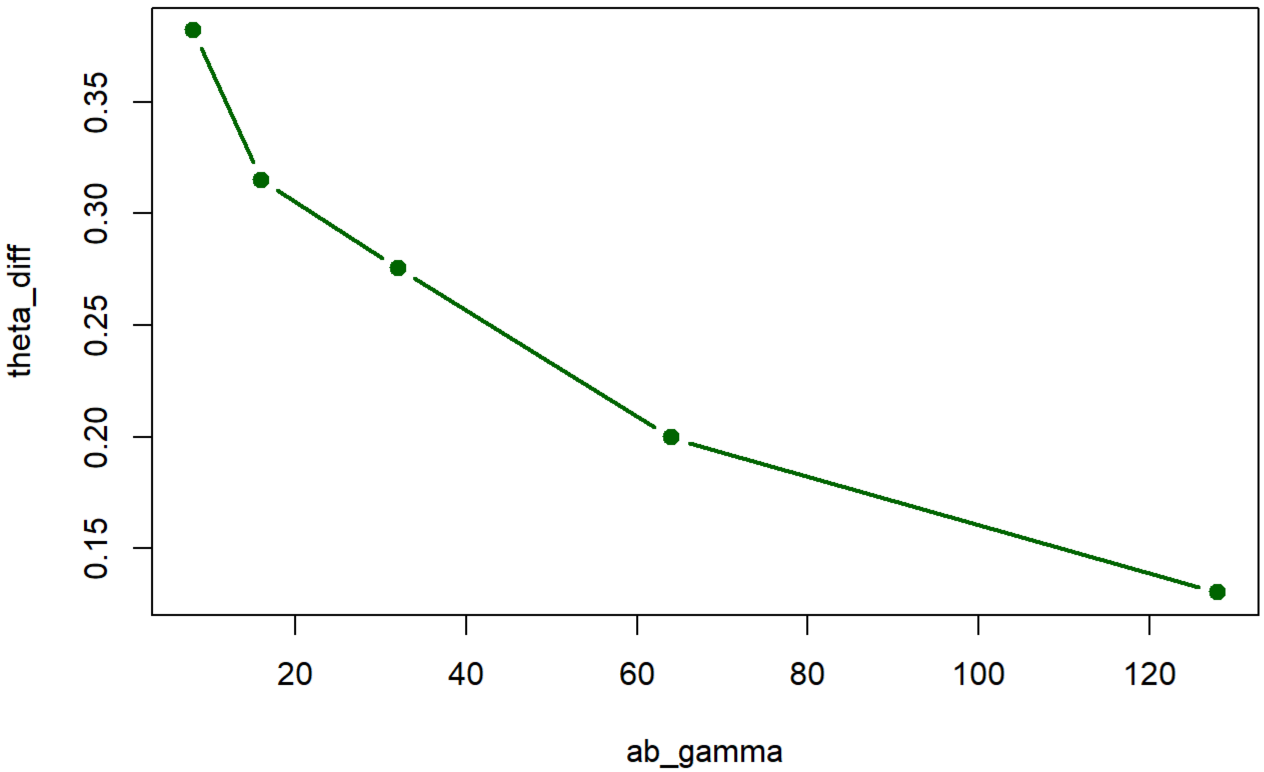
author: “Rory Quinlan” output: html_document —

```
# Descriptive Stats
n_a = length(Y_a)
n_b = length(Y_b)
ybar_a = mean(Y_a)
ybar_b = mean(Y_b)

# Set param values
a_theta = 2
b_theta = 1
S = 5000
ab_gamma = c(8, 16, 32, 64, 128)
```

```
theta_diff = sapply(ab_gamma, function(abg) {
 a_gamma = b_gamma = abg
 THETA = numeric(S)
 GAMMA = numeric(S)
# Starting values
theta = ybar_a
# Relative rate theta_B /theta_A
gamma = ybar_a / ybar_b
# For each value in s (5,000) create a theta with gamma(1,...)
# Then create a a gamma (1,...)
 for (s in 1:S) {
 theta = rgamma(
 1,
 a_theta + n_a * ybar_a + n_b * ybar_b,
 b_theta + n_a + n_b * gamma
 )
 gamma = rgamma(
 1,
 a_gamma + n_b * ybar_b,
 b_gamma + n_b * theta
 )
 THETA[s] = theta
 GAMMA[s] = gamma
 }
# Reconstruct theta_ and theta_B
 THETA_A = THETA
 THETA_B = THETA * GAMMA
 mean(THETA_B - THETA_A)
})
```

```
# Plot
plot(x = ab_gamma, y = theta_diff, xlab = "ab_gamma", ylab = "theta_diff", pch=19, lwd=2, col="darkgreen", type="b")
```



- Since γ_a and γ_b are equal, the gamma distribution will be centered at 1. As our belief in that increases, the mean posterior difference between θ_B and θ_A decreases.