

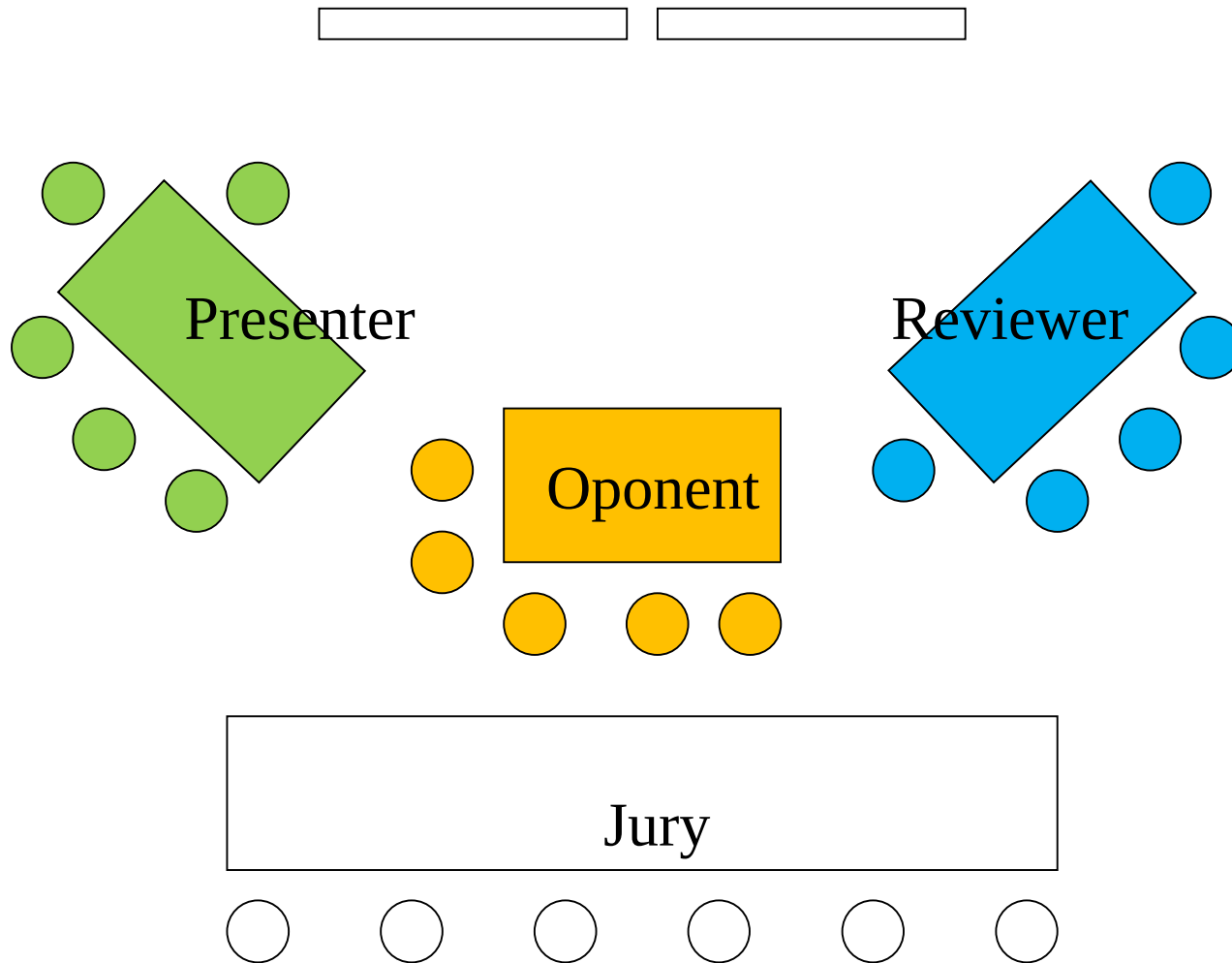


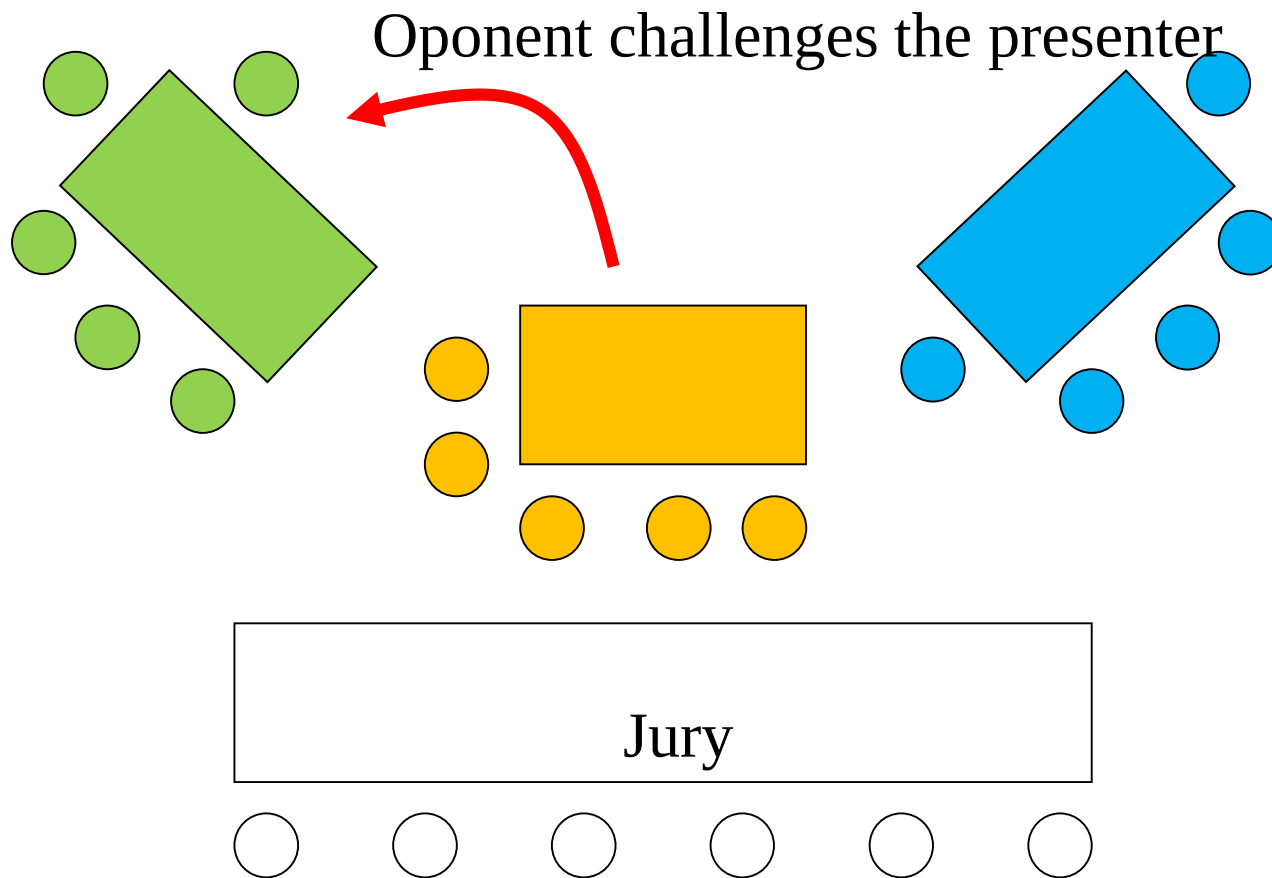
Co-funded by the
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