

Introduction



Insight

Correctness²
Confidence³

Classical Insight Problems (e.g.,
matchstick task)^{4, 5} = Math?



Math

Flow¹

Insight?

Cognitive
Disequilibrium¹

- Are there insights in mathematical problem-solving?
- If so, are people more likely to **1) reach a correct answer** and **2) have higher confidence levels in the correctness of the solutions** if they experience insight during the solving process?

Methods

Materials:

- educational resources targeting middle to high school math competitions
- 2 algebraic + 2 geometric + 3 logic problems
- high solving rates in limited time and low familiarity to college students

Participants:

- 46 Northwestern undergraduates from an introductory psychology class

Procedure:



The experimenter gives the subject instructions and the description of “insight”, which emphasizes **suddenness** and **inability to articulate how they get the idea**.



The subject works on the seven problems, and writes out their steps and solutions via a note-taking application on an electronic tablet.



For each problem:

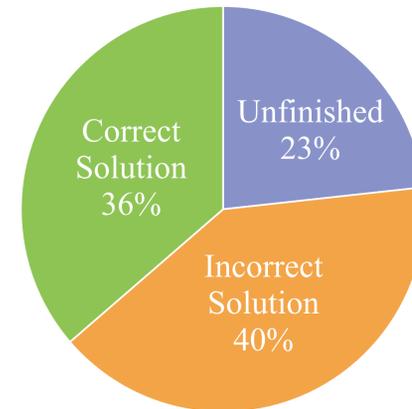
Report **familiarity** with the problem

While solving, self-report **insights** by drawing “!” along writings

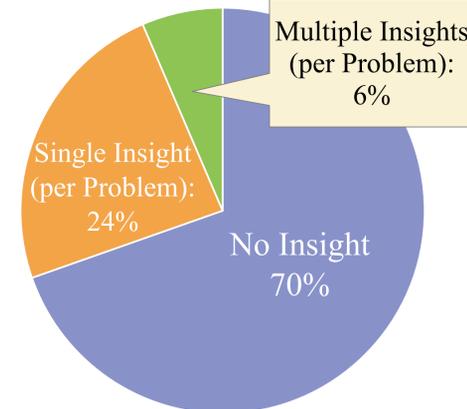
Report **confidence level** in the correctness of the solution

Results

Solving Rate

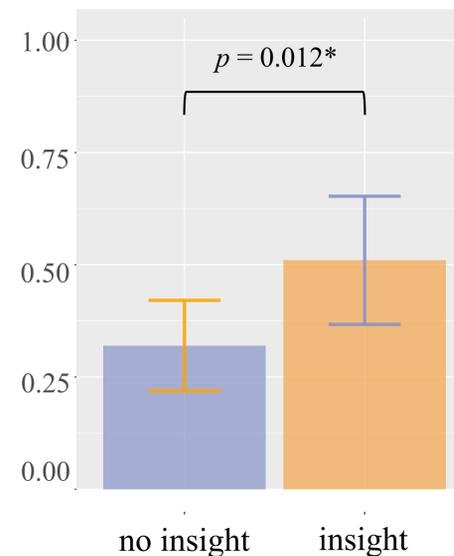


Insight Rate

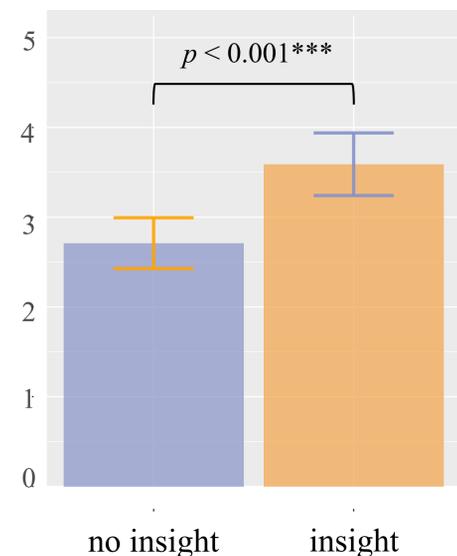


Note: These two charts show the percentages of trials with the indicated outcomes.

Correct Solving Rate (of all trials)



Confidence Level (of all finished trials)



Note: P-values were calculated by the mixed-effects model. Error bars indicate 95% confidence intervals.

Conclusions

- People experience insights, sometimes **multiple**, when solving a math problem.
- People are more likely to **reach a correct answer** if they experience insight when solving a math problem.
- People are more likely to **have higher confidence in the correctness of the solutions** if they experience insight when solving a math problem.

Discussion

Limitations:

- Self-reporting insights along writings might distract participants and make both the solutions and reports of insights less accurate.
- Problem order was not randomized.

Future Directions:

- Use more objective and non-interfering methods for detecting insights in the solving process
- What are the functions of insights besides leading directly to the solutions?

References

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