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Implications of Stress on Abstract Problem Solving Ability

ABSTRACT

Because of the covid-19 pandemic, most people are under lockdown and in severe stress about their livelihoods. In this stressful condition, there are students who write JEE and other competitive exams for their admissions. Many of these exams test students based on their abstract problem-solving capabilities. Here, we aim to look at how psychological stress can affect a person's abstract problem solving ability. Past research has shown how stress can affect one's memory and other aspects of cognition, however not sufficient research has been done in this aspect of problem-solving. In this experiment, 62 participants were asked to solve six advanced progressive matrices, and then subjected to either a stress or a non-stress intervention (using Montreal Imaging Stress Task), and then asked to solve six more advanced progressive matrices. The results show a significant decrease ($p < 0.05$) in the score of the participant across the pre-test and the post-test, and a significant decrease ($p < 0.001$) in the time taken across the two tests, implying a complex relationship between stress and problem solving.

OBJECTIVE

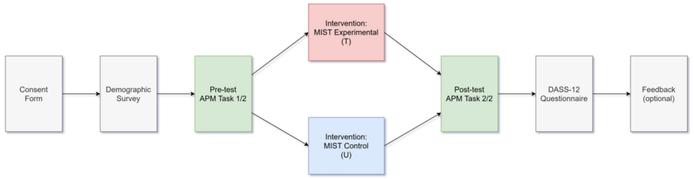
- Study how stress affects one's ability to solve abstract problems. Here, the ability of the subject can be measured by his
  - time taken to complete the task
  - correctness of the task
- Check for the effect of depression, anxiety and stress on the person's score in both the intervention and the actual task

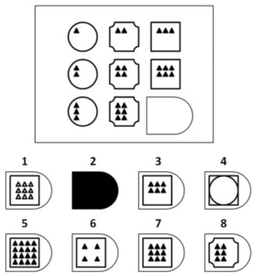
METHOD

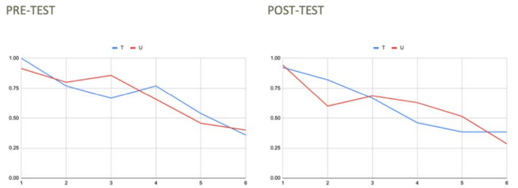
Experiment Design: pre-test post-test design, (control group - treatment group, set of test used: 1 or 2)

Task description:

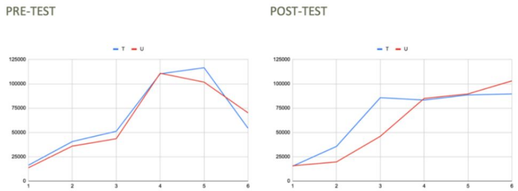
Raven's Progressive Matrices (2 sets of 6 questions each) as the main task
MIST (montreal imaging stress task) as intervention
DASS (depression anxiety stress scale) as the health check of the subject.







Graph 3: Average Accuracy per question in pre-test and post-tests



Graph 4: Average Time (in ms) per question in pre-test and post-test

RESULTS

On inducing stress, problem-solving ability of the person is somewhat deteriorated.

- Score is reduced
- time taken per item is slightly less

There is a potential difference with gender and response to stress.

Depression significantly affected the person's score in the stressful intervention (MIST)

		Control	Experimental
Time taken to solve the task correctly (between pre- and post- tests) [post-pre]	Z	-.943	-4.075
	p (two-tailed)	.346	<.005
Score (between the pre- and the post- tests) [post-pre]	Z	-1.083	-2.130
	p (two tailed)	.279	.033

IMPLICATIONS

- Future study into the effect of stress on creative thinking
- More controlled experimental study using eye trackers
- Deeper understanding of how stress can affect the student's performance on standardised tests that focus more on abstract creative thinking

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