

# Probability in-class demo

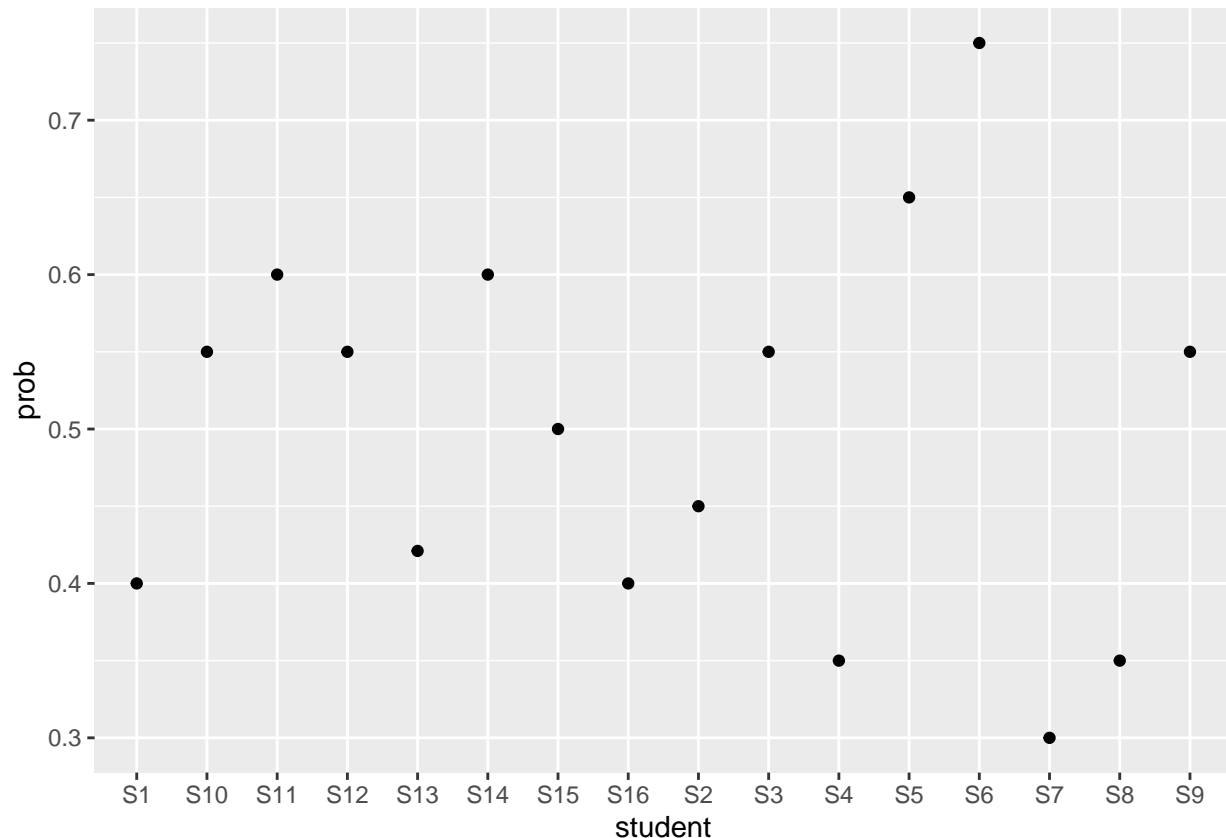
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## Visualizing parity dat

