Exercise on experiments

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1 Introduction

This exercise asks you to conduct a complete experimental analysis from start to finish. The scenario is as follows:

> A company wants to test whether different work environments affect employee creativity. They randomly assigned 75 employees to three conditions:
>
> - **Open office** (25 employees)
> - **Private office** (25 employees)
>
> - **Flexible workspace** (25 employees)
>
> After 4 weeks, they measured creativity scores on a standardized test (scale: 0-100). You can download the data here

You now need to go through the following steps:

1. Data exploration
2. Assumptions checking
3. Statistical Analysis
4. Interpretation and visualization
5. Bonus: conduct an ANCOVA

Complete each step below. A possible solution is available here.

2 Step 1: Data Exploration

1. Get basic descriptive statistics for the dataset
2. Calculate mean and SD of creativity_score by work_environment
3. Create a visualization comparing creativity scores across environments

3 Step 2: Assumption Checking

1. Check normality of creativity scores within each group
2. Test equality of variances across groups
3. Create histograms or Q-Q plots to visually inspect assumptions

4 Step 3: Statistical Analysis

1. Conduct one-way ANOVA using both aov() and lm()
2. Verify that both approaches give identical F-statistics and p-values
3. If significant, perform post-hoc comparison
4. Calculate effect size (eta-squared)

5 Step 4: Interpretation and Visualization

1. Create a professional publication-ready plot
2. Write a 2-3 sentence interpretation of your results
3. Delineate a practical recommendation to the company

6 Step 5: ANCOVA

1. Add years_experience as a covariate
2. Does this change your conclusions?