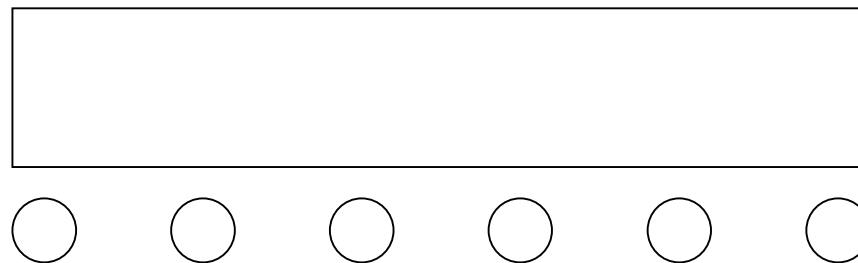
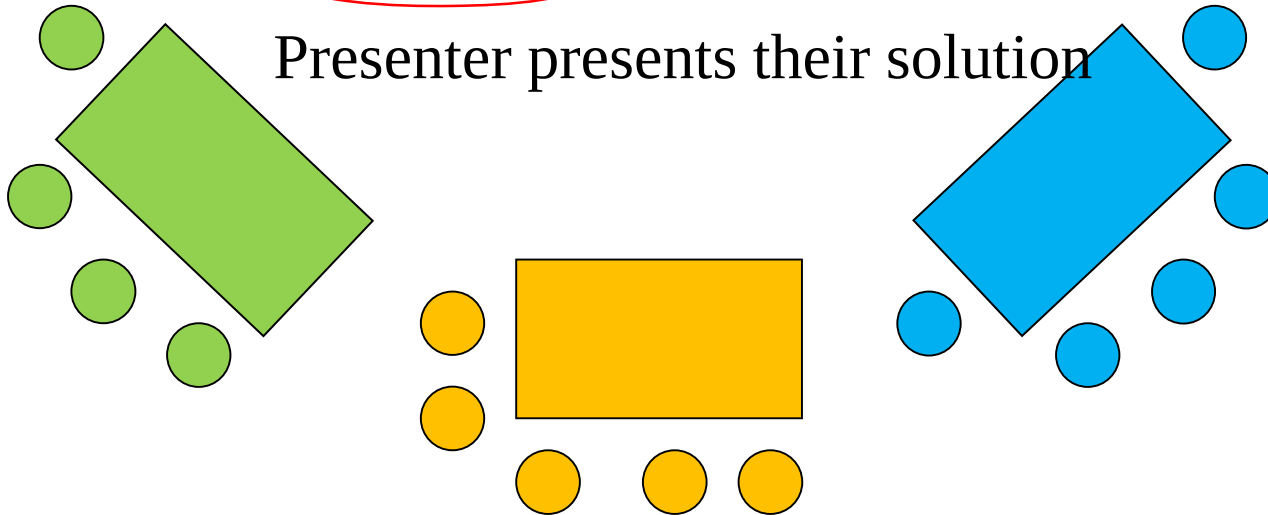
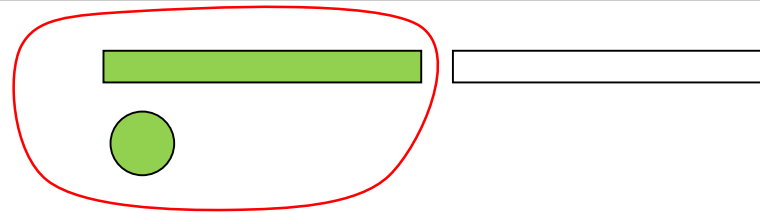


