Evaluating COOL Technique for Commercial Pilots Overcoming Startle Effect

Samarth Vilas Burande

Cranfield University, United Kingdom

SUMMARY

This study assessed the effectiveness of the "Control, Orient, Organize, and Lead" (COOL) technique in mitigating startle responses among commercial pilots during unexpected in-flight situations. Employing a quasi-experimental design, the experimental group received COOL training, while the control group had no specific training. Both groups encountered simulated startle-inducing emergencies in a flight simulator. Quantitative measurements using the NASA Task Load Index were taken, revealing moderate improvements in the experimental group's workload management, task engagement, stress levels, and flight precision. Despite a lack of statistical significance, these findings suggest potential benefits in integrating COOL into pilot training for effective startle mitigation. Further research with expanded participant cohorts is recommended for a comprehensive evaluation of COOL's efficacy in enhancing aviation safety.

KEYWORDS

Aviation safety, Pilot training, Startle effect, Stress coping, Situational awareness

Introduction

Managing startle responses elicited by unexpected and stressful stimuli remains an ongoing and critical challenge within the aviation industry, with major implications for flight safety and pilot performance. The “Control, Orient, Organize and Lead” (COOL) technique has been proposed as a structured cognitive-behavioural approach that pilots can employ to counteract the adverse effects of startle through sequential prompts guiding them to remain calm, attentively observe the situation, arrive at a diagnostic understanding, and take decisive action. By managing startle reactions, structured cognitive aids like COOL could strengthen pilots’ coping mechanisms and decision-making abilities amid unexpected aviation events (Landman et al., 2020). Moreover, incorporating evidence-based practices into flight training curricula is pivotal for optimizing safety and operational preparedness (Martin et al., 2011).

Method

A quasi-experimental research design was utilized involving the operation of a flight simulator to evaluate the COOL technique. The participant cohort was bifurcated into an experimental group (n=6) that received specialized training in implementing the COOL technique and a control group (n=6) without any specific training related to startle response management. Both groups were subsequently exposed to a series of startling simulated emergency scenarios within the flight simulator environment. Quantitative measurements of perceived workload, situational awareness, stress levels and other parameters were captured through the empirically validated NASA Task Load Index instrument across multiple dimensions and T-tests were used to compare variables between the experimental and the control group.

Results

While statistical significance was not reached between experimental and control groups, likely due to the limited sample size, the results suggest moderate improvements in the experimental group's management of workload, flight precision, task engagement, and stress during unanticipated scenarios. This implies potential benefits of integrating techniques like COOL into pilot training for mitigating startle effects and enhancing resilience. Although the experimental group generally showed higher values in various dimensions (Table 1), differences in NASA-TLX parameters were not statistically significant. Overall, based on hypothetical moving average trendlines, the COOL technique appears to have reduced perceived workload, temporal and physical demand, mental demand, and frustration in the experimental group. There's also an indication of a positive impact on performance perception and an increase in perceived effort.

NASA-TLX Parameters	Experimental group mean	Control group mean
Workload	41.2	29.4
Mental Demand	48.3	30
Physical Demand	28.3	16.7
Temporal Demand	36.7	25.8
Performance	41.7	30.8
Effort	46.7	34.2
Frustration	28.3	14.2

Table 1: Mean NASA-TLX for Experiment Group and Control Group

Conclusion

In conclusion, the study's findings underscore the potential benefits of integrating structured cognitive-behavioral techniques, such as the COOL approach, into aviation training protocols to mitigate startle responses among commercial pilots. While initial observations suggest heightened subjective perceptions of cognitive and physical demands among pilots utilizing COOL, it is important to note that the NASA Task Load Index (NASA-TLX) parameters reflect subjective perceptions rather than definitive performance metrics. These perceptions may indicate heightened engagement by pilots in adopting a new cognitive tool, potentially leading to increased mental and temporal arousal. While the experimental group demonstrated moderate improvements in workload management, flight precision, task engagement, and stress mitigation compared to the control group, further research with expanded participant cohorts is warranted to comprehensively evaluate the efficacy of COOL. Such investigation should delve into potential factors influencing perceived workload, including the cognitive effort required to adopt a new technique and its impact on undesirable aspects such as frustration, mental and temporal demands, and workload. Conclusively ascertaining the efficacy of COOL is crucial for enhancing aviation safety, particularly among commercial pilots operating advanced aircraft systems. Therefore, continued research efforts are essential to elucidate the nuanced effects of cognitive-behavioural interventions like COOL on pilot performance and safety outcomes in the dynamic aviation environment.

References

Landman, A., Van Middelaar, S., Groen, E., Van Paassen, M., & Bronkhorst, A. W. (2020). The effectiveness of a Mnemonic-Type startle and surprise management procedure for pilots. The International Journal of Aerospace Psychology, 30(3–4), 104–118. https://doi.org/10.1080/24721840.2020.1763798

Martin, W. L., Murray, P. S., & Bates, P. R. (2011). What would you do if...? Improving pilot performance during unexpected events through in-flight scenario discussions. Aeronautica, 1(1), 8-22.