

## When pivot-wider goes wrong

# Packages

The inevitable:

```
library(tidyverse)
```

## Some long data that should be wide

```
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
```

- Six observations of variable *y*, but three measured before some treatment and three measured after.
- Really matched pairs, so want column of *y*-values for pre and for post.
- `pivot_wider`.

# What happens here?

```
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
```

- Should be *three* pre values and *three* post. Why did this happen?
- `pivot_wider` needs to know which *row* to put each observation in.
- Uses combo of columns *not* named in `pivot_wider`, here `obs` (only).

# 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
```

```
# 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
5      3 pre    15
6      3 post   14
```

- column subject shows which subject provided each pre and post.
- when we do `pivot_wider`, now only 3 rows, one per subject.

## 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.

## 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.