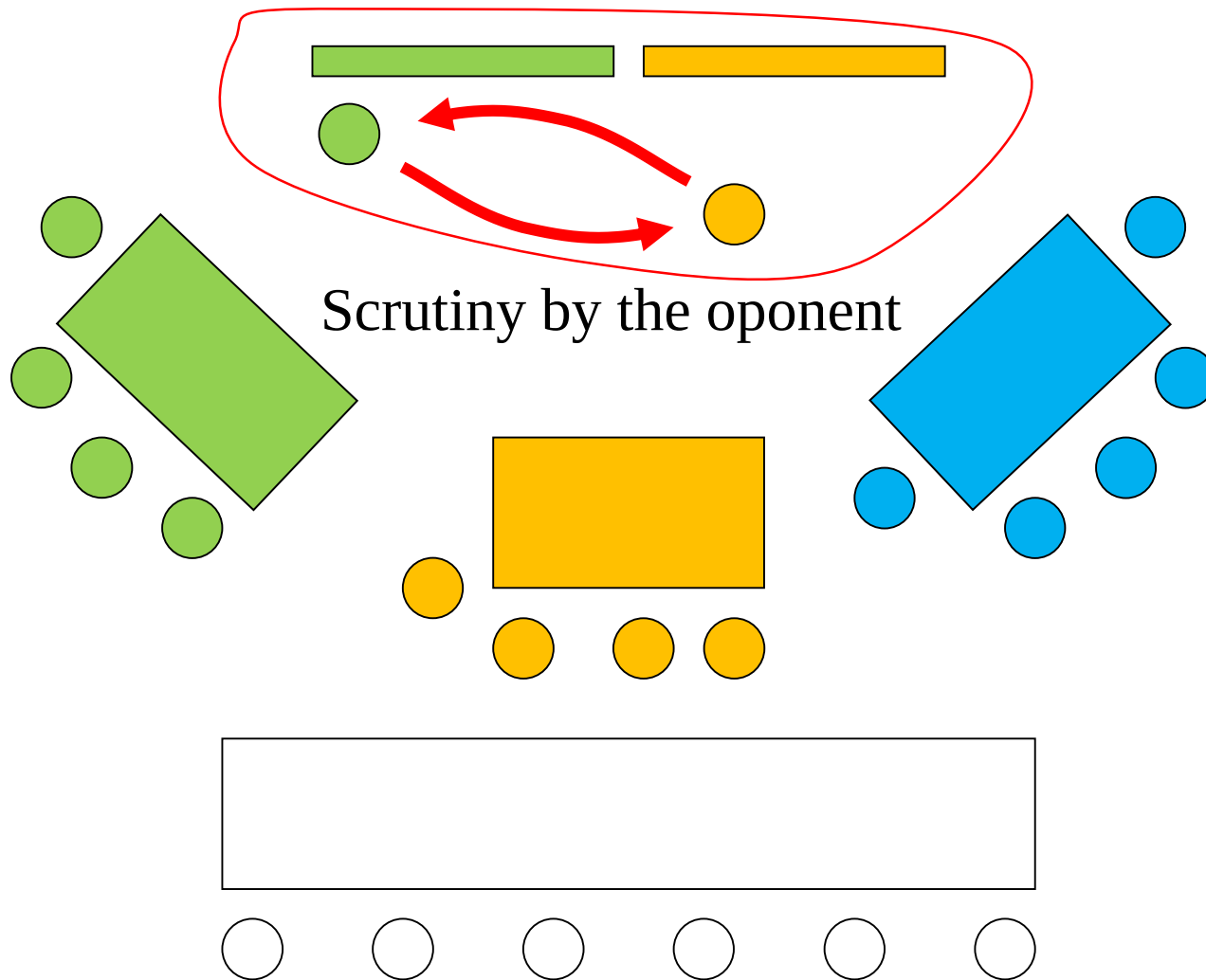
YPT toolkit

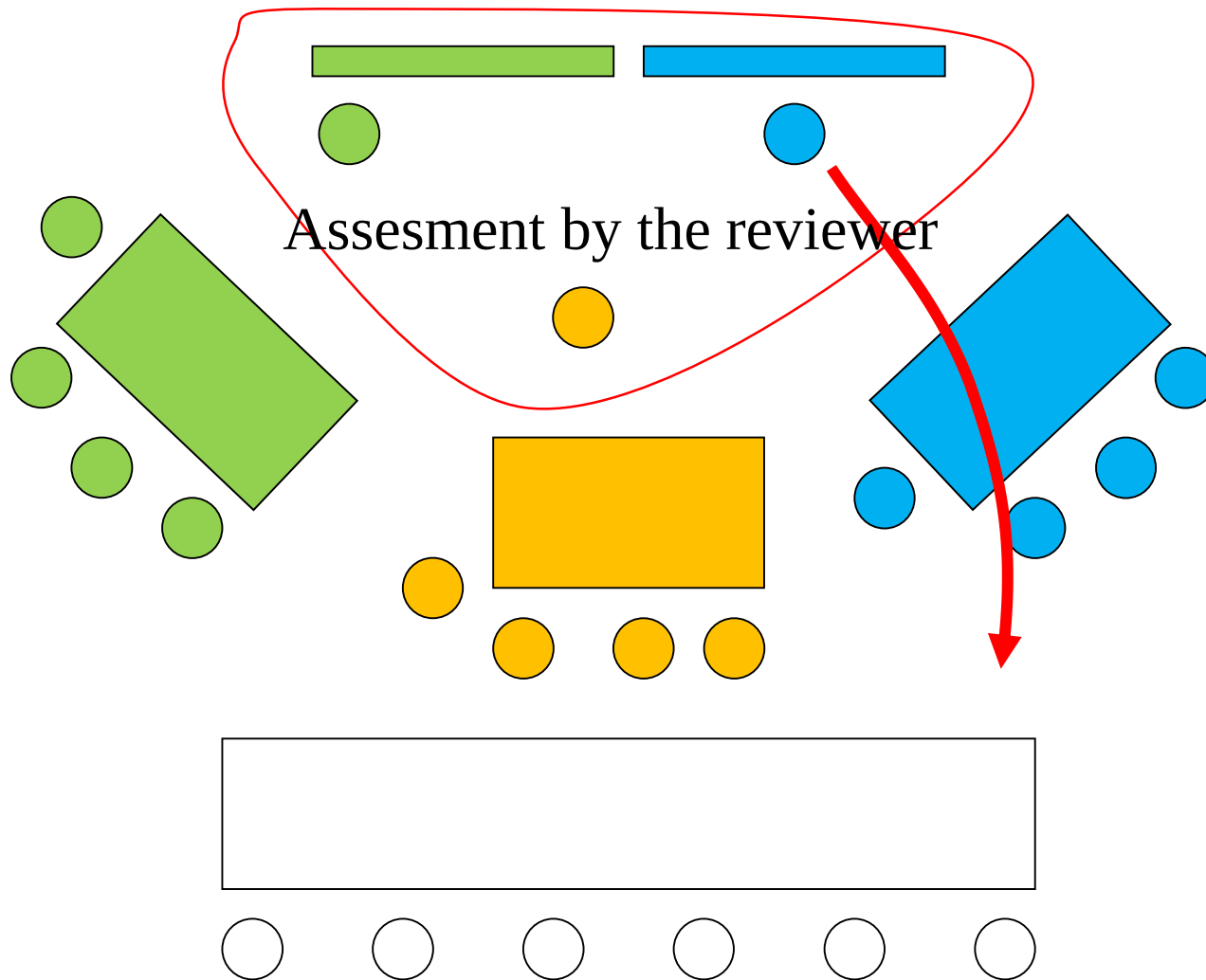
Project DIBALI

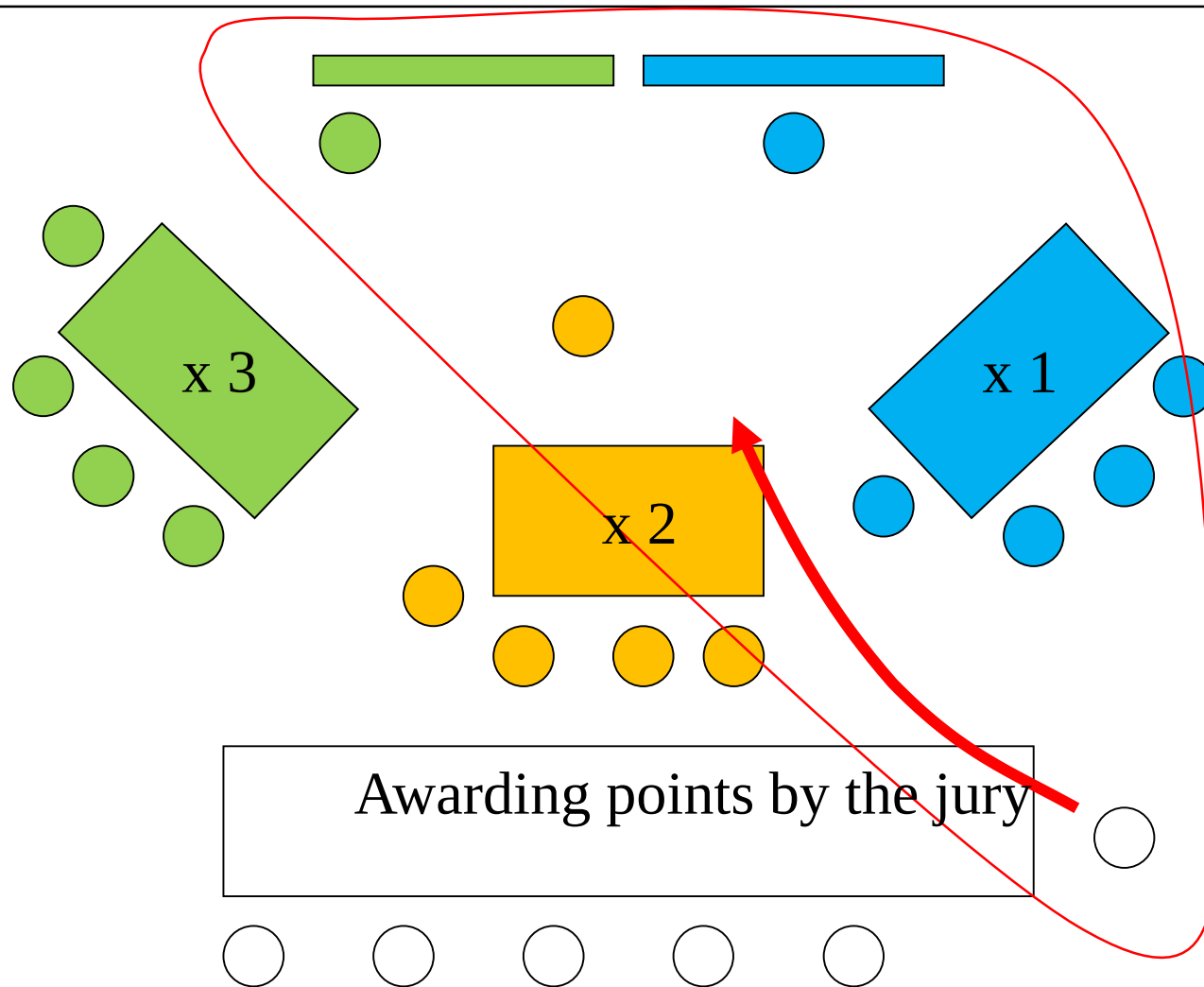










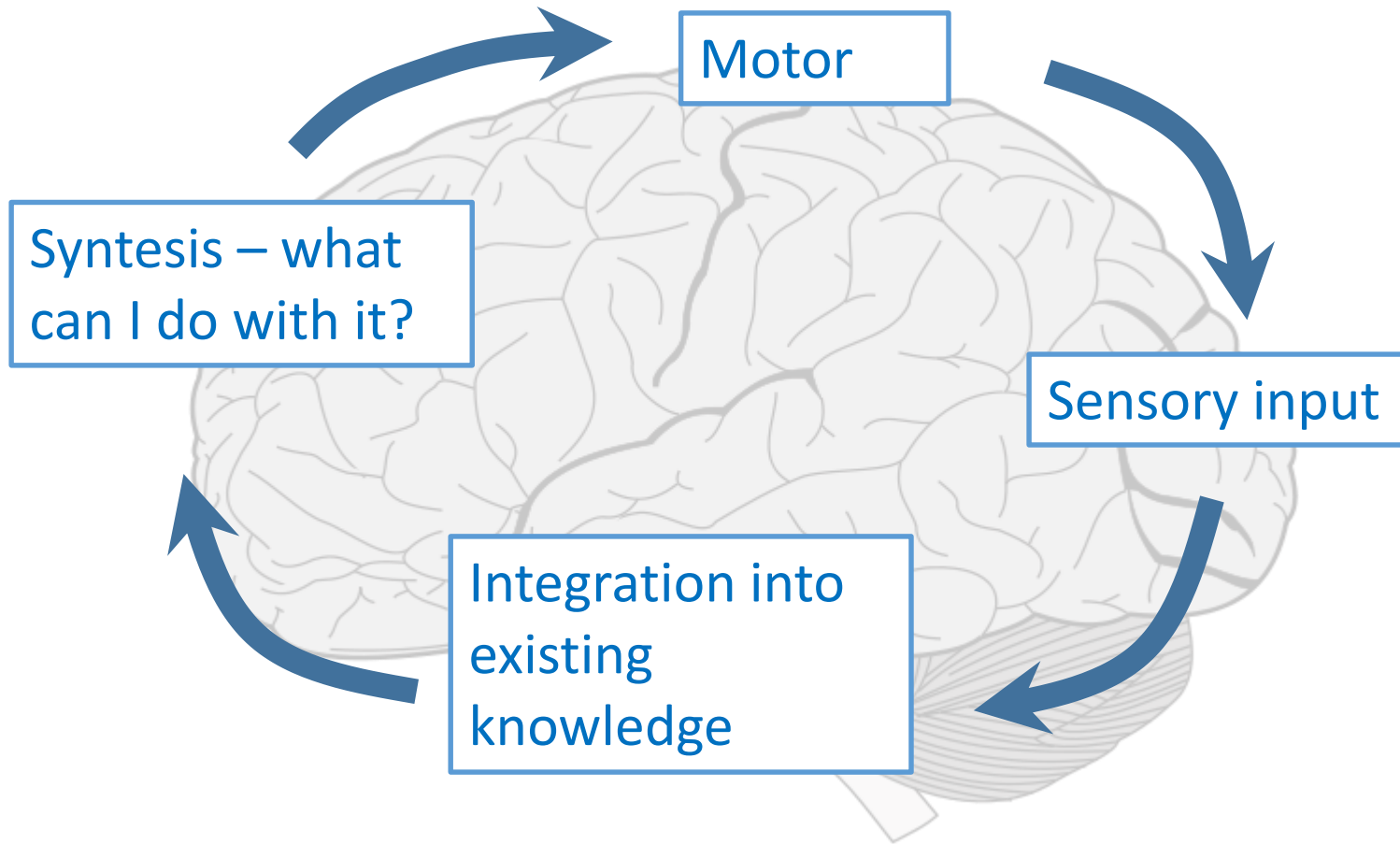


IYPT

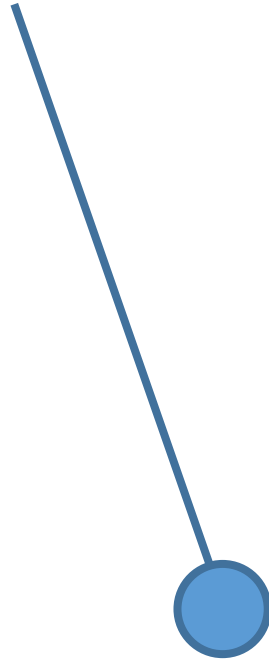
Structure of a fight

- The **oponent challenges** the reporter (more than 3 refusals have penalties)
 - **Presentation** by the presenter
 - **Scrutiny** by the oponent
 - **Assessment** by the reviewer
- (See a pattern here?)
- For both presenter and oponent
 - Clarification for the **jury** and awarding points

