Pitch mix

Chapter overview

- New tools to evaluate July pitch mix

- Types of pitches

- Pitch rate

- Change in pitch rate

- Propensity to throw certain pitches

- Changes in pitch types

Pitch types

```
> head(greinke[, c(2:6)])
  pitcher_id batter_stand pitch_type     pitch_result atbat_result
1     425844            R         FF             Ball         Walk
2     425844            R         FF  Swinging Strike       Single
3     425844            R         FF    Called Strike     Home Run
4     425844            R         SL  Swinging Strike     Strikeout
5     425844            R         FF  Swinging Strike     Strikeout
6     425844            R         SL  Swinging Strike     Strikeout

> unique(greinke$pitch_type)
[1] FF SL CH FT CU EP IN
Levels: CH CU EP FF FT IN SL
```

table()

```
> table(greinke$pitch_type)

  CH   CU   EP   FF   FT   IN   SL
 599  293    2 1398  321    2  621

> table(greinke$pitch_type, greinke$month)

       4    5    6    7    8    9   10
  CH  117   90  100  112   87   76   17
  CU   37   35   58   51   53   54    5
  EP    0    0    1    0    0    1    0
  FF  215  235  273  207  217  204   47
  FT   45   36   51   66   51   57   15
  IN    0    0    0    2    0    0    0
  SL   99   99   98   86  121   94   24
```

prop.table()

```
> prop.table(table(greinke$pitch_type, greinke$month), margin = 2)

        4      5      6      7      8      9     10
CH 0.2281 0.1818 0.1721 0.2137 0.1645 0.1564 0.1574
CU 0.0721 0.0707 0.0998 0.0973 0.1002 0.1111 0.0463
EP 0.0000 0.0000 0.0017 0.0000 0.0000 0.0021 0.0000
FF 0.4191 0.4747 0.4699 0.3950 0.4102 0.4198 0.4352
FT 0.0877 0.0727 0.0878 0.1260 0.0964 0.1173 0.1389
IN 0.0000 0.0000 0.0000 0.0038 0.0000 0.0000 0.0000
SL 0.1930 0.2000 0.1687 0.1641 0.2287 0.1934 0.2222
```

prop.table()

```
> prop.table(table(greinke$pitch_type, greinke$month))

        4     5     6     7     8     9    10
 CH 0.036 0.028 0.031 0.035 0.027 0.023 0.005
 CU 0.011 0.011 0.018 0.016 0.016 0.017 0.002
 EP 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 FF 0.066 0.073 0.084 0.064 0.067 0.063 0.015
 FT 0.014 0.011 0.016 0.020 0.016 0.018 0.005
 IN 0.000 0.000 0.000 0.001 0.000 0.000 0.000
 SL 0.031 0.031 0.030 0.027 0.037 0.029 0.007
```

EXPLORING PITCH DATA IN R

Let's practice!

Ball-strike count and pitch usage

The ball-strike count

```
> unique(greinke$bs_count[greinke$balls == 0])
[1] "0-0" "0-2" "0-1"

> unique(greinke$bs_count[greinke$balls == 1])
[1] "1-1" "1-2" "1-0"

> unique(greinke$bs_count[greinke$balls == 2])
[1] "2-2" "2-1" "2-0"

> unique(greinke$bs_count[greinke$balls == 3])
[1] "3-2" "3-1" "3-0"
```

Relative run expectancy

Ball-strike counts	0	1	2
0	-0.038	-0.081	-0.133
1	0.000	-0.056	-0.120
2	0.060	0.002	-0.079
3	0.167	0.102	0.018

Identify propensity for certain pitches

Modified from Albert (2010)

