INVESTIGATING FUNCTIONAL FIXEDNESS IN PROBLEM SOLVING

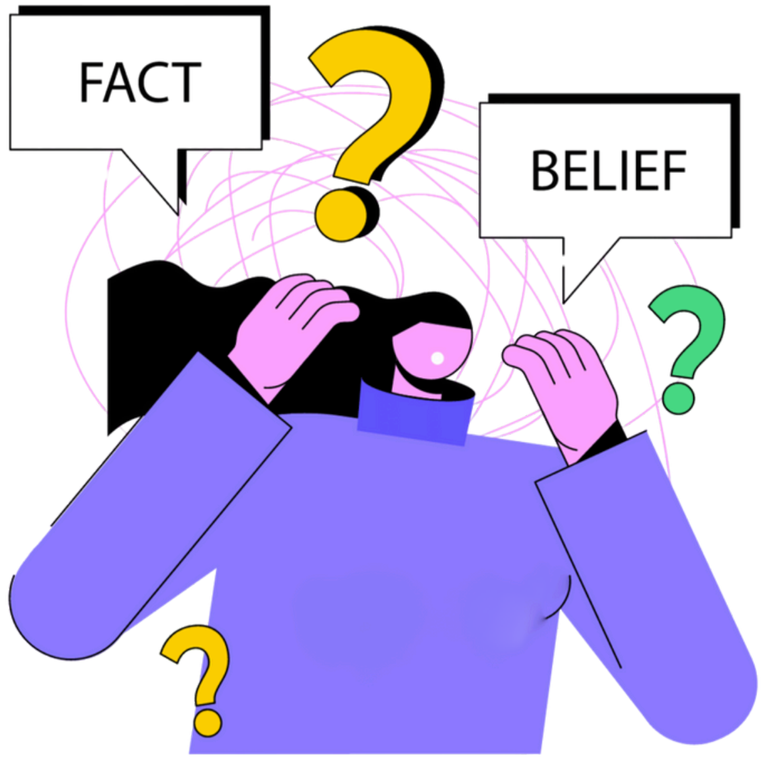
THE ROLE OF CONTEXTUAL PRIMING

INTELLIGENCE AND COGNITIVE BIASES

TEAM I3

WHAT IS FUNCTIONAL FIXEDNESS?

Functional fixedness is a cognitive bias that limits a person to using an object only in the way it is traditionally used.



PROBLEM STATEMENT

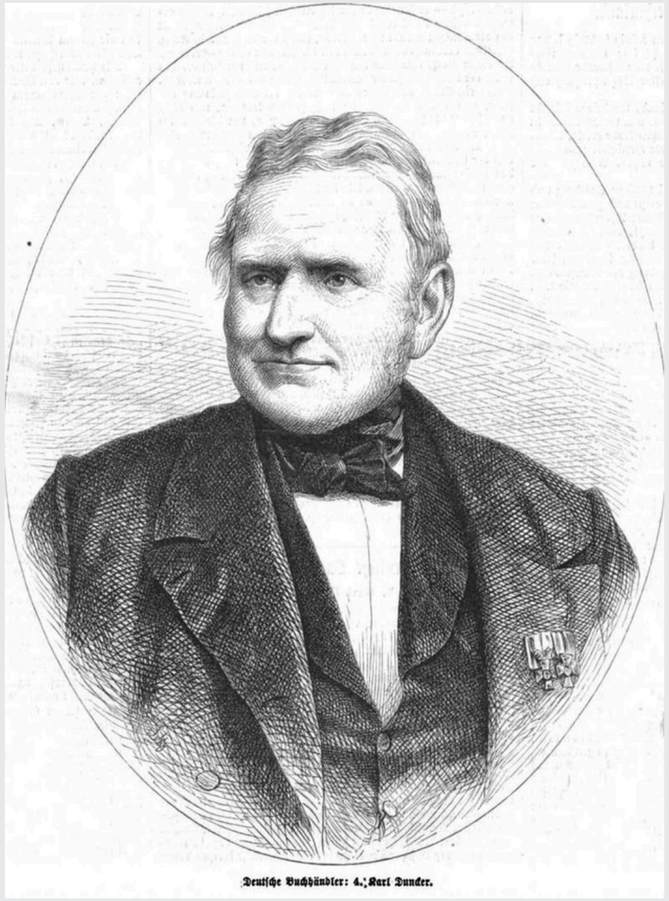
*Can contextual priming reduce the cognitive bias of **functional fixedness** and improve problem-solving performance?*

HYPOTHESIS

Participants exposed to subtle environmental cues that depict unconventional object usage will demonstrate:

- *Faster puzzle-solving times*
- *Reduced hesitation during tasks*
- *Fewer solution attempts*

compared to those exposed only to traditional object contexts.



