Edpsy 50BAY: homework 3 answers

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Note: I didn't state which years you should have compared, so you could have compared any two years. Below I report all possible comparisons.

First set up the problem:

```
a06 <- 1568
o06 <- 395
a16 <- 1330
o16 <- 528
a18 <- 1102
o18 <- 439

n06 <- a06+o06
n16 <- a16+o16
n18 <- a18+o18
```

I wanted to check the proportions who support or are in favor of gun control laws, so…

```
(p06 <- a06/n06)

## [1] 0.7987774

(p16 <- a16/n16)

## [1] 0.7158235

(p18 <- a18/n18)

## [1] 0.7151201
```

The draws from the posertior only have to be done once and the code below does the monte carlo draws

```
S <- 1E4
simFavor06 <- rbeta(S,(a06+1),(o06+1))
simFavor16 <- rbeta(S,(a16+1),(o16+1))
simFavor18 <- rbeta(S,(a18+1),(o18+1))
```

1. Difference in proportions

    (a) 2006 versus 2016
    ```
    mean(simFavor06>simFavor16)
    ```

    ```
    ## [1] 1
    ```

Support is larger in 2006 and considerly so compared to 2016.

(b) 2006 versus 2018

```
mean(simFavor06>simFavor18)
```

```
## [1] 1
```

Looks like 2006 is really different from 2016

(c) 2016 versus 2018

```
mean(simFavor16>simFavor18)
```

```
## [1] 0.5147
```

Support for gun control laws is about the same in 2016 and 2018.

2. Relative risks

(a) 2006 versus 2016

```
rrisk06.16 <- simFavor06/simFavor16
mean(rrisk06.16>1)
```

```
## [1] 1
```

(b) 2006 versus 2018

```
rrisk06.18 <- simFavor06/simFavor18
mean(rrisk06.18>1)
```

```
## [1] 1
```

(c) 2016 versus 2018

```
rrisk16.18 <- simFavor16/simFavor18
mean(rrisk16.18>1)
```

```
## [1] 0.5147
```

Summary: Relative risks indicate that support of gun control laws in 2006 is different from that in 2016 and 2018; however, support in 2016 and 2018 is about the same.

3. Odds ratios

(a) 2006 versus 2016

```
theta06.16 <- (simFavor06*(1-simFavor16))/((1-
simFavor06)*simFavor16)
mean(theta06.16 > 1)
```

```
## [1] 1
```

(b) 2006 versus 2018

```
    theta06.18 <- (simFavor06*(1-simFavor18))/((1-
simFavor06)*simFavor18)
    mean(theta06.18 > 1)
```

```
## [1] 1
```

   (c) 2016 versus 2018

```
    theta16.18 <- (simFavor16*(1-simFavor18))/((1-
simFavor16)*simFavor18)
    mean(theta16.18 > 1)
```

```
## [1] 0.5147
```

Summary:

Odds ratios, relative risk and difference in proportions, all tell the same story. There is a difference between 2006 relative to 2016 and 2018 but not between 2016 and 2018. If we look at the observed proportions we can see why this may be so. The observed proportion in 2006 was .7988, in 2016 it was .7158, and in 2018 it was 0.7151.

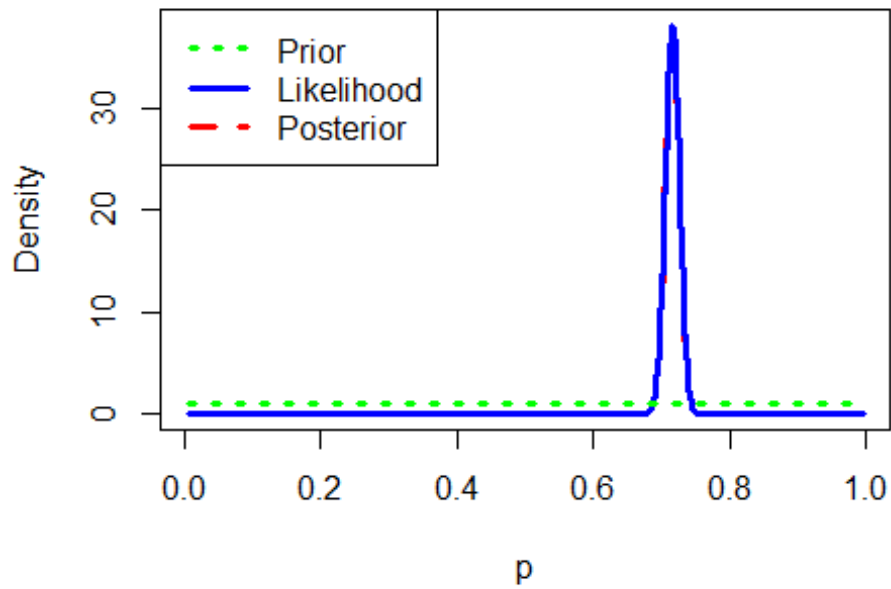## Lets take a look at postieriors for each year:

```
library(LearnBayes)
```

```
triplot(c(1,1),c(1569,396), where="topleft")
```

