      y
  <chr>    <dbl>
1 control      8
2 control     11
3 control     13
4 control     14
5 treatment    12
6 treatment    15
7 treatment    16
8 treatment    17
```

- ▶ These should be arranged like this
- ▶ but what if we make them wider?

Wider

```
d3 %>% pivot_wider(names_from = group, values_from = y)
```

```
# A tibble: 1 x 2  
  control treatment  
  <list>    <list>  
1 <dbl [4]> <dbl [4]>
```

- ▶ row determined by what not used for pivot_wider: nothing!
- ▶ everything smooshed into *one* row!
- ▶ this time, too *much* data for the layout.
- ▶ Four data values squeezed into each of the two cells: “list-columns”.

Get the data out

- ▶ To expand list-columns out into the data values they contain, can use `unnest`:

```
d3 %>% pivot_wider(names_from = group, values_from = y) %>%  
  unnest(c(control, treatment))
```

```
# A tibble: 4 x 2  
  control treatment  
  <dbl>      <dbl>  
1      8         12  
2     11         15  
3     13         16  
4     14         17
```

- ▶ in this case, wrong layout, because data values not paired.

A proper use of list-columns

```
d3 %>% nest_by(group) %>%  
  summarize(n = nrow(data),  
            mean_y = mean(data$y),  
            sd_y = sd(data$y))
```

```
# A tibble: 2 x 4  
# Groups:   group [2]  
  group      n mean_y sd_y  
  <chr>  <int>  <dbl> <dbl>  
1 control     4   11.5  2.65  
2 treatment   4    15  2.16
```

- ▶ another way to do `group_by` and `summarize` to find stats by group.
- ▶ run this one piece at a time to see what it does.