LITERATURE REVIEW

FUNCTIONAL FIXEDNESS

First introduced by Duncker, K. (1945) in his classic work "**On Problem-Solving.**"

Duncker demonstrated that people often fail to see alternative uses for familiar objects due to mental rigidity.

Reference:

Duncker, K. (1945). On problem-solving. Psychological Monographs, Part III ,Chapter VII: On Functional Fixedness of Real Solution-Objects.

VARIABLES

Independent Variable

- Type of environment (Traditional use vs. Primed with unconventional use)

Dependent Variable

- Solution time (in seconds)
- Hesitation time (in ms)
- Number of solution attempts
- Task completion rate (success %)

Confounding Variables

- Puzzle difficulty (same across groups)
- Instructions provided
- Object types and usage contexts
- Prior Experience

EXPERIMENT DESIGN

Design:

- **Between-Subjects Design** : Participants randomly assigned to Control Group (A) or Experimental Group (B)
- **Control Group (A)** : Objects presented in traditional contexts only.
- **Experimental Group (B) :** Objects situated in environments with subtle examples of unconventional use.

TEST ENVIRONMENTS

Two distinct virtual environments were used:

1. **Late Night Office** : Featured puzzles including retrieving a key with a repurposed paperclip
2. **Server Room** : Required using an Ethernet cable as an electrical contact rather than for networking

DATA COLLECTION

- Built within an interactive fiction game
- Logged metrics: time, hesitation points, success, attempts

SAMPLE SIZE

- Control Group: 14 Interactions
- Experimental Group: 32 Interactions

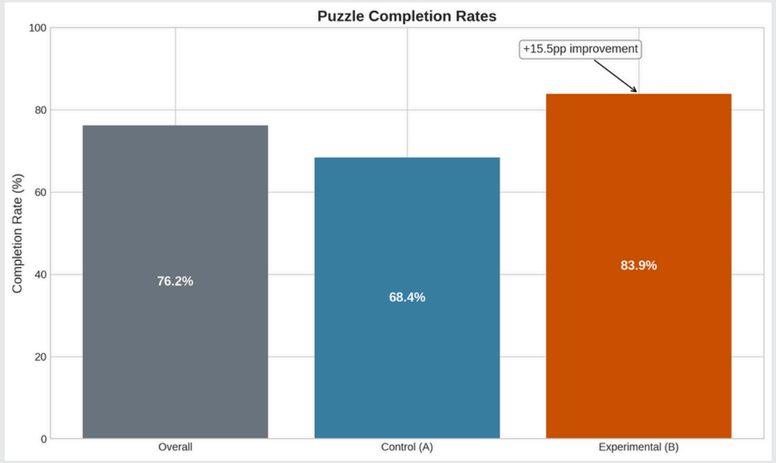
RESULTS

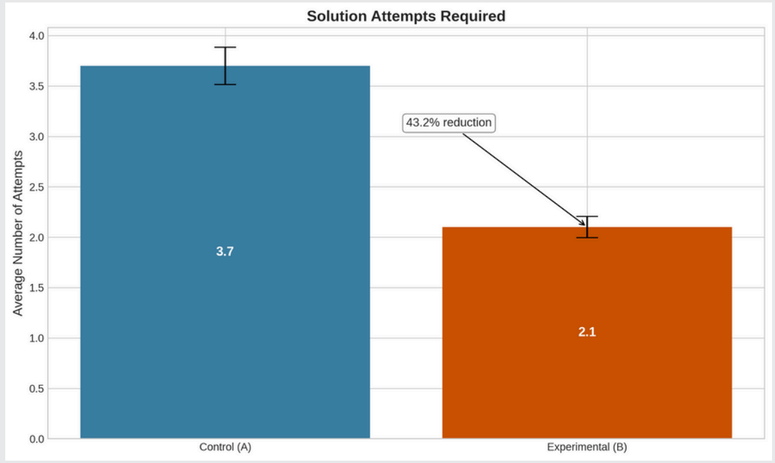
Metric	Control (A)	Experimental (B)	% Improvement
Mean Solution Time	147.3s	118.9s	19.3% faster
Avg Hesitation	2845ms	1892ms	35% reduction
Avg Attempts	3.7	2.1	43.2% fewer
Success Rate	68.4%	83.9%	15.5% more