How we learn

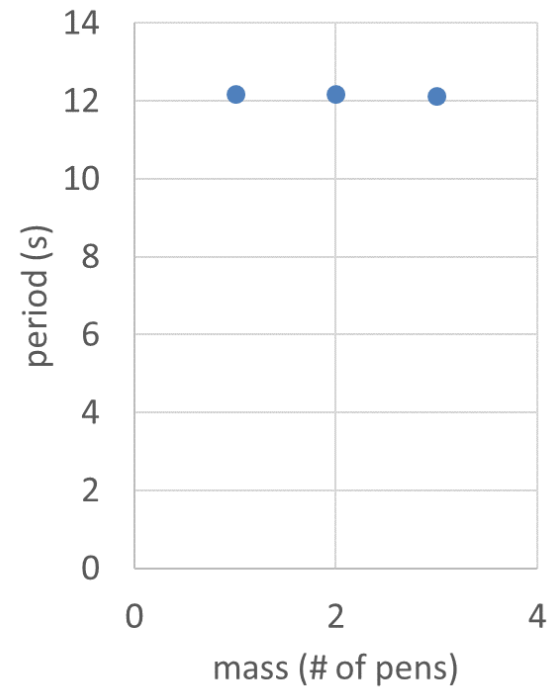
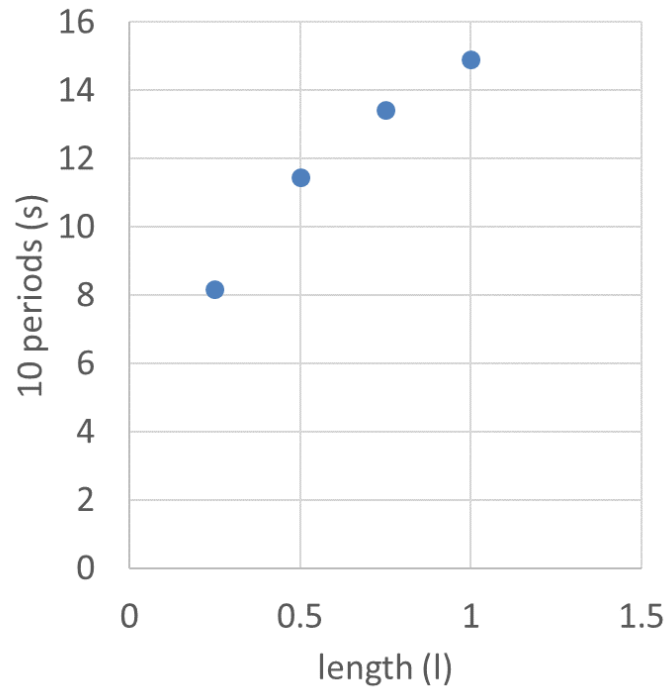


The phenomenon



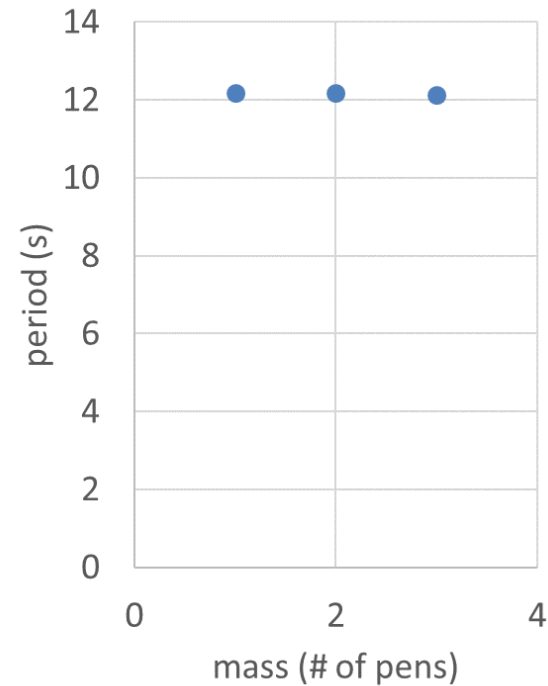
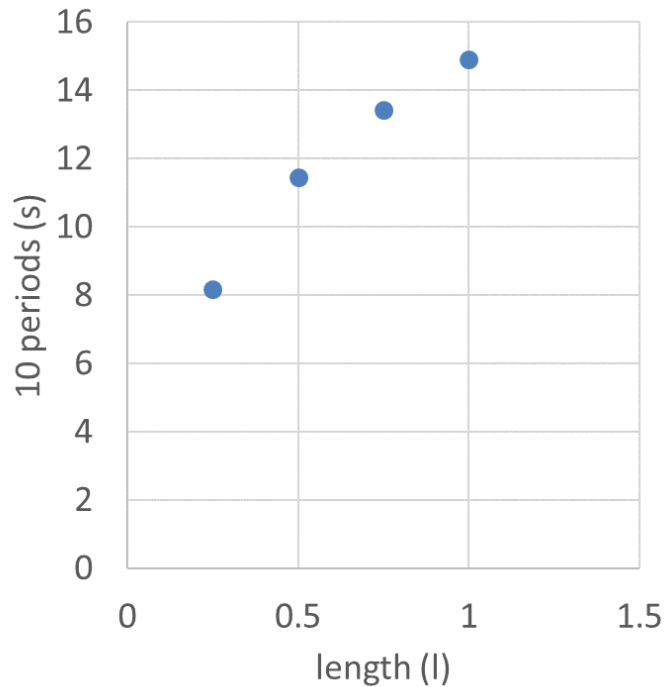
Research questions

- How does the oscillation period depend on the length of the string?
- How does the oscillation period depend on the mass on the string?



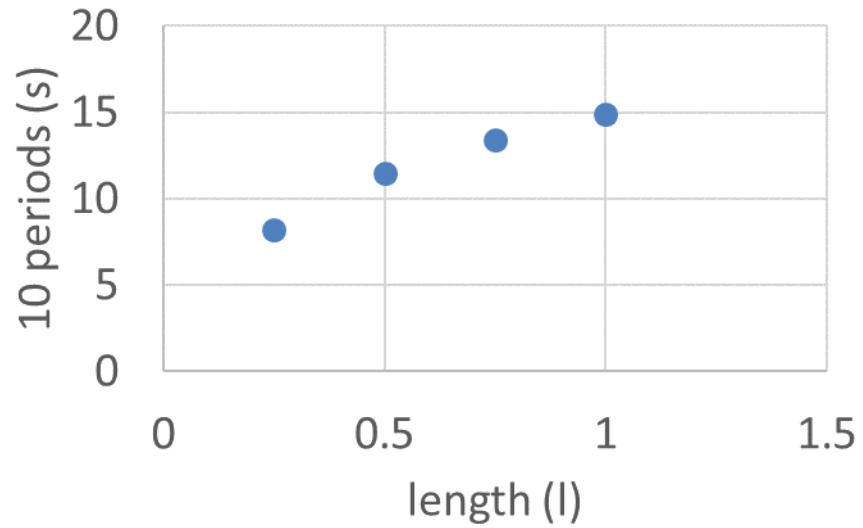
Research questions

- How does the oscillation period depend on the length of the string?
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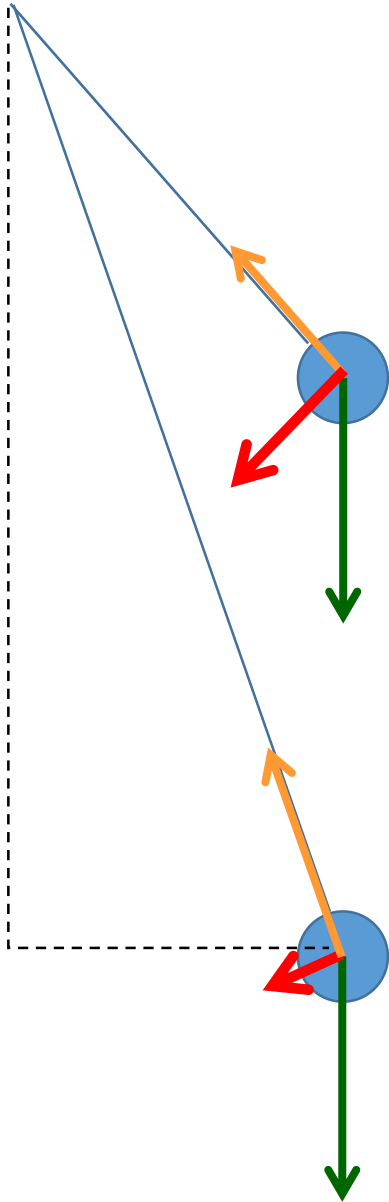


- How does the oscillation period depend on the amplitude?
- How does the oscillation period depend on the mass of the string?

