

Musicality

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Contents

#Packages

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

```
## Warning: package 'ggplot2' was built under R version 4.3.3
```

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

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

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

```
## Warning: package 'tinytex' was built under R version 4.3.3
```

#Data

```
library(readr)  
Musicality_Fall_2025 <- read_csv("Musicality_Fall_2025.csv")
```

```
## Rows: 48 Columns: 6  
## -- Column specification -----  
## Delimiter: ","  
## chr (1): Name  
## dbl (5): Attempt, Rhythm, Pitch, Experience, Ratio  
##  
## i Use 'spec()' to retrieve the full column specification for this data.  
## i Specify the column types or set 'show_col_types = FALSE' to quiet this message.
```

```
View(Musicality_Fall_2025)  
#Subset Data for groups  
Data <- Musicality_Fall_2025[c(1,2,3,7,8,9,22,23,24,31,32,33,34,35,36),]
```

#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)
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)   707.13      64.66  10.935 6.32e-08 ***
## Attempt       31.10      29.93   1.039  0.318
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for gaussian family taken to be 8960.403)
##
##      Null deviance: 126157  on 14  degrees of freedom
## Residual deviance: 116485  on 13  degrees of freedom
## AIC: 182.93
##
## 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? Was it supported or rejected?
Hypothesis: practicing can change a person's rhythm.
Prediction: practicing will lead to an increase in a person's rhythm
Our hypothesis was not supported as the p-value was not significant.
-What does the figure show us?
The figure shows potentially a trend of practice potentially increasing a person's rhythm but it is not clear.

##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)
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) -3109.63      809.24  -3.843   0.0311 *
## Pitch        150.88       31.84   4.738   0.0178 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for gaussian family taken to be 3244.917)
##
## Null deviance: 82577.2  on 4  degrees of freedom
## Residual deviance: 9734.8  on 3  degrees of freedom
## (10 observations deleted due to missingness)
## AIC: 58.059
##
## Number of Fisher Scoring iterations: 2

##Figure 2

ggplot(data = Data,
       aes(y = Rhythm,
           x = Pitch)) +
  geom_point() +
  geom_smooth(method = lm) +

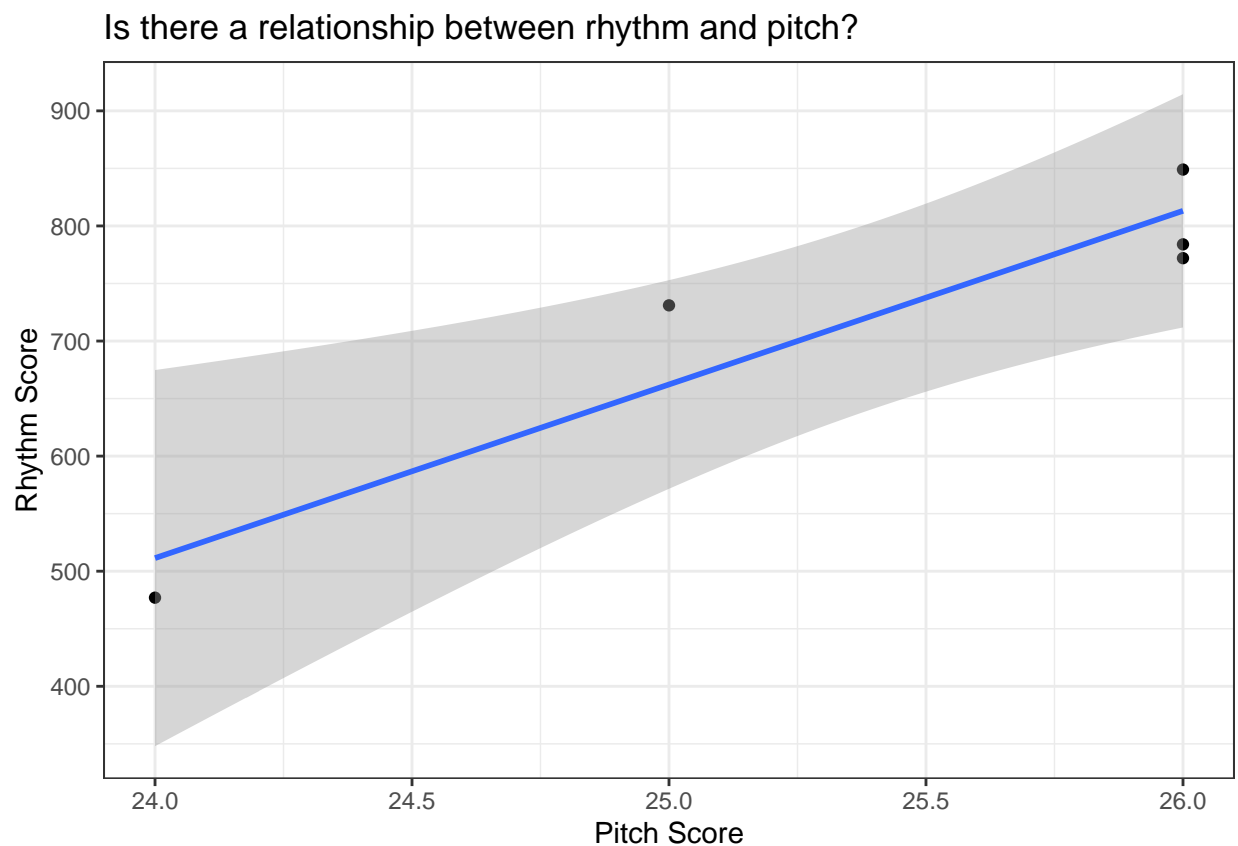
```

```
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 10 rows containing non-finite outside the scale range
## ('stat_smooth()').
```

```
## Warning: Removed 10 rows containing missing values or values outside the scale range
## ('geom_point()').
```



###Homework Questions: -What was the hypothesis? Was it supported or rejected? Hypothesis: There is no relationship between rhythm and pitch. Prediction: Someone with good rhythm, will have good or bad pitch. Our hypothesis was rejected as there was significance that pitch score and rhythm are correlated. Our p-value was 0.0178 which is statistically significant showing a relationship between rhythm and pitch. -What does the figure show us? The figure shows a positive correlation between pitch score and rhythm in a clear manner.

##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)
##
## Coefficients:
##             Estimate Std. Error z value Pr(>|z|)
## (Intercept)  2.357e+01  5.521e+05      0      1
## Ratio       -9.326e-08  1.833e+04      0      1
##
## (Dispersion parameter for binomial family taken to be 1)
##
## Null deviance: 0.000e+00 on 3 degrees of freedom
## Residual deviance: 4.661e-10 on 2 degrees of freedom
## (11 observations deleted due to missingness)
## AIC: 4
##
## Number of Fisher Scoring iterations: 22
'''

##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 11 rows containing non-finite outside the scale range
## ('stat_smooth()'.
'''

'''
## Warning: Removed 11 rows containing missing values or values outside the scale range
## ('geom_point()'.
'''

```

<!-- -->

###Homework Questions:

-What was the hypothesis? Was it supported or rejected?

Hypothesis: There is a relationship between previous musical experience and improved sense of rhythm/pitch.

Prediction: Someone with previous musical experience will have a better sense of rhythm/pitch.

There was no statistical significance between musical experience and a better sense of rhythm/pitch. It

-What does the figure show us?

The figure shows no trend at all.

-What does a higher or lower rhythm/pitch ratio mean?

Higher rhythm/pitch ratio means a higher rhythm score compared to pitch.

Lower rhythm/pitch ratio means a lower rhythm score compared to pitch.