Communicate It!, or Sci Fair Made Simple

MTSEF Training
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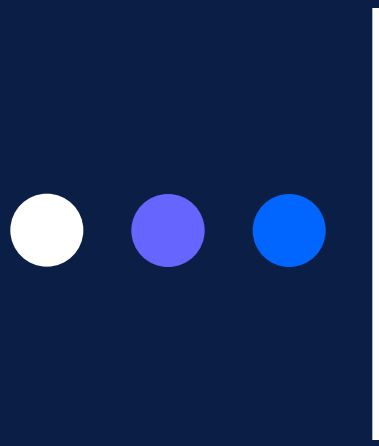


Part 1:
The Big Picture

Communication!

Science Fair is the BRIDGE between…

Communicating Research

- ***Written***
  - Log Book
  - Research Paper
- ***Visual & Written***
  - Science Fair Board
- ***Auditory***
  - The Presenter's words

Written Communication: **Log Book**

- Log book is a record of…
  - What…
  - When…
  - How you did EVERYTHING in your research.
- **Keys:** Attention to detail and thoroughness
- Mainly for your personal benefit, but bring it to the science fair to show how much work you put into your research!

Written Communication: **Paper**

- The research paper is a ***full*** report on the purpose, background, procedure, findings, and significance of your research.
- Your paper should be able to stand by itself, with no extra information or interpretation needed.
- **Keys:** Clarity and depth
- Websites: The JSHS website is VERY GOOD.
  Guide: http://www.jshs.org/forms/guidelines.pdf
  Ex.: http://web.utk.edu/~scisym/researchpaper.pdf

Written and Visual Communication: **Project Board**

- What the board is not…
  - Art contest
  - Back cover of a paperback novel
  - Your research paper mounted on cardboard!

- The **BOARD** is a **BROAD *summary*** of your research that:
  - Gets people interested in your work
  - Gives them all the information they need to understand what you did on a broad level.

- **Keys:** Organization, ability to communicate the BIG IDEA.

Board & Paper - **Similarities**

- In written communication, writing style is critical. For scientific writing…
  - NO GRAMMATICAL MISTAKES!!!!
  - **Tense**: Third person passive ALWAYS
    - Ex: Don't write "I poured 20 mL…"
      Write "20 mL was poured…"
  - Technical writing is not like English class: more adjectives and adverbs are not necessarily a good thing. Keep it clear and simple.
  - Write everything in paragraph form…keep listing to a bare minimum.

Auditory Communication: **YOU!**

- Judges sit and read all day. They're lonely…talk to them! Judges WANT to talk to you, so take advantage of the opportunity.

- **Content:**
  - Summarize
    - The dreaded five words: **Tell me about your project**
  - Be flexible
  - Tell your story

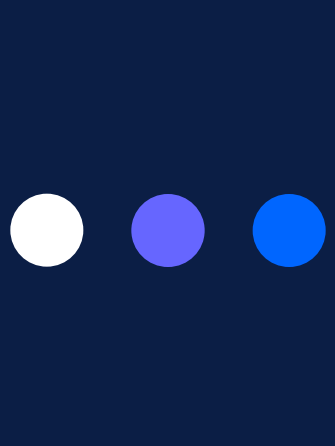
    If there is a personal reason, interest, or story that led you to your research, tell it!

- **Attitude:**
  - Be prepared!
  - Be polished!
  - **BE CONFIDENT!**

    You know what you are talking about! **Admit it** when you don't know something, but be confident in what you do know. That confidence will show in your presentation.

Communication Overview

- Use the science fair board as the bridge to help others understand what you did and why you did it!



