

Musicality

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Contents

#Packages

```
#install.packages("readr")  
library("readr")
```

```
## Warning: package 'readr' was built under R version 4.1.3
```

```
#install.packages("ggplot2")  
library("ggplot2")  
#install.packages("viridis")  
library("viridis")
```

```
## Loading required package: viridisLite
```

```
## Warning: package 'viridisLite' was built under R version 4.1.3
```

```
library("tinytex")
```

#Data

```
Data <- read.csv("Musicality_Fall_2025.csv")  
head(Data)
```

```
##           Name Attempt Rhythm Pitch Experience      Ratio  
## 1 Madison Beale      1    784    26          NA 30.98718  
## 2 Madison Beale      2    811    NA          NA      NA  
## 3 Madison Beale      3    822    NA          NA      NA  
## 4 Daniel Chang      1    807    24           1 32.73611  
## 5 Daniel Chang      2    737    NA          NA      NA  
## 6 Daniel Chang      3    813    NA          NA      NA
```

```
#Subset Data for groups  
#Data <- Data[c(),]
```

#Research Questions -Can practice improve rhythm? -Does previous musical experience lead to improved sense of pitch/rhythm? -Is there a relationship between rhythm and pitch?

```
##Model 1

'''r
#Can practice improve rhythm?
Modell1 <- glm(Rhythm ~ Attempt, data = Data)
summary(Modell1)
'''

'''
##
## Call:
## glm(formula = Rhythm ~ Attempt, data = Data)
##
## Deviance Residuals:
##      Min       1Q   Median       3Q      Max
## -277.03  -26.91   16.94   45.07   94.97
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    732.50      27.71  26.437  <2e-16 ***
## Attempt         21.53      12.83   1.679    0.1 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for gaussian family taken to be 5264.278)
##
##      Null deviance: 256992  on 47  degrees of freedom
## Residual deviance: 242157  on 46  degrees of freedom
## AIC: 551.47
##
## Number of Fisher Scoring iterations: 2
'''

##Figure 1

'''r
ggplot(data = Data,
       aes(x = as.factor(Attempt),
           y = Rhythm,
           col = as.factor(Attempt))) +
  geom_jitter() +
  geom_boxplot() +
  geom_smooth(aes(x = Attempt,
                  y = Rhythm,
                  col = Attempt),
              method = lm) +
  ggtitle("Can practice improve rhythm?") +
  ylab("Rhythm Score") +
  xlab("Attempt") +
  guides(color = guide_legend(title = "Attempt")) +
  scale_color_viridis(discrete = TRUE,
                     option = "viridis") +
  theme_bw()
'''
```

```

'''
## 'geom_smooth()' using formula = 'y ~ x'
'''

'''
## Warning: The following aesthetics were dropped during statistical transformation:
## colour.
## i This can happen when ggplot fails to infer the correct grouping structure in
##   the data.
## i Did you forget to specify a 'group' aesthetic or to convert a numerical
##   variable into a factor?
'''

```

```
<!-- -->
```

```

###Homework Questions:
-What was the hypothesis?
the hypothesis was >>>>
-Was it supported or rejected?
-What does the figure show us?

```

```
##Model 2
```

```

##Is there a relationship between rhythm and pitch?
Model2 <- glm(Rhythm ~ Pitch, data = Data)
summary(Model2)

```

```

##
## Call:
## glm(formula = Rhythm ~ Pitch, data = Data)
##
## Deviance Residuals:
##      Min       1Q   Median       3Q      Max
## -274.33  -28.67   38.33   53.08   79.36
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  215.259    213.792   1.007  0.3311
## Pitch        22.336     8.949   2.496  0.0257 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for gaussian family taken to be 8568.778)
##
##      Null deviance: 173347  on 15  degrees of freedom
## Residual deviance: 119963  on 14  degrees of freedom
## (32 observations deleted due to missingness)
## AIC: 194.16
##
## Number of Fisher Scoring iterations: 2

