

The Effect of the Choice of Hydration Strategy on Average Academic Performance

Some concerned fellow students

Abstract—We evaluate the relationship between hydration strategy and academic performance and project that by using the right button of the water dispenser to fill up their water bottles, students can potentially gain up to 4.14s of study time per refill, which is amounts to raising their grades by up to 0.00103 points.

Index Terms—KIT Library, Academic Performance, Hydration

I. INTRODUCTION

THE concepts of hydration and study have always been tightly interwoven. As an example, an investigation was once conducted by Bell Labs into the productivity of their employees that found that “workers with the most patents often shared lunch or breakfast with a Bell Labs electrical engineer named Harry Nyquist” [1], and we presume that they also paired their food with something to drink. We can see that intellectual achievement and fluid consumption are related even for the most prestigious research institutions.

In this work, we quantify this relationship in the context of studying at the KIT library and subsequently develop a novel and broadly applicable strategy to leverage it to improve the academic performance of KIT students.

II. EXPERIMENTAL SETUP

Over a period of one week, we monitored the usage of the water dispenser on the ground floor of the KIT library at random times during the day. The experiment comprised two parts, a system measurement to determine the flowrate of the water dispenser, and a behavioural measurement, i.e., a recording of the choice of hydration strategy of the participants: S_L denotes pressing the left button of the water dispenser, S_R the right one, and S_B pressing both buttons.

For the system measurement 10 datapoints were recorded for each strategy, for the behavioural measurement 113 in total.

III. EXPERIMENTAL RESULTS

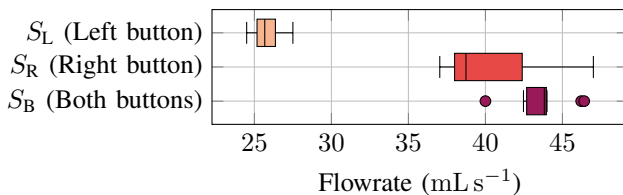


Fig. 1. Flow rate of the water dispenser depending on the hydration strategy.

Fig. 1 shows the results of the system measurement. We observe that S_L is the slowest strategy, while S_R and S_B are similar. Due to the small sample size and the unknown distribution, the test we chose to verify this observation is a Mann Whitney U test. We found that S_L is faster than S_R with a significance of $p < 0.0001$, while no significant statement

could be made about S_R and S_B . Fig. 2 shows the results of the behavioural measurement.

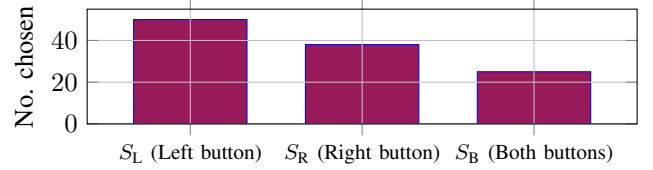


Fig. 2. Distribution of the choice of hydration strategy.

IV. MODELLING THE GRADE IMPROVEMENT

We can consider the water dispenser and students as comprising a queueing system, specifically an M/G/1 queue [4]. The expected response time, i.e., the time spent waiting as well as the time dispensing water, is [4, Section 14.3]

$$W = E\{S\} + \frac{\lambda E\{S^2\}}{2(1-\rho)},$$

where S denotes the service time (i.e., the time spent refilling a bottle), λ the mean arrival rate, and $\rho = \lambda \cdot E\{S\}$ the system utilization. Using our experimental data we can approximate all parameters and obtain $W \approx 23.3$ s. The difference to always using the fastest strategy amounts to 4.14s.

Strangely, it is the consensus of current research that there is only a weak relationship between academic performance and hours studied [2]. The largest investigation into the matter found a correlation of $\rho = 0.18$ [3] between GPA and average time spent studying per day. Using a rather high estimate of 5 refills per day, we predict a possible grade gain of up to 0.00103 points.

V. DISCUSSION AND CONCLUSION

Further research is needed, particularly on the modelling of the arrival process and the relationship between the response time gain the grade gain. Nevertheless, we believe this work serves as a solid first step on the path towards achieving optimal study behaviour.

In this study, we investigated how the choice of hydration strategy affects average academic performance. We found that always choosing to press the right button leads to an average time gain of 4.14s per refill, which translates into a grade improvement of up to 0.00103 levels. We thus propose a novel and broadly applicable strategy to boost the average academic performance of KIT students: always using the right button.

REFERENCES

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