Part 2:
The Elements

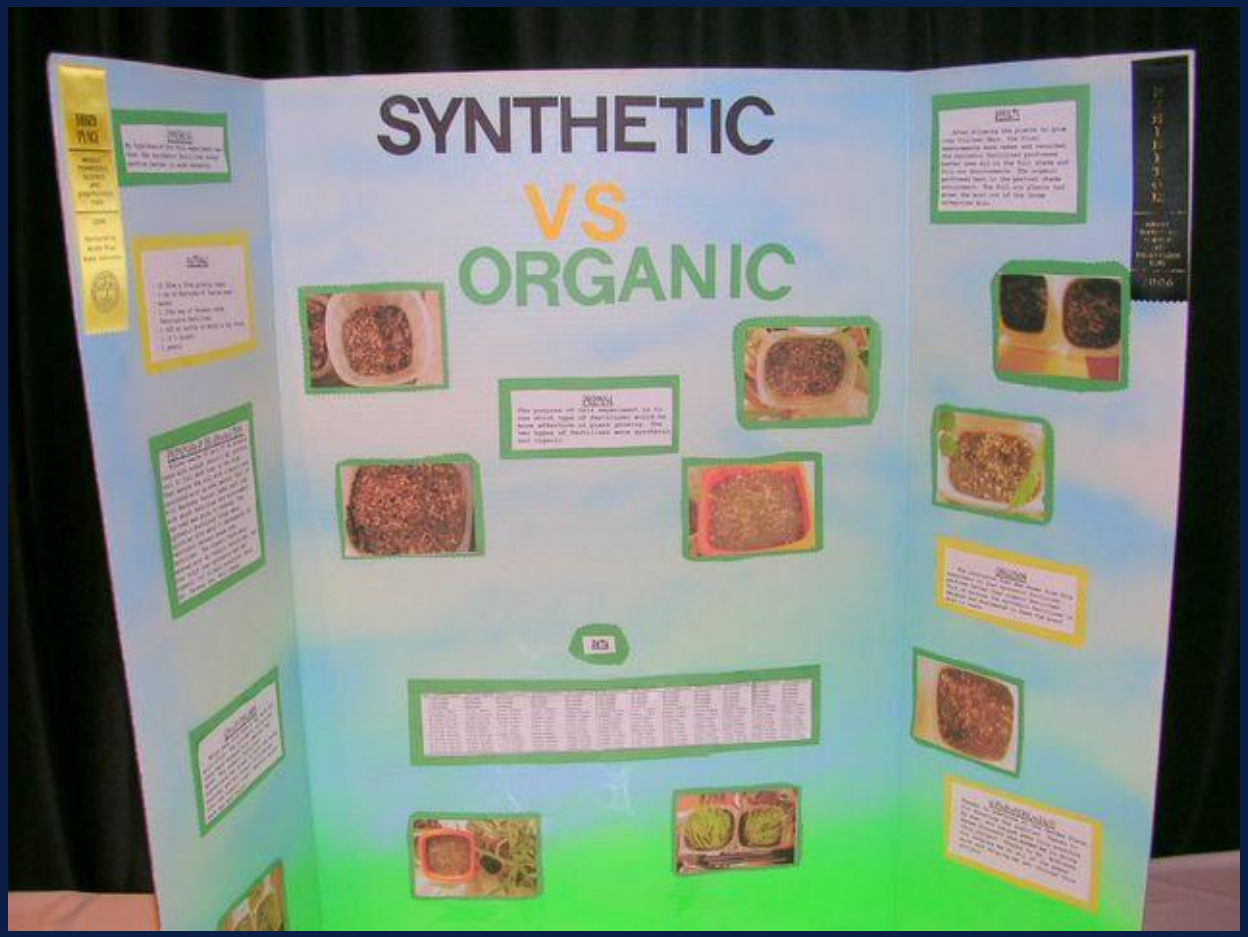
The Elements

- Title
- Abstract
- Introduction
- Purpose
- Hypothesis
- Procedure
- Results
- Conclusion
- References
- Acknowledgments