```

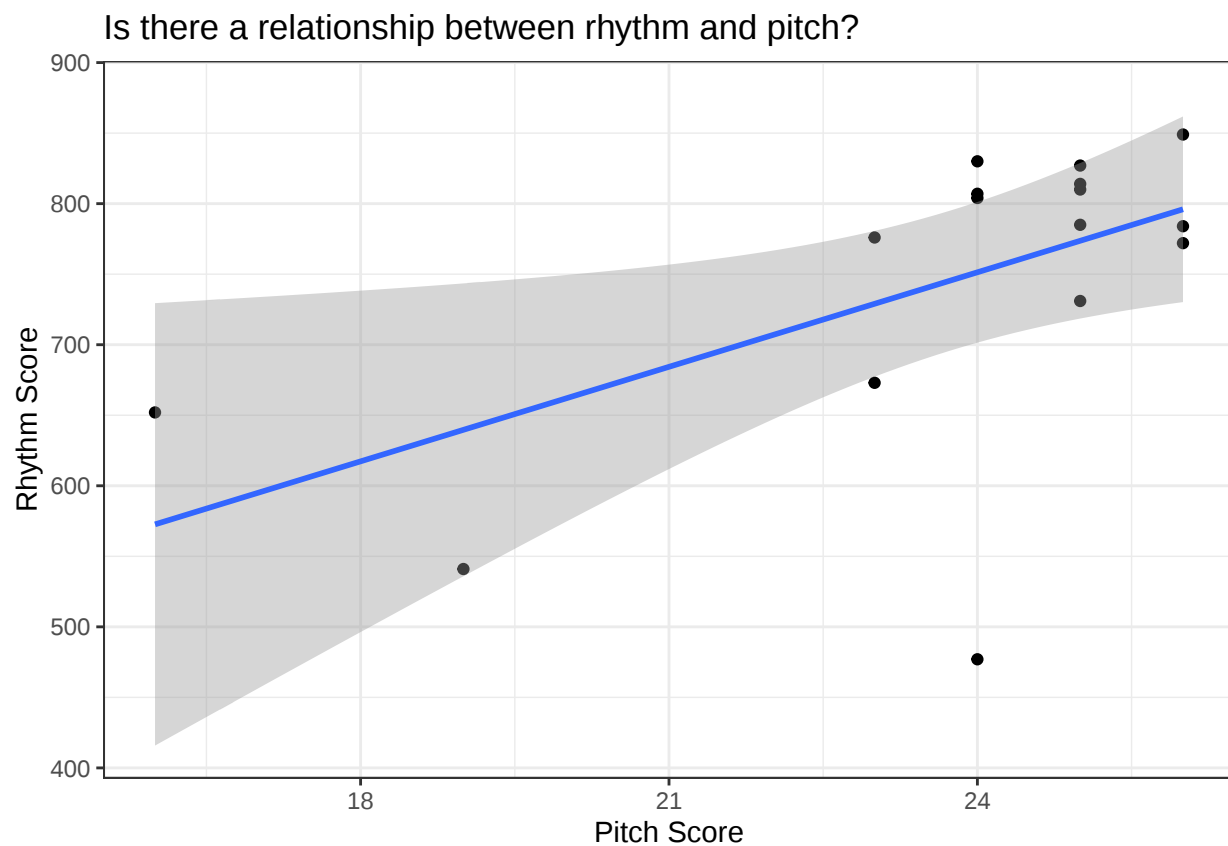
```
##Figure 2
```

```
ggplot(data = Data,
       aes(y = Rhythm,
           x = Pitch)) +
  geom_point() +
  geom_smooth(method = lm) +
  ylab("Rhythm Score") +
  xlab("Pitch Score") +
  ggtitle("Is there a relationship between rhythm and pitch?") +
  theme_bw()
```

```
## 'geom_smooth()' using formula = 'y ~ x'
```

```
## Warning: Removed 32 rows containing non-finite outside the scale range
## ('stat_smooth()').
```

```
## Warning: Removed 32 rows containing missing values or values outside the scale range
## ('geom_point()').
```



###Homework Questions: -What was the hypothesis? Was it supported or rejected? -What does the figure show us?

##Model 3

'''r

```

#Does previous musical experience lead to improved sense of rhythm/pitch?
Model3 <- glm(Experience ~ Ratio, family = "binomial", data = Data)
summary(Model3)
'''

'''
##
## Call:
## glm(formula = Experience ~ Ratio, family = "binomial", data = Data)
##
## Deviance Residuals:
##      Min       1Q   Median       3Q      Max
## -2.09087   0.01831   0.49041   0.69324   1.09374
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  18.7361    13.3216   1.406   0.160
## Ratio        -0.5300     0.3985  -1.330   0.183
##
## (Dispersion parameter for binomial family taken to be 1)
##
##      Null deviance: 17.397  on 14  degrees of freedom
## Residual deviance: 12.584  on 13  degrees of freedom
## (33 observations deleted due to missingness)
## AIC: 16.584
##
## Number of Fisher Scoring iterations: 6
'''

##Figure 3

'''r
ggplot(data = Data,
       aes(x = Ratio,
           y = Experience)) +
  geom_point() +
  stat_smooth(method = "glm",
             method.args = list(family = "binomial"),
             se = T) +
  ylab("Musical Experience") +
  xlab("Rhythm/Pitch Score") +
  ggtitle("Does previous musical experience lead to improved sense of rhythm/pitch?") +
  theme_bw()
'''

'''
## 'geom_smooth()' using formula = 'y ~ x'
'''

'''
## Warning: Removed 33 rows containing non-finite outside the scale range
## ('stat_smooth()').
'''

```

```

'''
## Warning: Removed 33 rows containing missing values or values outside the scale range
## ('geom_point()').
'''

<!-- -->

###Homework Questions:
-What was the hypothesis? Was it supported or rejected?
-What does the figure show us?
-What does a higher or lower rhythm/pitch ratio mean?

```