We made an observation



Search for explanations

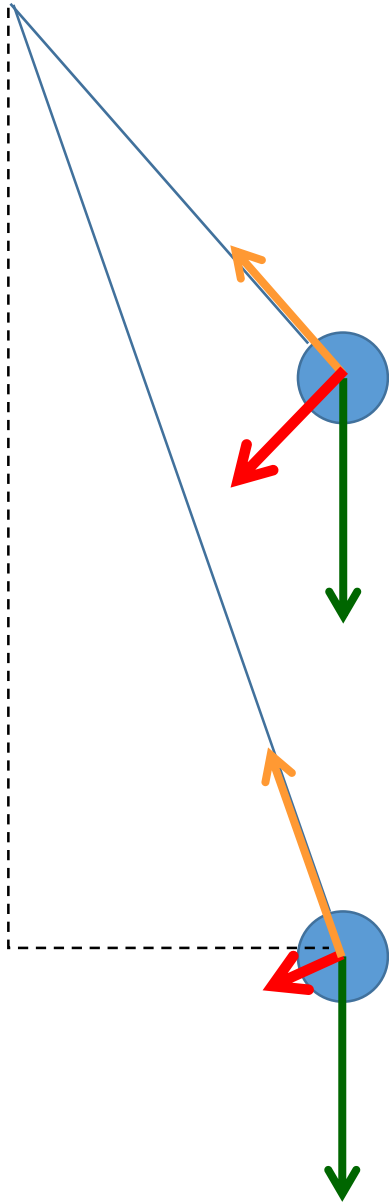


$$\frac{F}{mg} \approx \frac{x}{l}$$

$$a = \frac{F}{m}$$

$$x = at^2/2$$

Search for explanations



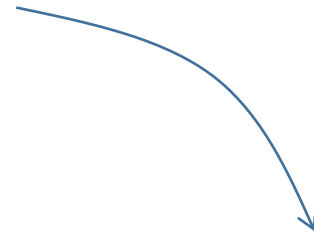
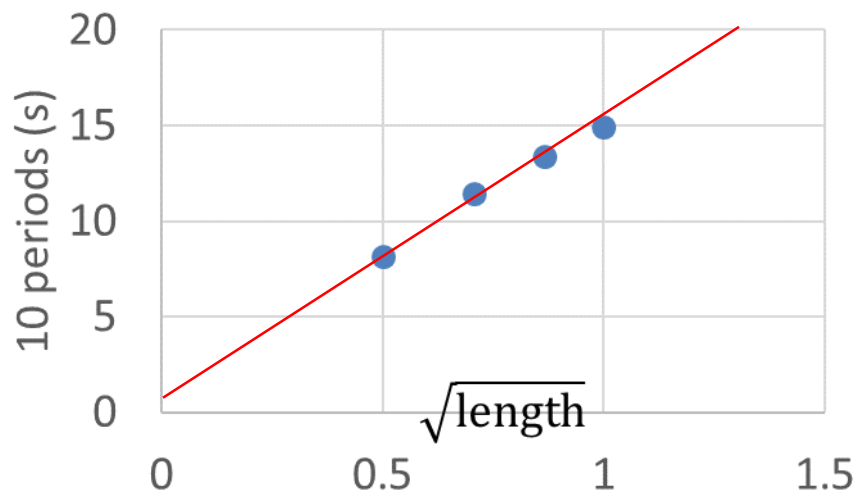
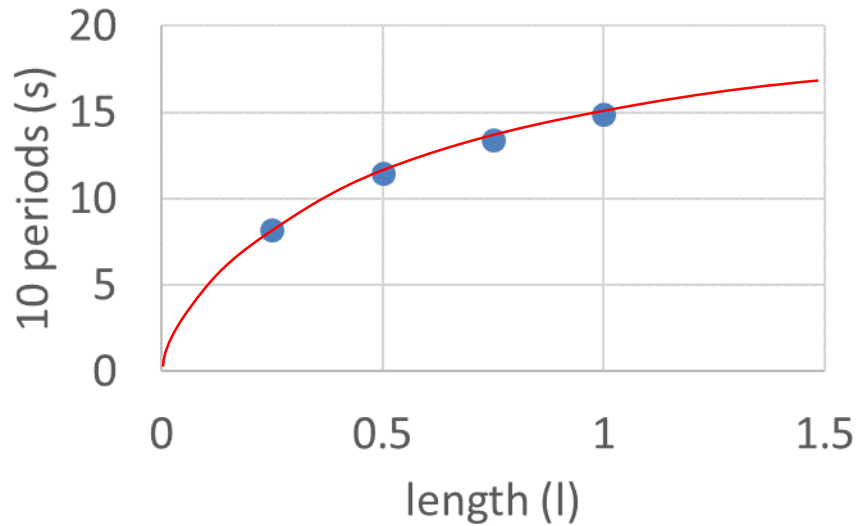
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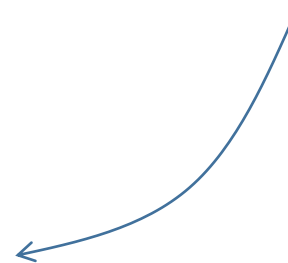
$$t_0^2 \propto l$$