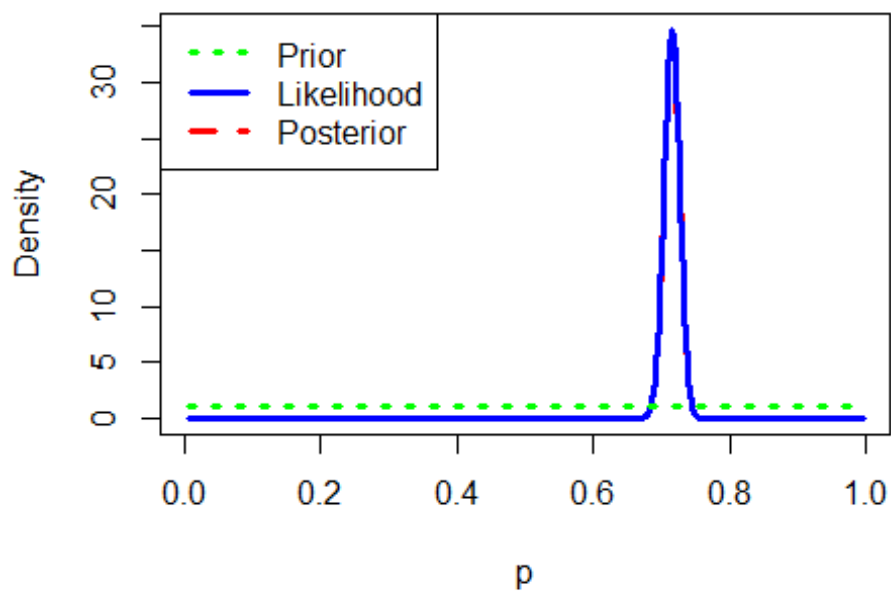**Bayes Triplot, beta(1 , 1) prior, s= 1569 , f= 396**
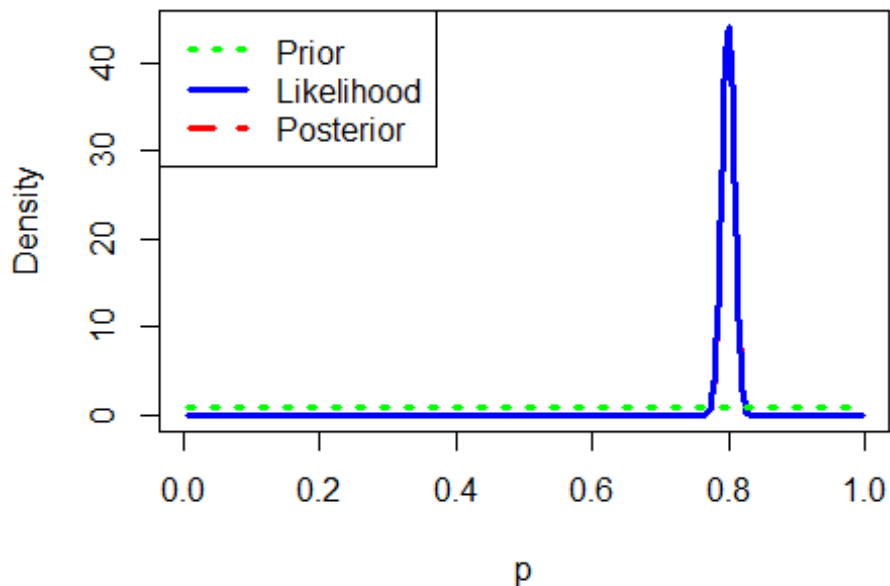

```
triplot(c(1,1),c(1331,529),where="topleft")
```

Bayes Triplot, beta(1 , 1) prior, s= 1331 , f= 529


```
triplot(c(1,1),c(1103,440),where="topleft")
```

Bayes Triplot, beta(1 , 1) prior, s= 1103 , f= 440

The posteriors are very narrow because of the large sample sizes. Note that the posteriors for 2016 and 2018 are nearly identical.