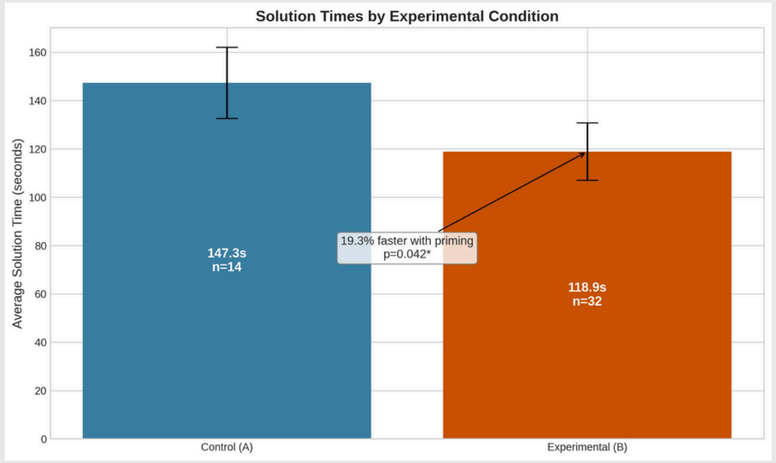
t-test Results: Solution Time: $p = 0.042$ (statistically significant)

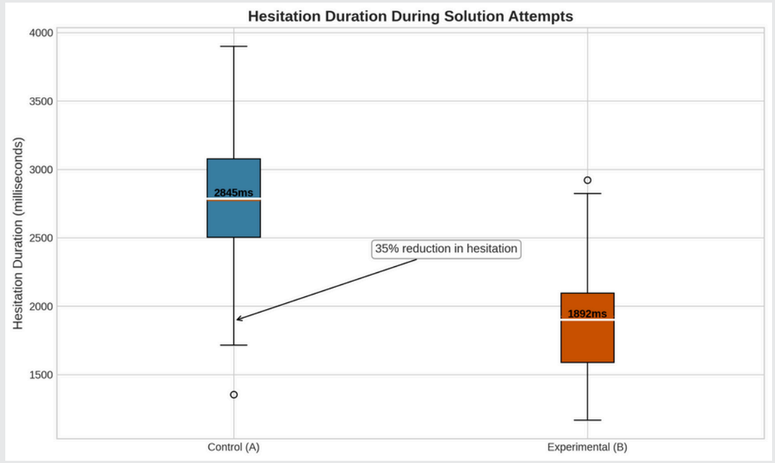
Stronger priming effects observed in tasks with more familiar objects like paperclips.

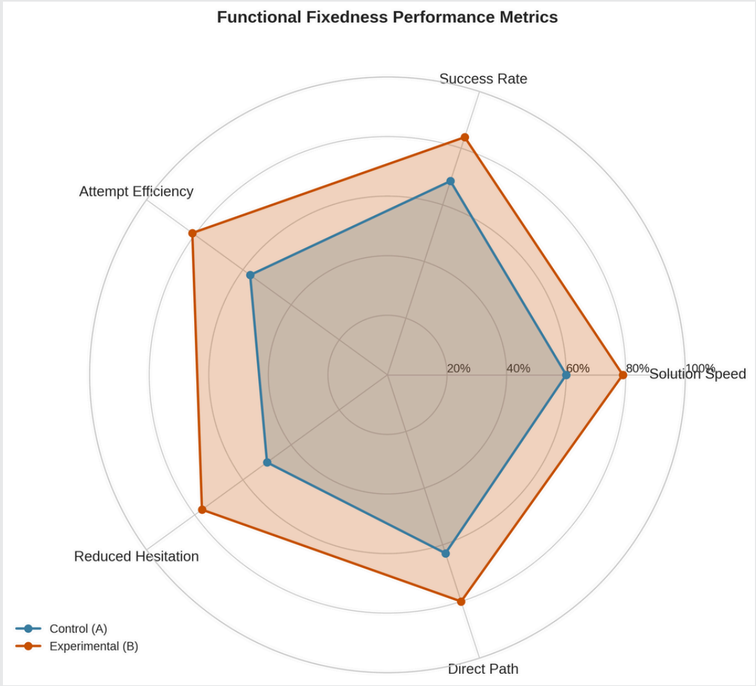
RESULTS : VISUALIZATION











INFERENCE AND CONCLUSION

Hypothesis Supported

Environmental priming significantly reduces functional fixedness.

Key Takeaways:

- Participants exposed to unconventional uses were:
  - Faster, more confident, and more successful
  - Less cognitively constrained by prior associations

Implications:

- Educational tools and workplace training can incorporate priming to improve creativity and adaptability.

THANK YOU

EXPLORE THE INTERACTIVE EXPERIMENT:

Scan the QR code to try it yourself

THE TEAM

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