Title

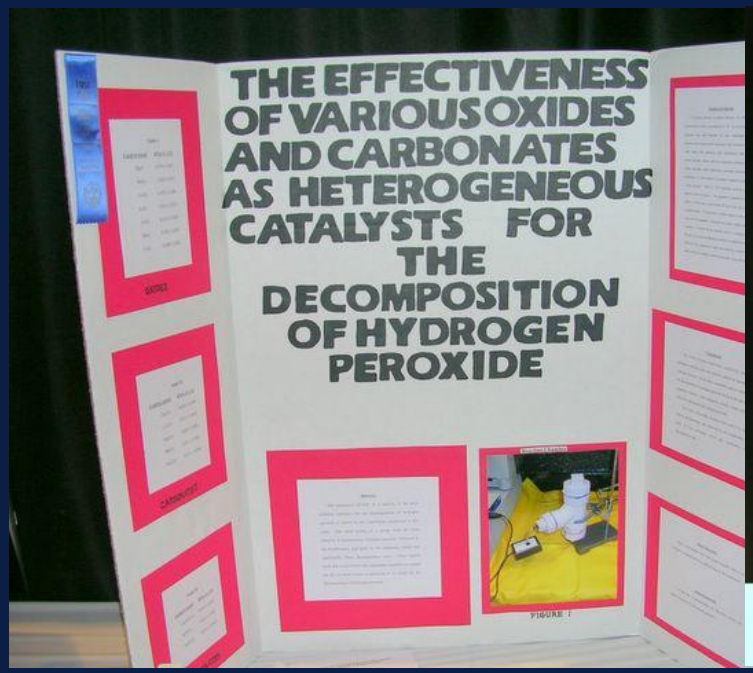
- You don’t have to make it catchy! Simple titles are better!
  - Tomato Plant Maturation in UV Light, NOT Fried Green Tomatoes!
- Needs to be large, but not so large that it takes up the rest of the board.
- Preferably not in the form of a question.

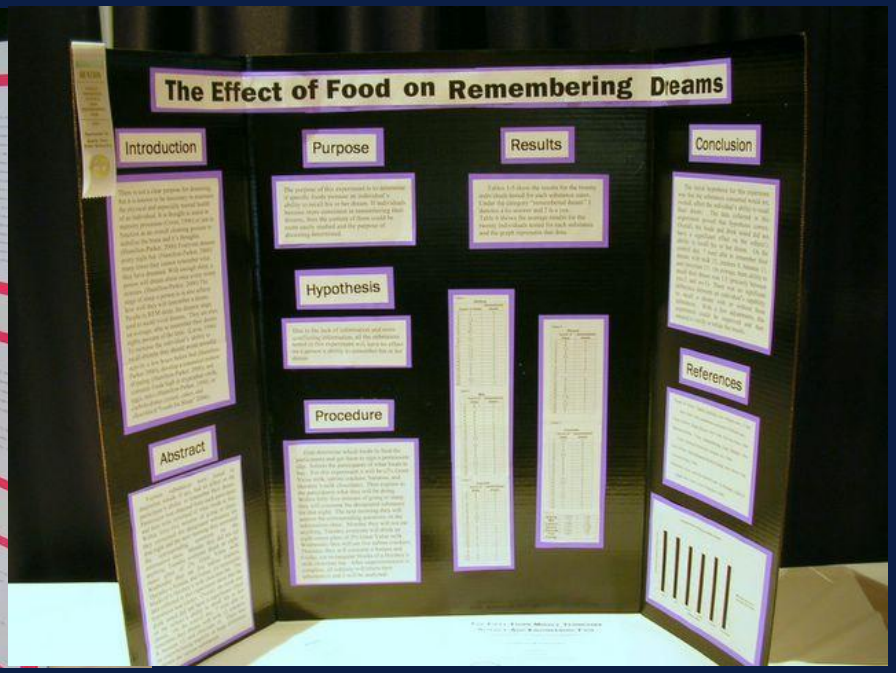
Title



Title

Vs.


THE EFFECTIVENESS OF VARIOUS OXIDES AND CARBONATES AS HETEROGENEOUS CATALYSTS FOR THE DECOMPOSITION OF HYDROGEN PEROXIDE


The Effect of Food on Remembering Dreams
Introduction
Purpose
Results
Conclusion
Hypothesis
Procedure
Abstract
References

Purpose

- The goal and summary of your experiment, i.e. the question your research seeks to answer in statement form.
  - Shouldn't be over one to two sentences.
  - It is one of the…

…**MAIN THINGS THE JUDGES READ.**

Introduction

- Gives background information on your project:
  - Literature search
  - Reasons for experimentation
  - How your project is unique
  - **If you have any personal interest in the project, this is the place to give it.**

Hypothesis

- Your prediction of what will happen in the experiment.
  - Not a random guess – based on a scientific principle stated in the Introduction
  - Your hypothesis doesn't have to be correct. Wrong is just as good as right! Maybe even better!
  - Some projects don't need a hypothesis.

