**Big Idea:** Seeing is not always believing.


**Intended Learning Outcomes:**
By completing this activity students will have a greater understanding of the potential explanations for the Müller-Lyer Illusion by analysing, interpreting, and applying psychological research findings.

**Key Skills:**
- Formulate research questions and construct testable hypotheses
- Design and conduct investigations using experimental and non-experimental methods such as observation studies, case studies and correlation studies
- Collect, record and summarise both quantitative and qualitative data
- Analyse and interpret data, and draw conclusions consistent with the research question
- Evaluate the validity and reliability of research investigations including potential confounding variables and sources of error and bias
- Work independently and collaboratively as appropriate and within identified research constraints
- Adhere to current occupational health and safety codes and ethical guidelines for conducting psychological investigations.
- Process and interpret information, and make connections between psychological concepts and theories
- Communicate psychological information, ideas and research findings accurately and effectively
- Use communication methods suitable for different audiences and purposes
- Use scientific language, conventions and referencing of information sources appropriate to the medium of communication.

**Educative Value:**
This activity will provide students with valuable experience in research design and reporting: two foundation skills of psychological research. Students will have the opportunity to create testable hypotheses based on their understanding of visual illusion theory, design their own experiment for testing their hypotheses, collect and analyse data, and present it all in the form of a psychological lab report. Students will be scaffolded into the report writing with an ERA template.

**Links to everyday life and society:**
The skills required in this activity are regularly used by academics across scientific disciplines when conducting and reporting on their own research.

Teacher instructions
In a previous lesson you will have taken students through the Muller-Lyer illusion including some of the common theories for explaining it. In this lesson you will be taking students through an experimental design that looks into the validity of the ‘Carpentered World’ theory.

- Describe the experimental design to students and have them show an understanding of how the particular stimulus sets in this experiment put this particular theory to the test.
- Have students come up with their own hypotheses and then as a class work on a procedure that they will all use to collect their data.
- The procedure will require students to test participants on two stimulus sets: one standard Muller-Lyer set and one set replacing the slanted fins with circles (see figures 1 and 2).

Figure 1: Stimulus set A - standard Muller-Lyer stimuli incorporating straight lines of equal length tipped with slanting fins.
• Figure 2: Stimulus set B - Modified Muller-Lyer stimuli replacing slanting fins with circles.
• Have students collect their data and pool data into a class set that all students will use in their ERA.
• Take students through the ERA template and explain to them how to use it to create their own report.
• Provide students with class data and chi-square results.
• Take students through the ERA criteria/rubric (see attached)
• Task students with delivering a completed ERA based on the ERA template, the class data and the statistical analyses.
Student ERA template general instructions

- This is a skeleton plan
- Wherever you see **red bold and italics** you need to add information
- The parts not in red are suggestions only – they are included so you can see how the report will flow together
- **Green text** includes general instructions and hints
- While dot points have been used in this template for ease of explanation they are **NOT** to be used in your final report
- The procedure needs to remain as is – this is the experiment as we conducted it
- ERA formatting requires that you write in the 3rd person – do NOT write *I, we, or our.* Instead say ‘researchers’ or ‘in the current experiment’ etc.
- Do not assume that your reader knows anything – all explanations need to be complete and not rely on prior knowledge
- When you use information from an outside source or from your text it needs to be referenced – see below for reference formatting

Referencing in Psychology

Whenever we use an idea or information from another source we need to let the reader know where we got it. In text referencing in psychology is relatively simple all you need to include is the authors last name and the year of publication.

For example if we were to cite our text book we would put at the end of the relevant sentence or paragraph (Grivas, Letch, Down & Carter, 2010). Once we have cited this publication once in full (with all authors names included) we can then start using an abbreviated reference using only the first listed authors name i.e. (Grivas, 2010)

To include this reference in our bibliography or references section we need to give a little more detail about the title of the book, the authors, where and when it was published etc.

For example,

The aim of the current study was to...........

It was hypothesised that..................

The results from the current study support / reject the hypothesis

In conclusion.....................

Heading for your report needed here

•  (Example opening only) An understanding of visual illusions helps us understand the distinction between sensation and perception.
•  How would you define a visual illusion?
•  Describe the Muller Lyer illusion
•  List some of the common explanations for the Muller Lyer illusion?
•  Expand on the ‘Depth Explanation’ and summarise the evidence in support of this theory.
•  The aim of this study is to............... 
•  It is hypothesised that .................. 
•  The independent variable for this study was......
•  The dependent variable for this study was......
Method

Participants
Participants for this study were (number, sex, age, where from)

Materials
Describe stimulus sets used in this experiment...

Figure 1: Stimulus set A - standard Muller-Lyer stimuli incorporating straight lines of equal length tipped with slanting fins.

Figure 2: Stimulus set B - Modified Muller-Lyer stimuli replacing slanting fins with circles.
**Procedure**
describe procedure accurately and with enough detail for the experiment to be replicated

**Results**

* ……………………………………………………………………………………………………………………………*

* ……………………………………………………… are displayed in table 1.*

Table 1.

You need a heading for this table

<table>
<thead>
<tr>
<th></th>
<th>Stimulus set A</th>
<th>Stimulus set B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of participants who reported lines were of different length</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of participants who reported lines were of the same length</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The results displayed in table 1 show that…….
The number of participants who reported lines were of different length did / did not differ significantly by stimulus set [ \( \chi^2 = ?, p ? .05 \)]

Discussion

• The aim of this study was ................

• It was hypothesized that ................

• The results from this study support / reject the hypothesis, with the results showing that the type of Muller Lyer stimuli did / did not affect the number of participants who reported the vertical lines were of equal length, as indicated by a significant / non significant chi-squared test.
  (Refer back to the patterns in your data to support your argument)

• These findings support / do no support previous research.

• A number of important implications arise from the current study
  (here you need to explain how what this research has shown is relevant for situations outside of the lab setting. This might include a discussion of the following points)
    - The way information is presented in schools?
    - Teaching and learning of information?
    - Every day memory improvement?

• The current study faced a number of limitations…What was wrong with the study?

• This study could be improved by…. what could have been done better?

• In conclusion (wrap it all up, what was found and why does it matter)