

MORE 'STREAKINESS' EXERCISES with SOLUTIONS

With the baseball example, the focus was on the length of the longest streak in a binary sequence. Another way to measure streakiness in a sequence is the number of switches from 0 to 1 or from 1 to 0. For example, if the binary sequence is given by:

0 1 0 0 0 1 0 0 1

Then there are three switches from 0 to 1 and two switches from 1 to 0 and so the total number of switches is equal to five. If `y` is a vector containing the binary sequence, then the R expression

```
sum(abs(diff(y)))
```

will compute the number of switches.

- 1) Construct a function **switches()** that computes the number of switches for a binary vector `y`. Test this function by finding the number of switches in Chase Utley's game hitting sequence for the 2006 season.

```
switches = function(y){  
  sum(abs(diff(y)))  
}
```

```
utley = read.table("http://personal.bgsu.edu/~mrizzo/Rx/Rx-data/utley2006.txt",  
                  header=TRUE, sep="\t")
```

```
utley.y = as.numeric(utley$H > 0)
```

```
switches(utley.y)
```

- 2) By making a slight change to the function **random.streak()** , construct a function that computes the number of switches for a random permutation of the 1's and 0's in *y*.

```
random.streak=function(y) {  
  mixed.up.y = sample(y)  
  switches(mixed.up.y)  
}
```

- 3) Use the **replicate()** function to repeat the random permutation in 2) above for 10,000 simulations. Construct a histogram of the number of switches for these 10,000 random sequences. Is the number of switches in Utley's sequence consistent with the values generated from these random sequences? Using the number of switches statistic, did Utley display unusually streaky behavior during this season?

```
s = replicate(10000, random.streak(utley.y))  
hist(s)  
abline(v = switches(utley.y), lwd=3)
```

No, Utley's values are not consistent using the switches statistic. He did not display unusually streaky behavior by this statistic. As visible in the plot below, a large area is to the left of his "switches line".