Procedure

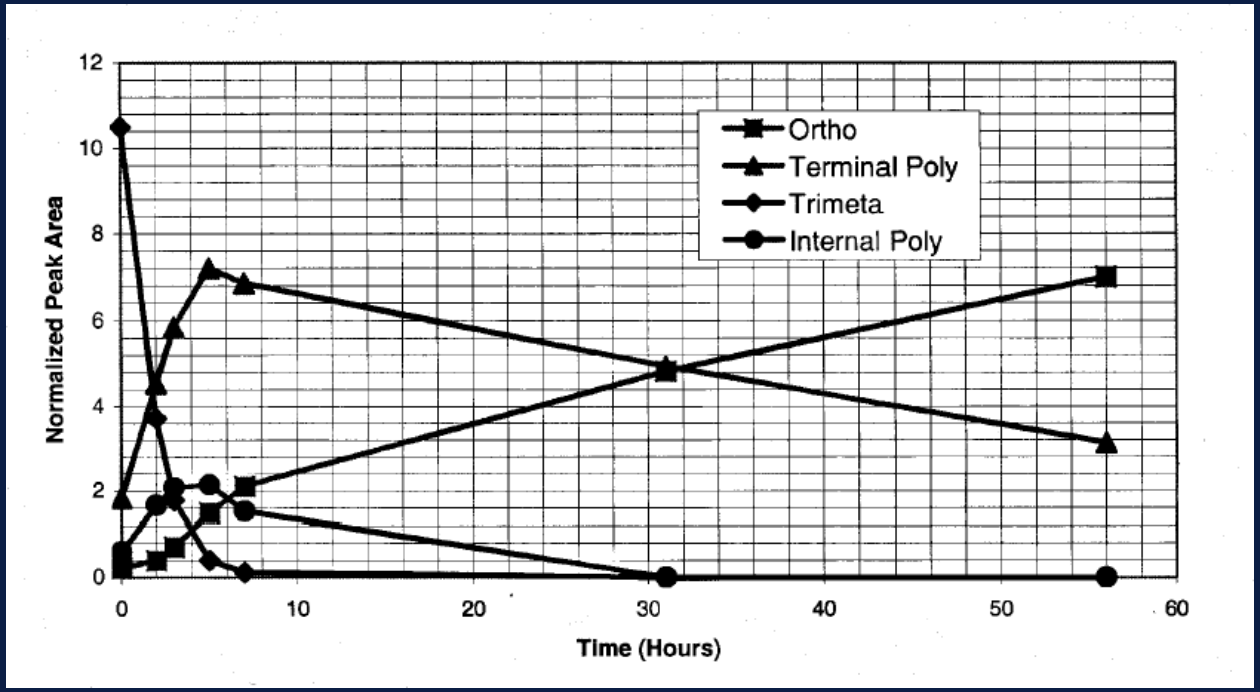
- Description of how the experiment was performed
  - Writing style: past tense, passive voice, paragraph form.
  - Use a list only if there is a very compelling reason to do so.
  - Provide enough information so that someone could replicate your project!

Procedure

An external reference standard was also made for the solutions. Approximately 50 mg of dibasic sodium orthophosphate were added to 1 mL of deuterated water. The pH of the standard was adjusted to 9 for the pH 1 solutions and was adjusted to 1 for the pH 7 solutions so the standard orthophosphate peak would separate from the standard's peak in the hydrolysis spectra. This solution was transferred into a NMR tube insert with a syringe or a pipet. This insert was then fitted into a 4mm NMR tube.