Using the `paste()` function

```
> greinke$inn_half <- paste(greinke$inning, greinke$inning_topbot, sep = "_")

> head(greinke[, 31:34])
  month day  july inn_half
1    10   3 other    4_top
2    10   3 other    3_top
3    10   3 other    5_top
4    10   3 other    6_top
5    10   3 other    8_top
6    10   3 other    1_top
```
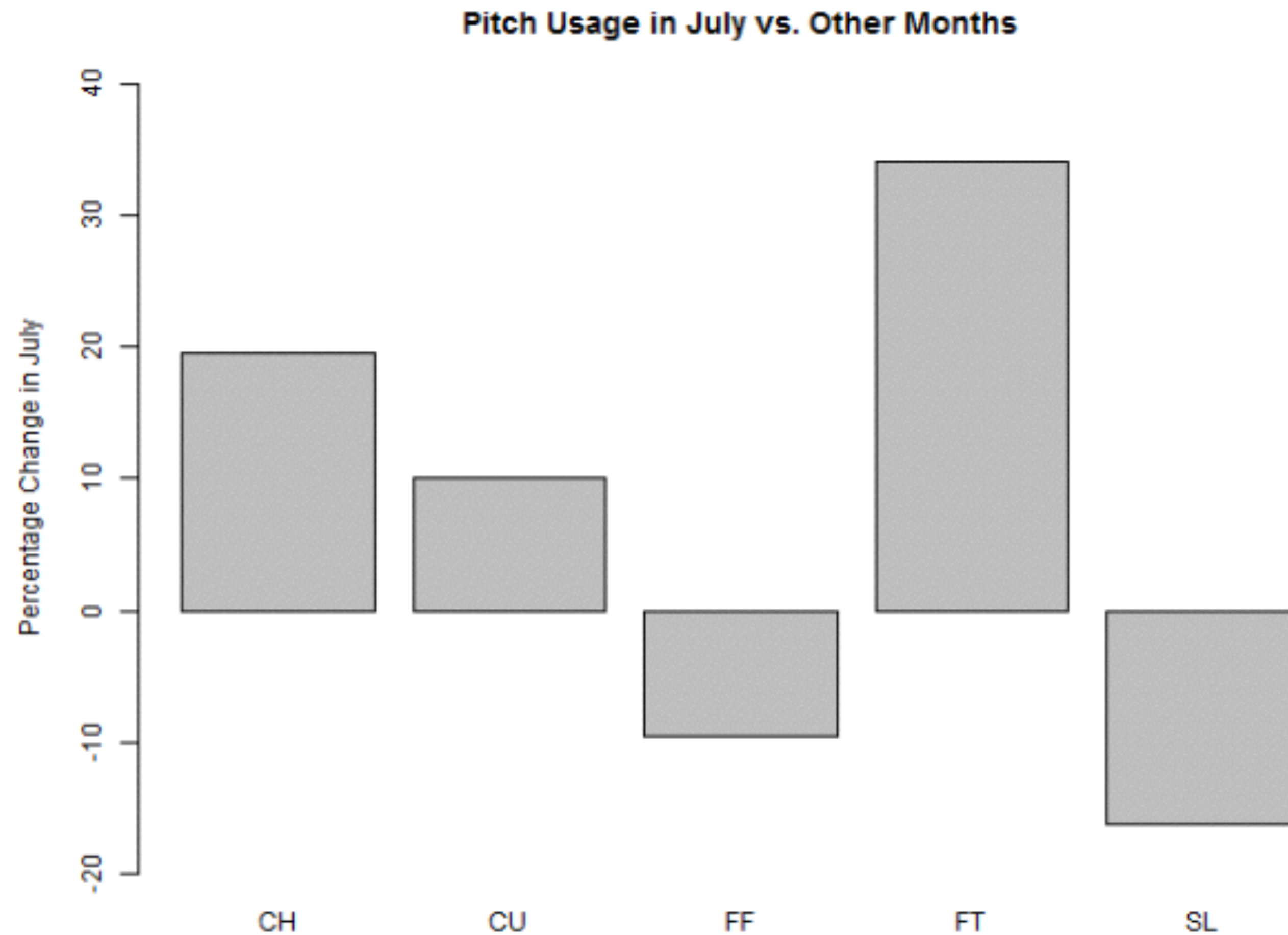
EXPLORING PITCH DATA IN R

Let's practice!