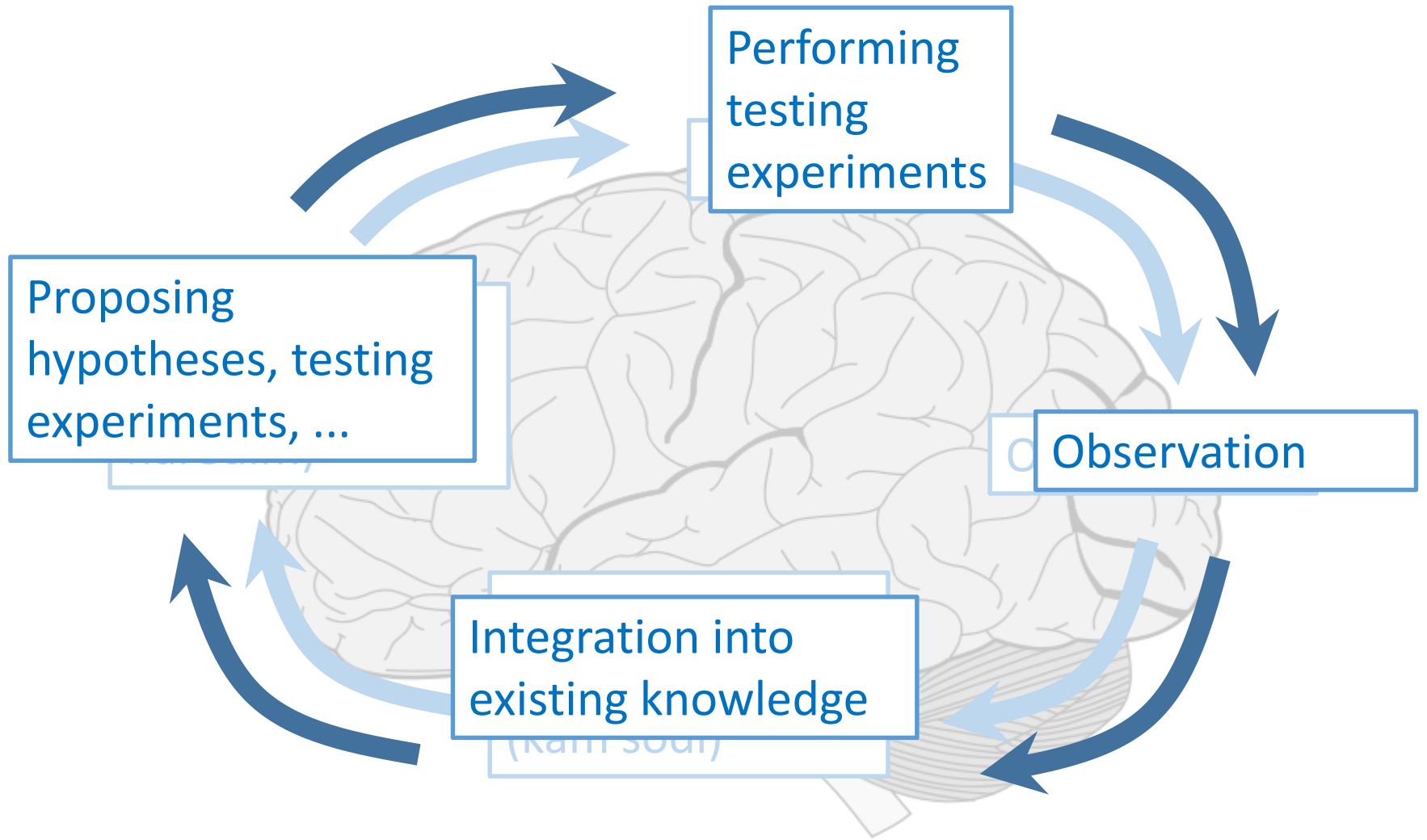
Testing the explanation (comparison)

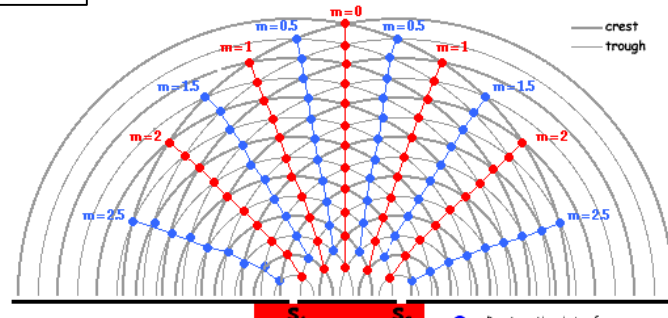
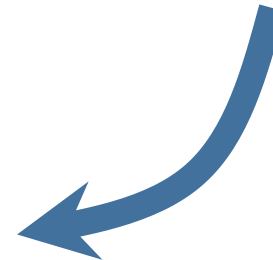
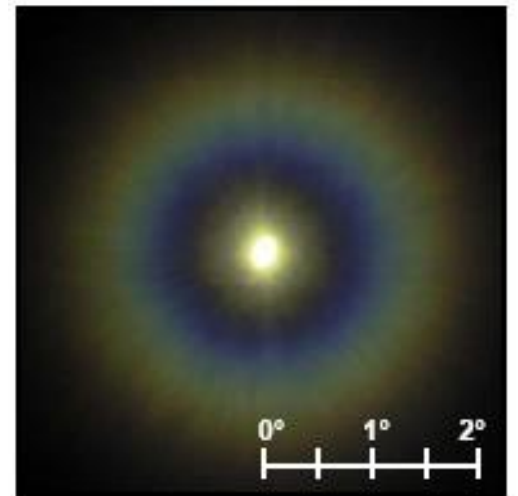
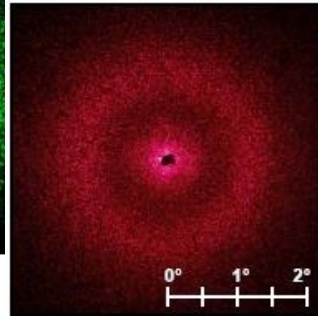
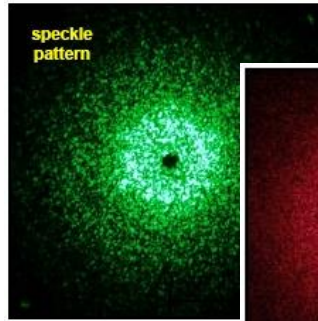


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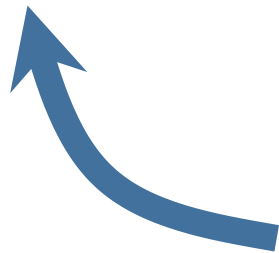
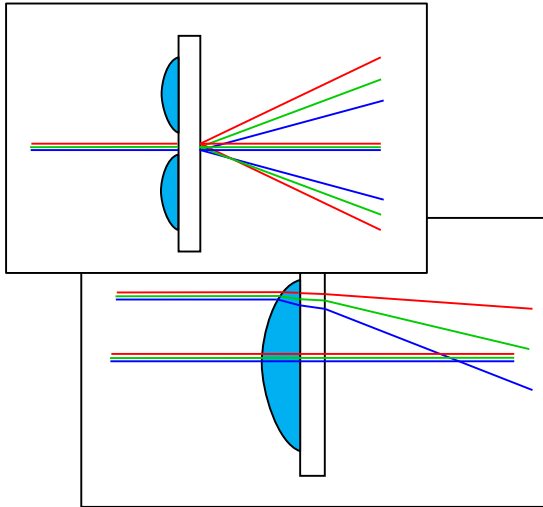
$$t_0 \propto \sqrt{l}$$







Vir: Cybergraphics graphic © 2000



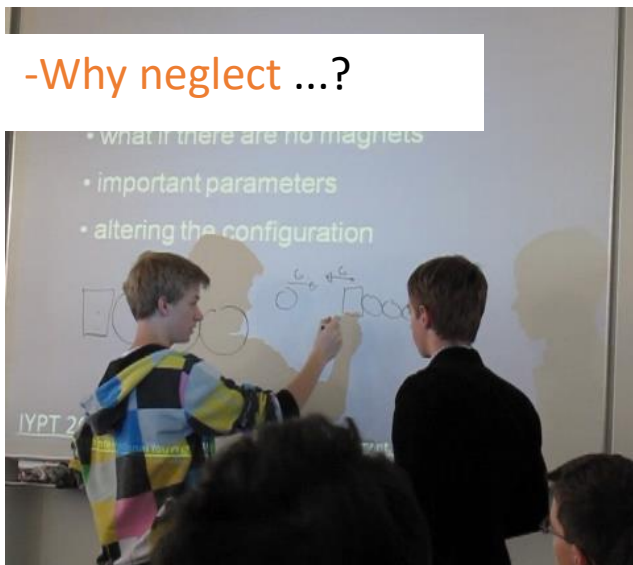
Then WHAT?

