Heather's Part
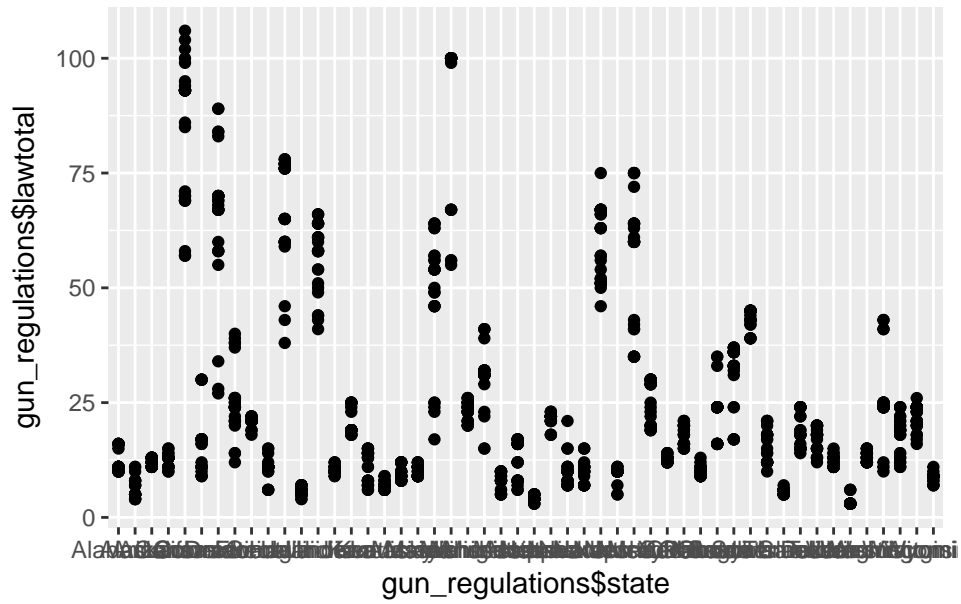
Heather

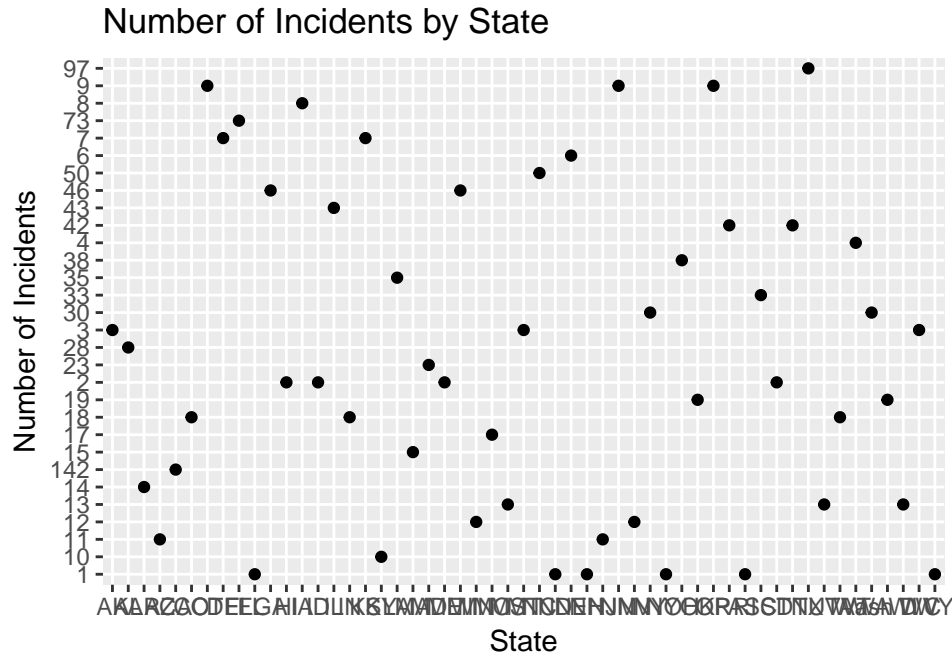*3/5/2018*

Soem exploratory/summary graphs:

