

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.