Results

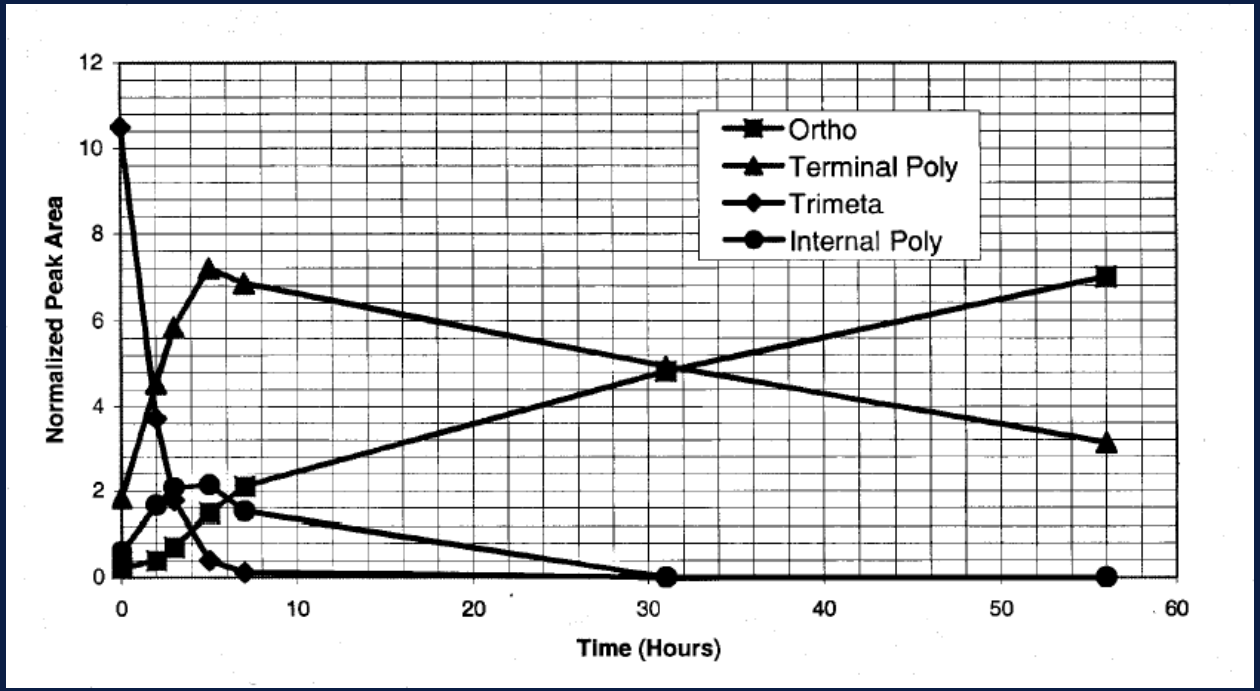
- **Observations** from the experiment
  - Describes the data obtained, but does not explain them.
  - This is the place for graphs, tables, and numerical data obtained from your experiment.



When the reaction began, only the peak representing trimetaphosphate rings was present. This peak, however, degraded very quickly and decayed almost completely in 10 hours. While this was occurring, peaks representing internal and terminal polyphosphate formed. These peaks grew in size until approximately 5 hours into the reaction and then slowly decayed throughout the remainder of the hydrolysis. Table 1 shows the trimeta breakdown to orthophosphate had a rate constant of approximately 3.3×10^{-2} / hr. Trimeta, however, had by far the shortest polyphosphate first order half-life of 1 hour.

Conclusions

- **Interpretation** of your results – explain what they mean!
  - This is where you decide what your project has **shown, not proven**.
  - Was your hypothesis correct?
  - Possible errors and future work.



The ring trimetaphosphate appears to be split into tripolyphosphate very quickly. While this is occurring, the tripolyphosphate formed breaks down into pyrophosphate and orthophosphate.

References

- Remember the background information in the Introduction? This is where you cite this information.
  - *Internet sources are not adequate by themselves.*
  - Several major styles of listing exist…ask your teacher for the appropriate type.