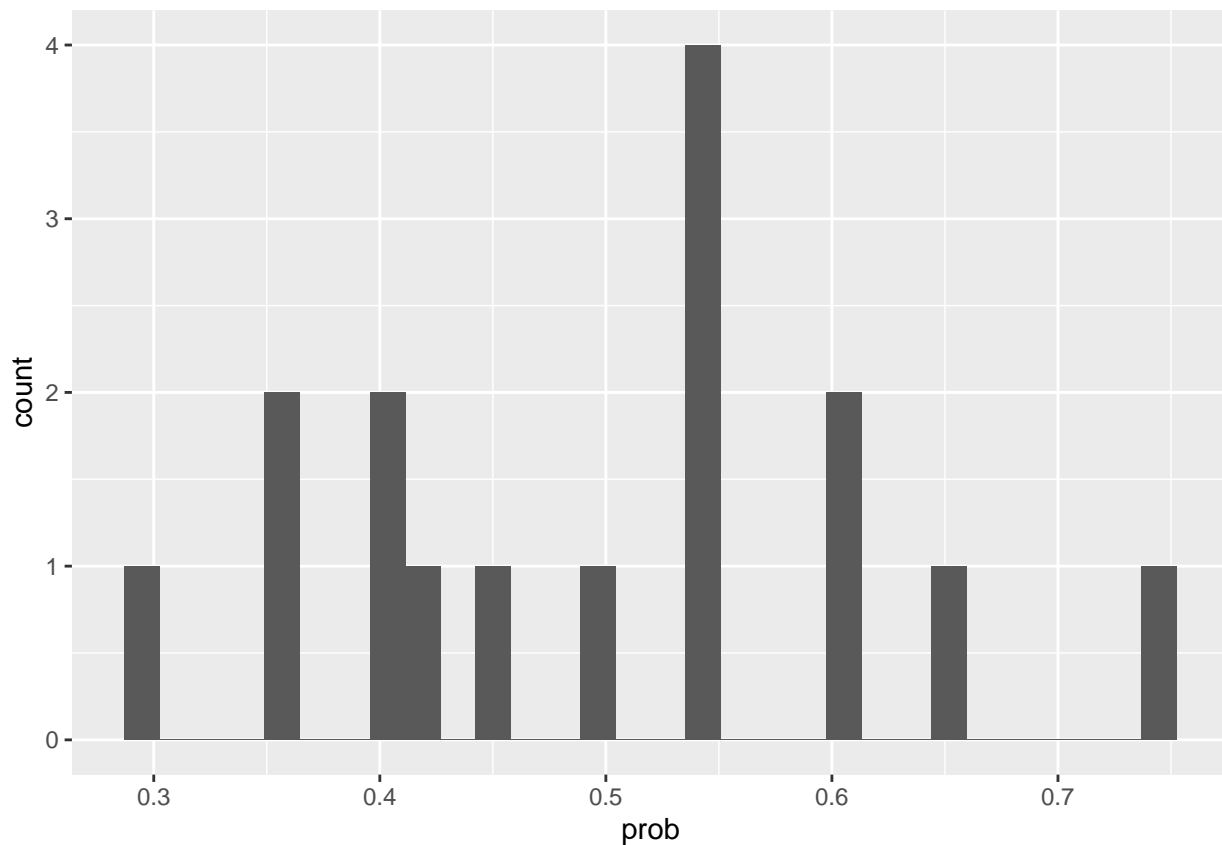
```
parity_dat = read.csv('parity.csv') %>%  
  select(-Trial) %>%  
  gather(key="student", value="acc") %>%  
  group_by(student) %>%  
  summarize(prob = mean(acc, na.rm=TRUE))
```

```
ggplot(parity_dat, aes(x=student, y=prob)) +  
  geom_point()
```



```
ggplot(parity_dat, aes(x=prob)) +  
  geom_histogram()
