M11 Problem Set: Correlations for TAs

Pablo E. GutiÃ©rrez-Fonseca

2024-04-09 17:51:05

We investigated the correlation between father guppy ornamentation (fatherOrnamentation) and the perceived attractiveness of their sons to female mates (sonAttractiveness). Guppies were sourced from Southeast Asian streams, and breeding pairs were selected based on genetic diversity and visual characteristics. After assessing father ornamentation, we conducted female choice trials to measure son attractiveness. By controlling for environmental factors, **we aimed to reveal any correlation between father ornamentation and son attractiveness.**

1. Is your data normally distributed?
2. What is the correlation coefficient value between father ornamentation and son attractiveness?
3. What is the coefficient of determination (r2) for the correlation between father ornamentation and son attractiveness?
4. Considering its strength and direction, how would you classify this correlation?
5. Write a concise one paragraph summary of this analysis.
   Remember that any summary should include the following:
6. Statement of the research hypothesis or study objectives.
7. Brief summary of methods (one sentence or less).
8. Statement of the statistical results (including type of test and shorthand: r= obtained value, p = 0.xxx). 3.A. Remember to include whether this is a Pearson or Spearman correlation.
   3.B. Remember to include the nature of the correlation: direct = positive or indirect = negative.
   3.C. Remember to include the strength of the correlation: weak, moderate, strong.
9. Description of any differences, if meaningful (weak, moderate, strong correlation), along with an interpretation of why these results make sense (or don't make sense).

#1. Import libraries and load packages

```
library(tidyverse)
library(dplyr)
library(readxl)
```

#2. importing our data

```r
fish <- read.csv("fish_guppies.csv")
```

```r
shapiro.test(fish$fatherOrnamentation)
```

```
##
##  Shapiro-Wilk normality test
##
## data:  fish$fatherOrnamentation
## W = 0.94899, p-value = 0.09717
```

```r
shapiro.test(fish$sonAttractiveness)
```

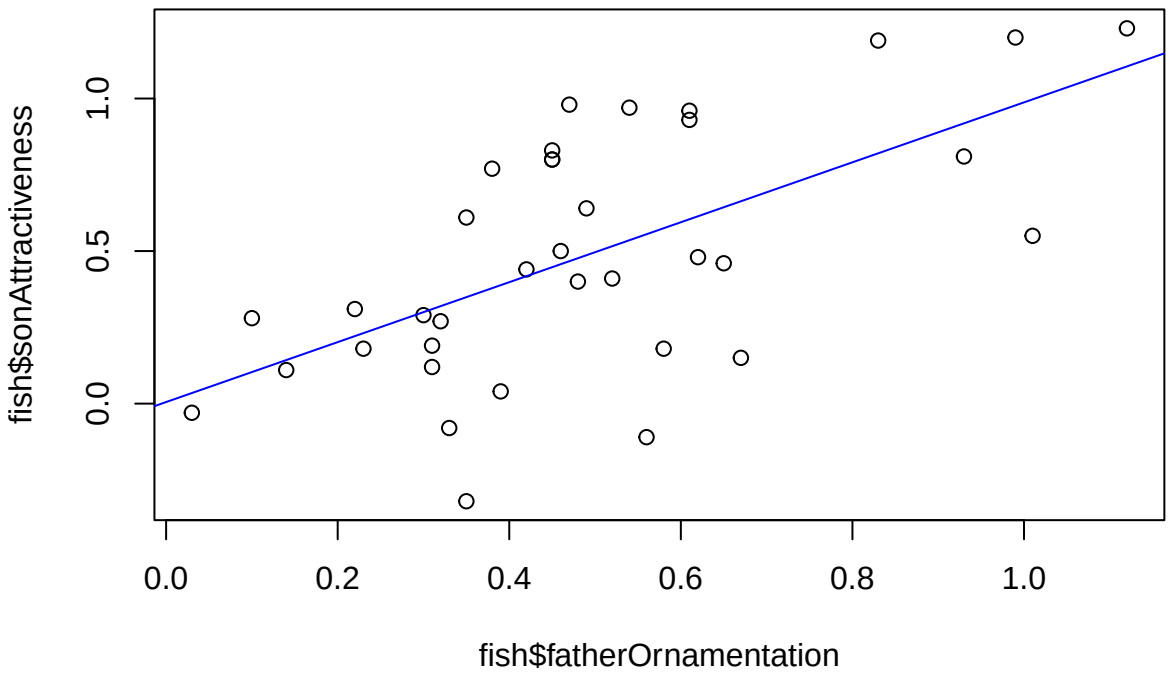
```
##
##  Shapiro-Wilk normality test
##
## data:  fish$sonAttractiveness
## W = 0.97364, p-value = 0.5329
```

```r
cor.test(fish$fatherOrnamentation, fish$sonAttractiveness,
         method='pearson')
```

```
##
##  Pearson's product-moment correlation
##
## data:  fish$fatherOrnamentation and fish$sonAttractiveness
## t = 4.5371, df = 34, p-value = 6.784e-05
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.3577455 0.7843860
## sample estimates:
##       cor
## 0.6141043
```

```r
plot(fish$fatherOrnamentation, fish$sonAttractiveness)
# Fit linear regression model
fit <- lm(sonAttractiveness ~ fatherOrnamentation, data = fish)

# Add trend line
abline(fit, col = "blue")
```



We assessed the potential correlation between father ornamentation and son attractiveness. Utilizing Pearson's correlation analysis, we examined data collected from observations of fish, specifically focusing on the ornamentation of fathers and the attractiveness of their sons. The analysis revealed a statistically significant correlation (correlation coefficient r=0.61, df=34, p<0.0001, r^2 0.37). This finding suggests a moderate to strong positive correlation between father ornamentation and son attractiveness. In essence, it implies that the ornamental traits displayed by fathers may influence the attractiveness of their offspring.

References: https://whitlockschluter3e.zoology.ubc.ca/RLabs/index.html

Exam: https://aniruhil.org/courses/pbio/knits/chapter_16 https://whitlockschluter.zoology.ubc.ca/data/chapter16