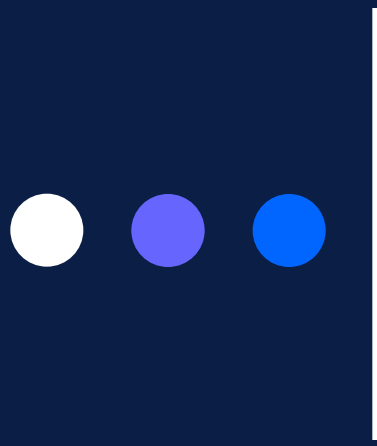
Acknowledgements

- Actually, a fairly major point of contention when it comes to science fair displays.
  - Very appropriate for the paper
  - Questionable on the board
- ISEF does not allow acknowledgements on the board, including institution names

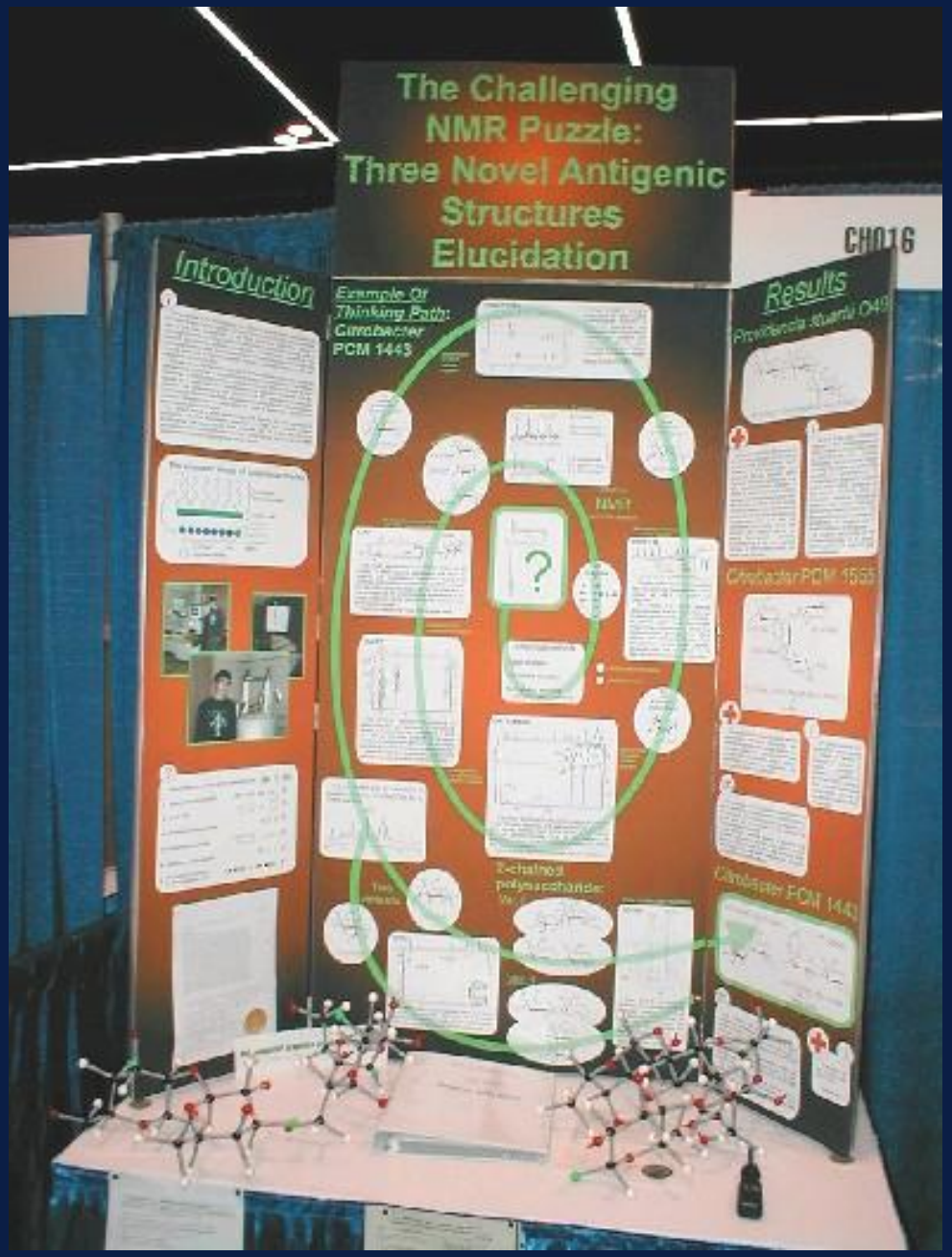
Abstract

- Paragraph-long summary of your project
  - One or two sentence introduction, one or two sentence procedure, remainder results and conclusions.
  - Should be the last thing done of your project!
  - Needs to be posted vertically on your board.
- It is one of the…

…**MAIN THINGS THE JUDGES READ**.