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```



## Binomial distribution

Lets assume that all students are at chance with guessing the parity (i.e., no mind readers amongst us)

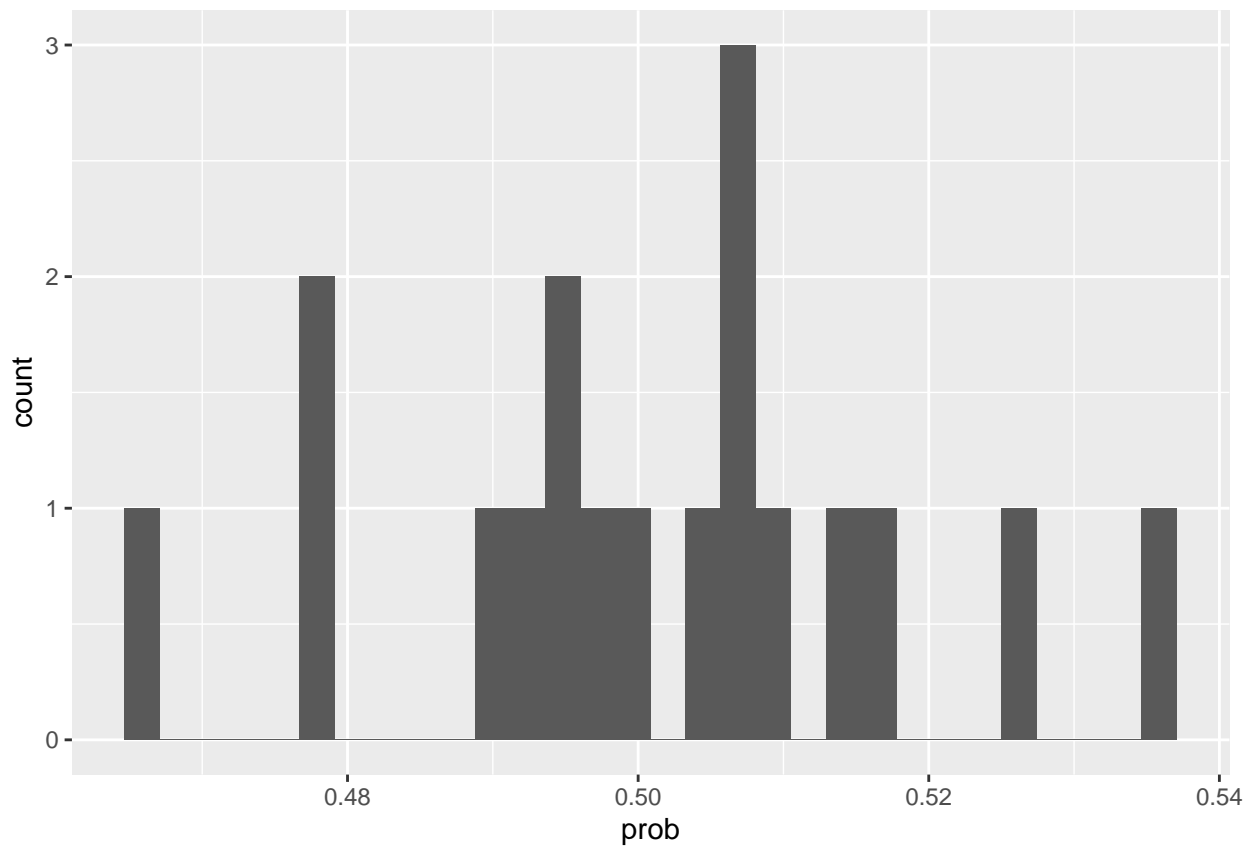
This code below simulates data for 18 students and gives the proportion of correct guesses for 1000 guesses.