Wrap-up

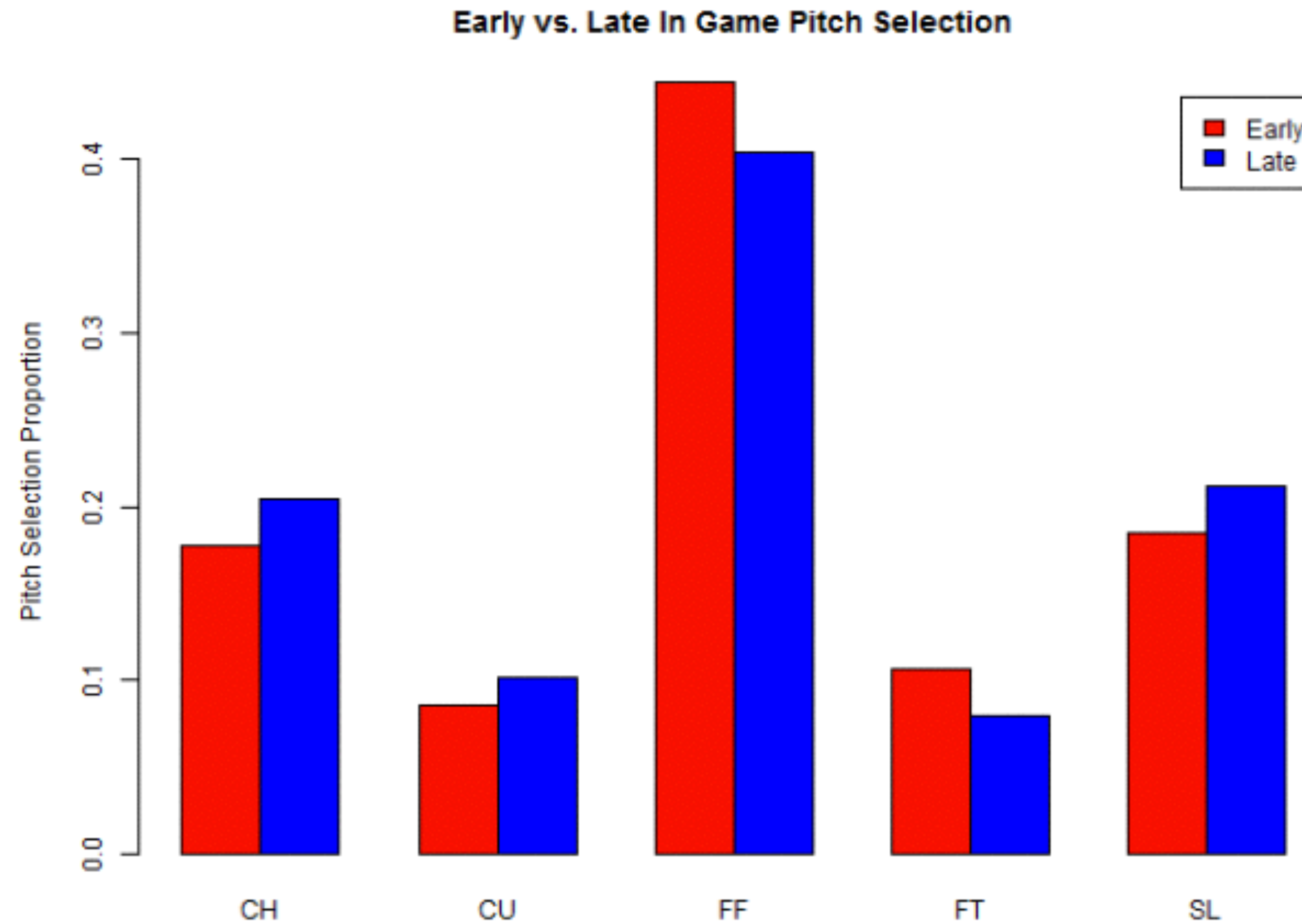# Percent changes in July pitch type usage

Pitch type usage by ball-strike count

```
> type_bs_prop

      0-0   0-1   0-2   1-0   1-1   1-2   2-0   2-1   2-2   3-0   3-1   3-2
CH 0.109 0.214 0.179 0.228 0.213 0.200 0.321 0.269 0.173 0.000 0.360 0.173
CU 0.147 0.113 0.050 0.111 0.102 0.029 0.048 0.070 0.030 0.000 0.000 0.029
FF 0.570 0.384 0.303 0.443 0.367 0.287 0.440 0.415 0.363 0.895 0.480 0.496
FT 0.064 0.126 0.095 0.104 0.135 0.100 0.131 0.105 0.113 0.105 0.060 0.086
SL 0.110 0.163 0.373 0.114 0.183 0.384 0.060 0.140 0.320 0.000 0.100 0.216
```

Early vs. late game pitch mix

Let's practice!