Part 3:
The Package


The Challenging NMR Puzzle: Three Novel Antigenic Structures Elucidation
Introduction
Example Of Thinking Path: Cumbacter PCM 1443
Results
?

It's not as easy as 1-2-3

Limits of the human ability to count

Jake Baron

Introduction: **How well can we count cluttered objects in the peripheral field of vision?**

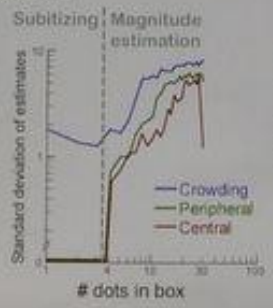
Human counting accuracy is well documented for centrally-viewed objects. Given a single glimpse, accuracy is perfect for up to 3 or 4 objects, but beyond that, error increases linearly with the number of objects viewed. One popular counting model supposes that two independent mental processes cover these two distinct domains: *subitizing* and *magnitude estimation*, respectively. But what happens to accuracy when objects are crowded (peripherally viewed and cluttered), as is common in everyday experience? Does the dichotomy of up-to-3 vs. 4-and-above still hold?

Methods & Results: **For each task, fixate the + and estimate the number of dots in the box. When the dots are crowded, this is quite hard.**

Five observers performed these three tasks 30 times each for every possible number of dots in the box, 1 through 30. The graphs on the right plot the standard deviation of each observer's 30 counts for each number of dots against the true number of dots. Each symbol represents an observer, and the colored lines represent the means of the five observers' standard deviations.

Conclusions: **Crowding cripples subitizing, yet spares magnitude estimation.**

The counting error data above are replotted here with logarithmic axes. This visualization highlights crowding's substantial impairment in counting accuracy for small numbers of objects.



When objects are crowded, we make errors counting even the smallest numbers: 1, 2, and 3.


Nanowire
Synthesizer
END27
END25

ARE YOU AT RISK?

