Puzzle Solving Strategies: How College Students Strategize and Solve Arrangement Problems

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Study Motivation

What Contributes to Problem-Solving?
Adaptability
Flexibility
Creativity

What else?

- Students from elementary school to college exhibit **creativity and flexibility** in their problem solving strategies
- **Creativity, personality and their influence on problem solving strategies** are suggested to be linked (James and Asmus, 2001)
- **Creativity and academic major choice** are suggested to be related (Mars, Barb & Ruggerio, 2007)
- **Gender differences** tend to exist amongst problem solvers and chosen strategies (Zhu, 2007)

What do we know about **arrangement** problem solving?

- **Pop-out and search solutions** = most common (Novick and Sherman, 2003)
- **Different solvers** pay attention to different pieces of the problem while solving (Novick and Sherman, 2008)

Current Study

- How do college students from different academic majors and gender identities solve anagram puzzles?
- Are they the same or different?

Hypotheses

1. Students involved with different academic majors will solve anagram problems differently from students.
2. Gender differences will exist in anagram problem-solving strategies

Design & Methods

Pre-Task: Instructions provided to solve anagram puzzles and then indicate which strategy best relates to the method used

Task: Once the word puzzle comes up on the screen, participants begin to solve. Once they've figured out the word they type it in the space below

S	R	E	D	S

Puzzles consisted of 5, 6, or 7 letters

Next, participants indicate which strategy they used to solve the puzzle

A: "The solution came to mind suddenly...."
B: "I tried various letter arrangements, then solution came to mind suddenly"
C: "....I worked the solution out step by step"
D: "I did not solve the anagram"
E: "Other"

The study was conducted using pavlovia.com
Because of the COVID-19 pandemic, all subjects participated from their personal computer via a link provided.

Subjects & Analysis

Subjects	Academic Majors - Divisions
28 Females	Sciences
2 Males	Social Sciences
2 Prefer Not to Say	Arts & Humanities

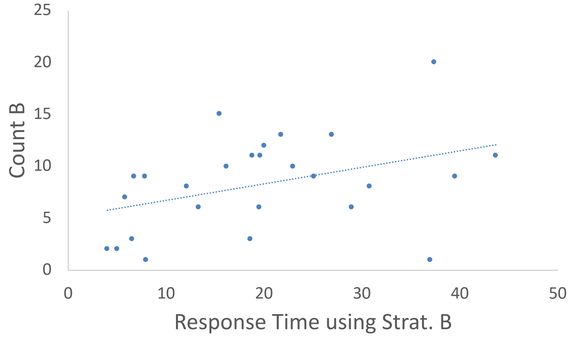
Dependent Variables

- Speed
- Accuracy
- Strategy Choice

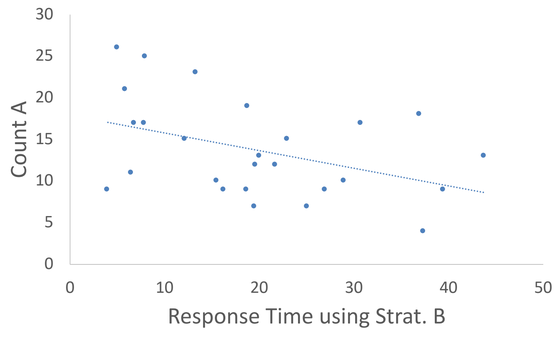
Analyses

- One-Factor ANOVA run for each DV by gender and academic division
- RM-ANOVA run to compare response speed and strategy choice
- Correlations between strategy choice and DVs

Results



Results indicated a significant positive correlation between the number of times participants used Strategy B and the time it took them to solve the puzzles that they used Strategy B for ($r = 0.400$, $p = 0.039$)



Results indicated a significant negative correlation between the number of times participants used Strategy A and the speed at which they solved puzzles using Strategy B ($r = -0.415$, $p = 0.032$)

Discussion

Goal 1: Determine whether Trinity students involved in different academic majors solve anagram puzzles differently from one another/if those from the same discipline solve puzzles in the same way. Results did not indicate any significant relationships between strategy choice and academic division.

Goal 2: Determine a relationship between gender and problem-solving strategy. Due to low response rate of non-female participants, a relationship was unable to be determined.

After analyzing accuracy and speed by strategy choice, no one strategy choice proved to be more beneficial than the other, though strategy A was chosen significantly more often than either strategy B or C.

An important take away from these non-significant results is that it's true! We all problem solve in various different ways and no one way is best. This information can be translated to the ways we teach and respond to problem solvers. If it is understood that various strategies can be used to achieve a goal and no one is necessarily better than the other, it can be helpful to teach toward all different learners and problem solvers and encourage various methods.

Significant results can tell us about beneficial practices for problem solving. Switching between strategies may be more beneficial for a quicker response time in solving problems.

Results can lead us to question further what does make someone a better problem solver than another and how can we test to see this?

References & Acknowledgements

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