

## lab 13

2025-06-23

```
#13.1 and 13.2 model
data = putts_train %>%
  mutate(
    m1 = mean(X),
    m2 = X
  )

#EF1
data = data %>%
  mutate(
    EF1 = {
      C = mean(X)*(1 - mean(X))
      sig = sqrt(C/N)
      xi_ = X/sig
      x_bar = mean(xi_)
      s2x_ = sum((xi_ - x_bar)^2)
      theta = x_bar + (1 - (n() - 1)/s2x_) * (xi_ - x_bar)

      theta * sig
    }
  )

#EF2
data = data %>%
  mutate(
    EF2 = {
      H = X * N
      num = H + 3/8
      denom = N + 3/4
      X2 = asin(sqrt(num / denom))
      nu = 1 / (2 * sqrt(N))
      X3 = X2 / nu

      x_bar = mean(X3)
      s2x_ = sum((X3 - x_bar)^2)
      theta = x_bar + (1 - (n() - 1)/s2x_) * (X3 - x_bar)

      sin(nu * theta)^2
    }
  )

#EB1
data = data %>%
  mutate(
    EB1 = {
```

```

    C = mean(X) * (1 - mean(X))
    u = m1
    tau2 = var(X) - (C/mean(N))

    u + (tau2)*(X-u)/(tau2 + C/N)
  }
)

#EB2
data <- data %>%
  mutate(
    EB2 = {
      H = X * N
      X2 = asin(sqrt((H + 3/8) / (N + 3/4)))
      nu2 = 1 / (4 * N)

      mu = mean(X2)
      tau2 = var(X2) - mean(nu2)

      shrink = tau2 / (tau2 + nu2)
      theta = mu + shrink * (X2 - mu)

      sin(theta)^2
    }
  )

```

```

##      model      mse
## 1    EB2 0.0006213173
## 2    EB1 0.0006221690
## 3     m1 0.0007470204
## 4    EF1 0.0008291139
## 5    EF2 0.0008637432
## 6     m2 0.0008902228

```

Bayes by far the best, with simple estimate=x the worst

True Second-Half Putting Performances vs Predicted Estimates