A Study of Lead in Drinking Water

Purpose

Hypothesis

Background Research

Results of Study

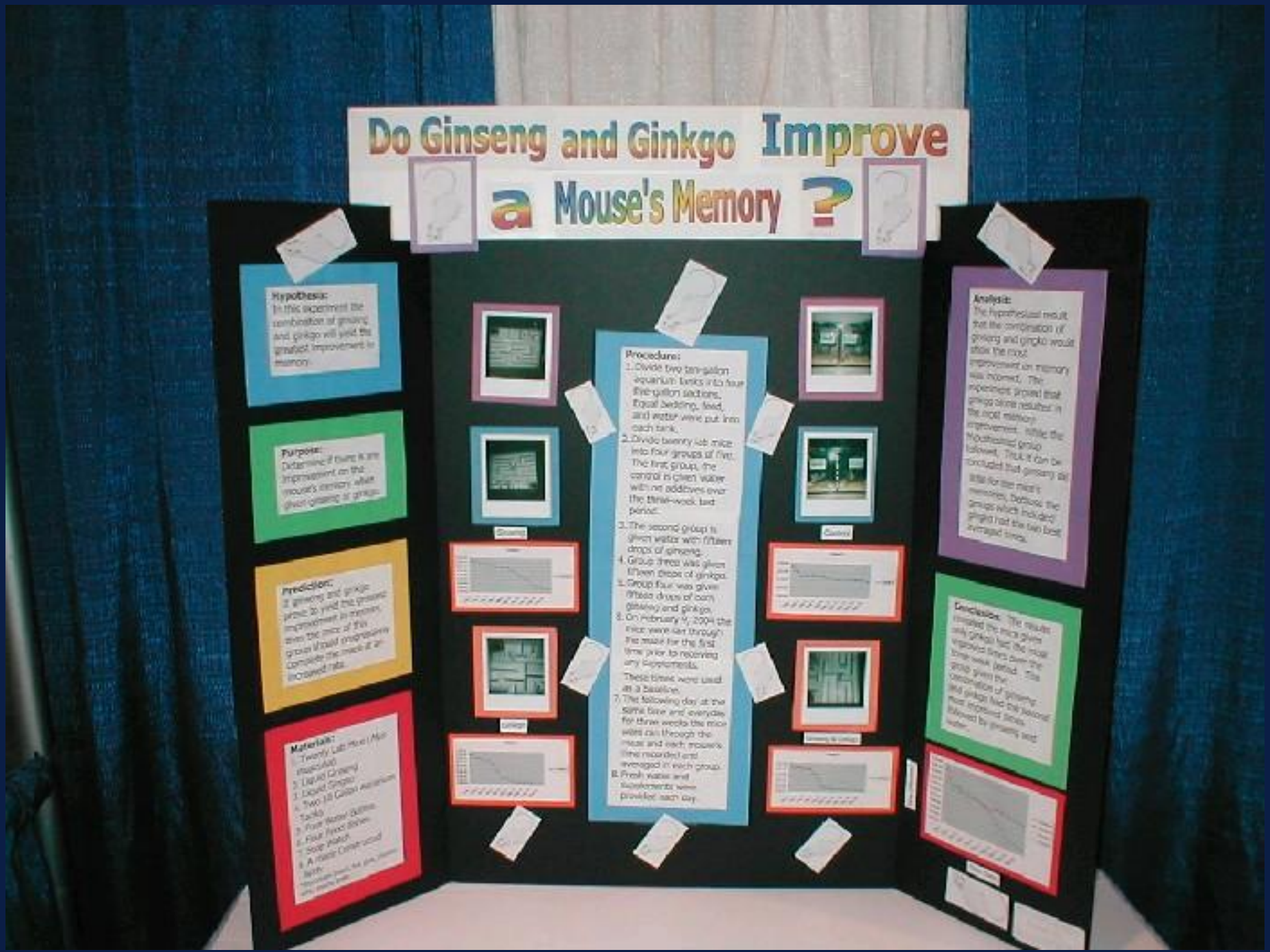
Future Studies

Reducing the Hazard of Lead in Drinking Water

Materials and Methods

Discussion

Bibliography


Do Ginseng and Ginkgo Improve a Mouse's Memory ?
Hypothesis:
In this experiment the combination of ginseng and ginkgo will yield the greatest improvement to memory.
Purpose:
Determine if there is any improvement on the mouse's memory when given ginseng or ginkgo.
Prediction:
If ginseng and ginkgo prove to yield the greatest improvement in memory, then the mice of this group should outperform or complete the maze at an increased rate.
Materials:
Procedure:
1. Divide two ten-gallon aquarium tanks into four five-gallon sections. Equal bedding, feed, and water were put into each tank.
2. Divide twenty lab mice into four groups of five. The first group, the control is given water with no additives over the three-week test period.
3. The second group is given water with fifteen drops of ginseng.
4. Group three was given fifteen drops of ginkgo.
5. Group four was given fifteen drops of each ginseng and ginkgo.
6. On February 9, 2004 the mice were ran through the maze for the first time prior to receiving any supplements.
These times were used as a baseline.
7. The following day at the same time and everyday for three weeks the mice were ran through the maze and each mouse's time recorded and averaged in each group.
8. Fresh water and supplements were provided each day.
Analysis:
The hypothesized result that the combination of ginseng and ginkgo would show the most improvement on memory was incorrect. The experiment proved that ginkgo alone resulted in the most memory improvement, while the hypothesized group followed. Thus it can be concluded that ginseng did little for the mice's memories, because the groups which included ginkgo had the two best averaged times.
Conclusion:
Control
Ginseng
Ginkgo
Ginseng & Ginkgo


The Universal Wheelchair
An Omnidirectional, Stair Climbing, All Terrain Wheelchair
PROBLEM STATEMENT
RESEARCH
DESIGN OVERVIEW
EARLY DEVELOPMENT
BUILDING THE PROTOTYPE
TESTING CAPABILITIES
COMPONENT DESIGN
MOTION DESIGN
RESULTS
7
139

Final Thought…

- Your board style and design is important, but not as important as:
  - The quality of your research
  - Your ability to communicate it when speaking to the judges.