Total Number of Gun Regulations by State

Number of Victims by Gun Type

Number of Incidents by State
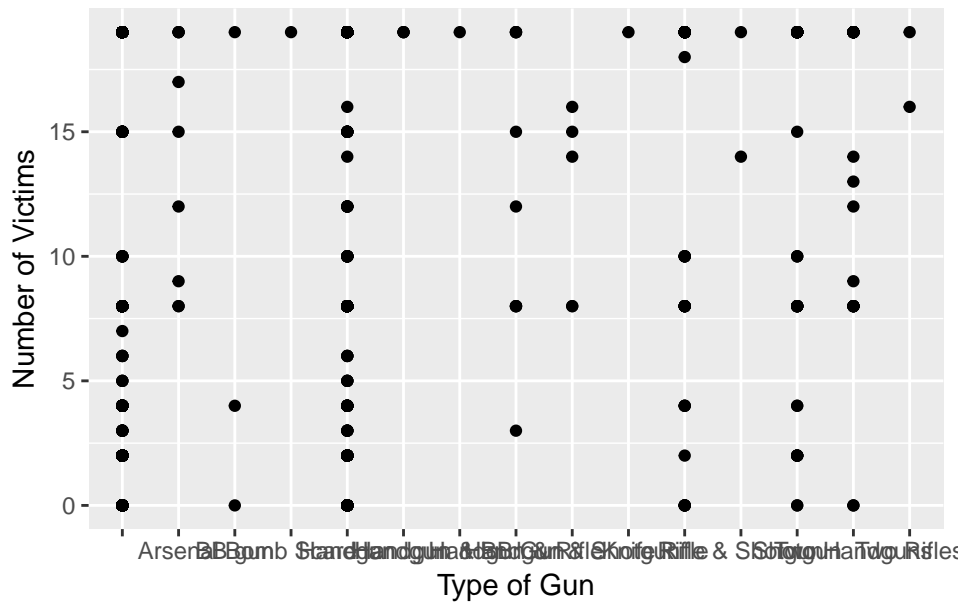
Goal: Model gun type with gun regualtions to see if increased gun regulations play a role in type of gun used in school shootings.

Still to do:
- Get code below to run for simple model and model with gun regulations.
- Check that priors for all models are vague. (histograms of priors and posteriors)
- Check for converenge issues (traceplots, Rhat and neff for all parameters)

Simple model for gun type used:

$$\text{gun type } = G_j \sim Multinomial(N, p_1, ..., p_J)$$

$$log(\frac{P(G_j = j | g.reg_i)}{P(G_j = J | g.reg_i)}) = \alpha_j$$

$$j = 1, ..., J - 1$$

J is the reference gun type

```
group.i <- as.vector(allshootings$Weapon.s..Categories)
n <- length(allshootings$Weapon.s..Categories)
group.j <- unique(group.i)
J <- length(group.j)
weapongetj.i <- rep(NA, n)
for (j in 1:J){
  weapongetj.i[group.i==group.j[j]] <- j
}

model <- "
model {
weapon_type[1:J] ~ dmultinom(p[1:J],N)

for (j in 1:J) {
          p[j] <- delta[j] / sum(delta[j])
```

```
              delta[j] ~ dgamma(alpha[j], 0.0001)
}

for (j in 1 : J) {
  alpha[j] ~ dunif(0.001, .8)

}

} # end model
"
jags.data <- list(weapon_type = allshootings$Weapon.s..Categories, J=J,
                  N=length(allshootings$Weapon.s..Categories))

parnames <- c( "alpha")

mod <- jags(data = jags.data, parameters.to.save=parnames, n.chains = 3, n.burnin = 1000, n.iter = 2500-
```

Using gun regulations to model gun type used:

$$\text{gun type } = G_j \sim Multinomial(N, p_1, ..., p_J)$$

$$log(\frac{P(G_j = j|g.reg_i)}{P(G_j = J|g.reg_i)}) = \alpha_j + \beta_j * g.reg_{s,t[i]}$$

$$ where gun regulations is a binary variable, either high or low in state, s, at time, t.

```
model <- "
model {
weapon_type[1:J] ~ dmultinom(p[1:J], N)

for (j in 1:J) {
              p[j] <- delta[j] / sum(delta[j])
              delta[j] ~ dgamma(phi[j], 0.0001)
}
for (j in 1 : J) {
  phi[j] <- alpha[j]     + beta*gun_reg

}

for (j in 1 : J) {
  alpha[j] ~ dunif(0.001, .8)

}

  beta ~ rnorm(0, 0.0001)


} # end model
"
jags.data <- list(weapon_type = allshootings$Weapon.s..Categories, J=J,
                  gun_reg = gun_regulations$lawtotal,
                  n=length(allshootings$Weapon.s..Categories))

parnames <- c( "alpha", "beta")
```

```
mod <- jags(data = jags.data, parameters.to.save=parnames,
            n.chains = 3, n.burnin = 1000, n.iter = 2500,
            model.file = textConnection(model))
```