Then WHAT?

Discussion phase

- >10 min for the discussion.

-Why neglect ...?

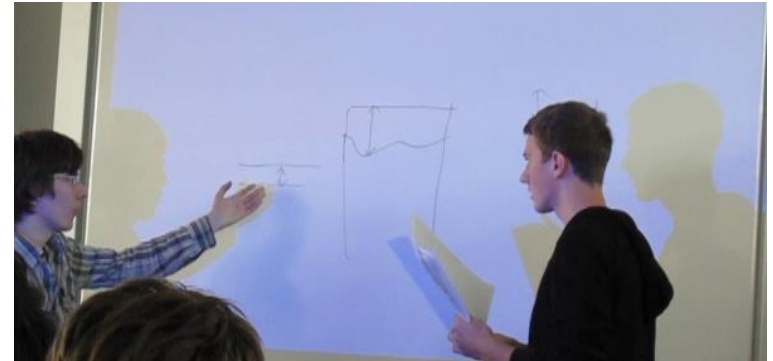
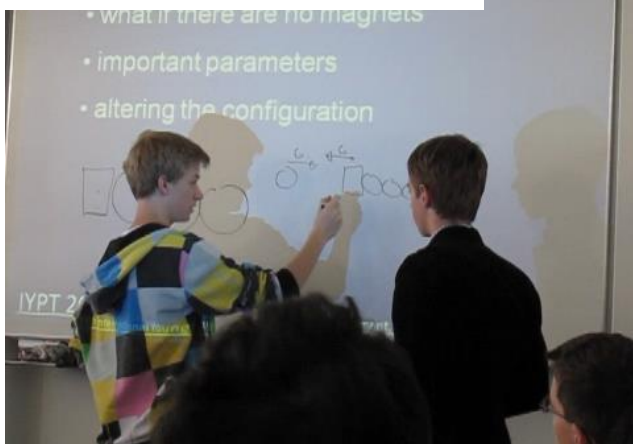


Then WHAT?

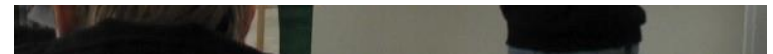
Discussion phase

- >10 min for the discussion.

-Why neglect ...?



- Is the **experimental setup** appropriate?

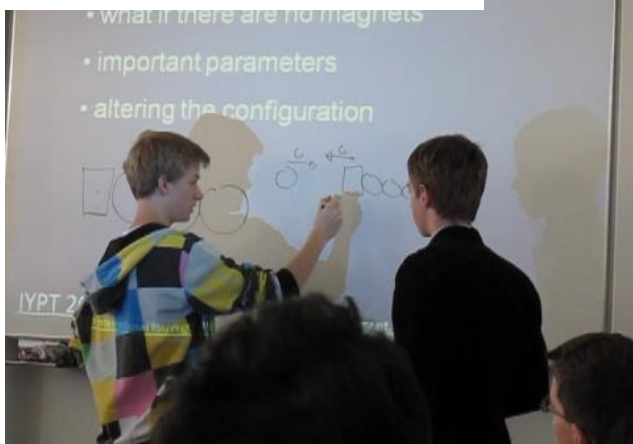


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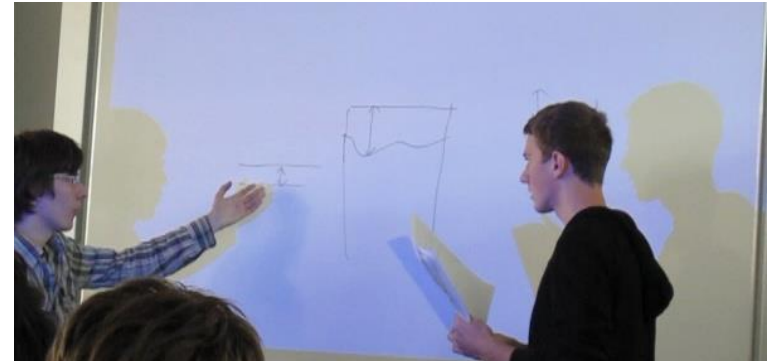
Discussion phase

- >10 min for the discussion.

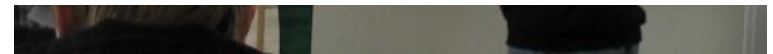
-Why neglect ...?



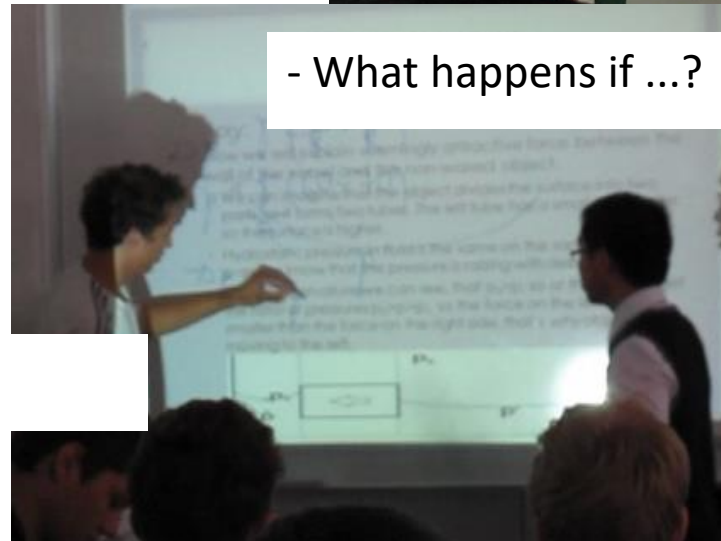
- Is the **model** appropriate?



- Is the **experimental setup** appropriate?



- What happens if ...?



Structure

Table of contents

1. About the toolkit

2. Introduction

2.1. What is IYPT

2.2. IYPT and inquiry-based learning

2.3. IYPT = inquiry problems + discussion format + ...

3. Working on YPT problems in class and beyond

3.1. Preparation and problem selection

3.2. Tasks to perform

3.2.1. Initial observation (I), initial idea (II) and what to investigate (IIIa) (first 20 min session)

3.2.2. Planning the experiments (IIIb) (second 20 minutes session)

3.2.3. Systematic experiments (IIIc) (third 20 minutes session)

3.2.4. Model and model predictions (IV) (fourth 20 minutes session)

3.2.5. Comparison model-experiment and preparing the presentation (V) (fifth 20 minutes session)

3.2.6. Present (VI) and defend (VII) (sixth, and any additional 20 minutes session)

3.2.6.1. Presentation

3.2.6.2. Discussion

3.2.6.2.1. Clarifying questions (2 minutes)

3.2.6.2.2. Opponent's presentation (maximum 4 minutes)

3.2.6.2.3. Discussion (10 minutes)

3.2.6.2.4. Discussion Summary (1 minute):

3.2.7. Review

4. Conclusion