```
num_guesses = 1000
```

```
parity_sim = data.frame(student = c(1:18),
                        success = rbinom(n=18, size=num_guesses, prob=0.5)) %>%
  mutate(prob = success/num_guesses)
```

```
ggplot(parity_sim, aes(x=prob)) +
  geom_histogram()
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```

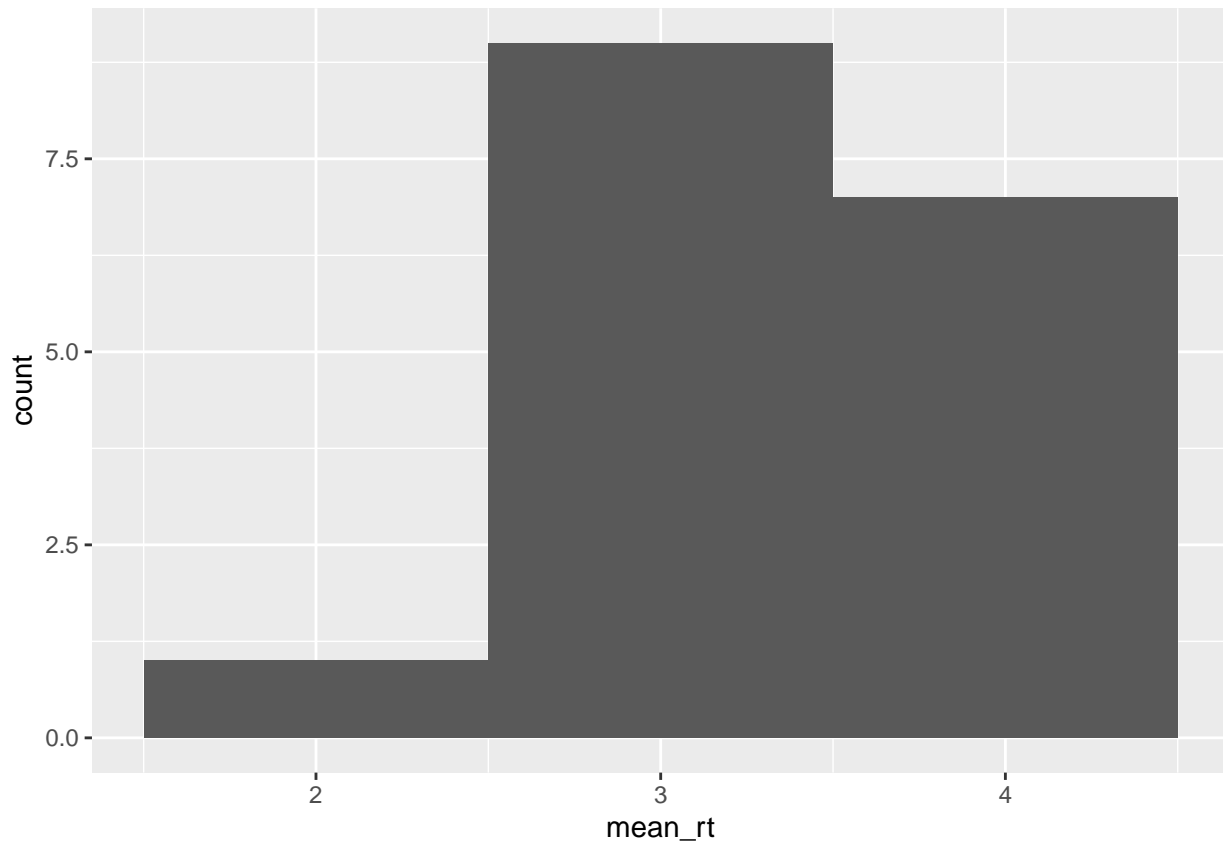


## Visualizing recounting time data

```
rt_dat = read.csv('rt.csv') %>%  
  select(-Trial) %>%  
  gather(key="student", value="rt") %>%  
  group_by(student) %>%  
  summarize(mean_rt = mean(rt, na.rm=TRUE))
```

```
ggplot(rt_dat, aes(x=mean_rt)) +  
  geom_histogram(binwidth = 1)
```

```
## Warning: Removed 1 rows containing non-finite values (`stat_bin()`).
```



## Normal distribution

Lets assume that when asked to recite the English alphabet rapidly people take on average 3.5 seconds to with a standard deviation of 1 second. The code below simulates mean RTs for 18 students under these assumptions.

Note, unlike with the binomial distribution we don't need to specify the exact number of trials that this average was computed over or the proportion of success. Instead, for a normal distribution we need to specify the mean and standard deviation.

```
num = 10000
```

```
rt_sim = data.frame(student = c(1:num),  
                    mean_rt = rnorm(n=num, mean=3.5, sd=1))
```

```
ggplot(rt_sim, aes(x=mean_rt)) +  
  geom_histogram()
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```

