The Influence of Exam Stress on Perceptual Decision Making: A Diffusion Model Analysis

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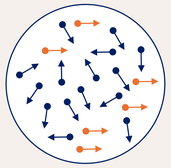
Introduction

- University students frequently experience high levels of stress, particularly during exam periods [1], with around 59% reporting symptoms in the clinical range [2].
- Exam-related stress has been linked to worse mental well-being and increased risk of academic dropout [3].
- The period leading up to exams has been linked to **increased stress and lower response times** in decision-making tasks [4].
- Furthermore, acute stress was also related to **lower accuracy** on similar cognitive tasks [5].
- While one prior study has examined how exam stress affects decision-making in students, little is known about the underlying cognitive mechanisms. This study addresses that gap by using a **Drift Diffusion Model (DDM)** to uncover latent cognitive processes in a perceptual decision-making task.

Hypothesis:
Performance on the random dot motion task **will differ between the exam stress and the no-stress condition**, as reflected in accuracy, response times, drift rate, decision threshold, and bias.

Methods

"Are the dots moving to **the left** or to the right?"



D or K

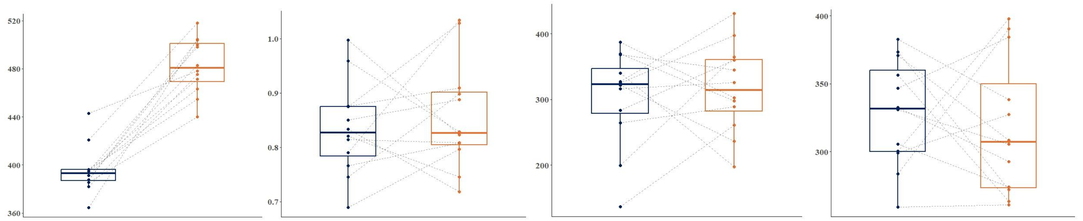
Within-subject design:

I. Condition: **Stress** during exam week
II. Condition: No stress after exams

N = 12
400 trials per testing

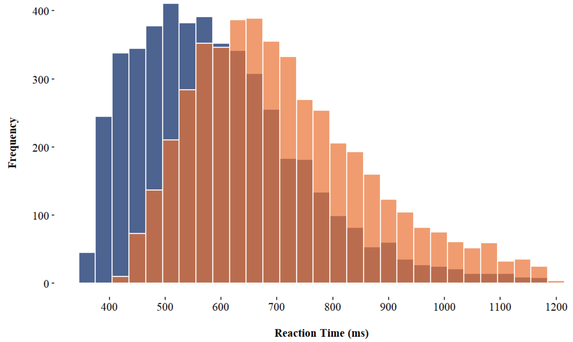
Results

Figure 1. DDM parameter differences between the **stress** and no-stress condition



threshold (a)	drift (v)	non-decision time (Ter)	bias (z)
$t(11) = -10.128$, $p < .001$*	$t(11) = -0.608$, $p = .556$	$t(11) = -0.502$, $p = .626$	$t(11) = 0.541$, $p = .599$

Figure 2. RT distribution for the **stress** and no-stress condition



DDM

The **threshold** was significantly different ($t_{11} = -10.128$, $p < .001$) between the **stress** ($M = 395$, $SD = 19.7$) and the no-stress condition ($M = 482$, $SD = 28.2$)

No significant differences in other parameters.

BEHAVIOR

Significant difference in **response times** between the conditions

$t_{11} = -35.327$, $p < .001$

Significant difference in **accuracy** between the conditions

$t_{11} = -3.853$, $p = .003$

Drift Diffusion Model

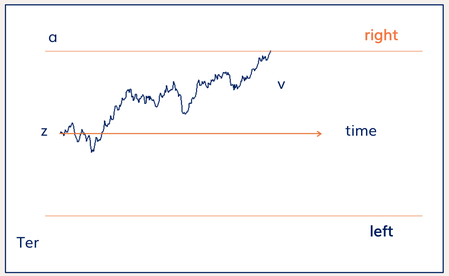


Figure 3. Drift generated for one trial

Conclusion

- Participants' **performance significantly differed** under exam stress, showing worse accuracy, faster response times, and reduced decision thresholds compared to the no-stress condition, which was in line with previous findings [4].
- However, **no differences** were observed in **drift rate or starting point (bias),** which contrasts with previous findings suggesting that psychological stress reduces perceptual processing efficiency [6].

References

[1] Ahmed et al. (2023). Effects of examination-induced stress on memory and blood pressure. Journal of family medicine and primary care, 12(11)
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[5] Wemm & Wulfert (2017). Effects of Acute Stress on Decision Making. Applied psychophysiology and biofeedback, 42(1)
[6] Dambacher & Hübner (2015). Time pressure affects the efficiency of perceptual processing in decisions under conflict. Psychological Research, 79(1)

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