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Exploring the Effect of Fatigue on Pilot Performance During Single and Multi-Takeoffs and Landings Flight Missions

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Abstract: Fatigue is a dangerous issue that can impair every aspect of a pilot's ability and in turn can influence the aircraft's safety. The effect of the number of flight takeoffs and landings on the pilot's performance seems to be a factor of concern. To analyze the impact of number of landing and take on the pilot fatigue level, we conducted an experiment with four experienced pilots exposed to two flight scenarios (i) single take-off and landing and (ii) multiple takeoffs and landings. Five fatigue tests were administered to subjectively measure the fatigue level. All test sessions contained the Karolinska Sleepiness Scale (KSS), the Samn- Perelli (SP) and a 5-minute Psychomotor Vigilance Test (PVT). In addition, to eye tracking measurements (The transition sequence). The study results showed that there were notable increases in pilot fatigue level, for both scenarios as the flight went on to the destination. Pilots who made multi-takeoff and landing flights became fatigued more quickly compared to a single-takeoff and landing flight case, even though the flight duration were similar in both cases. The study results showed that there were significant differences in reaction time ($p < 0.037$) and the number of lapses ($p < 0.047$) in the two scenarios. In subjective fatigue results, there have also been significant differences on the KSS scale ($p < 0.039$) and SP scale ($p < 0.031$). Eye tracking results also showed differences in the pilot's visual search patterns between the single and multi-takeoff and landing cases.

Keywords: Multi-takeoff and landing flight missions, Fatigue, pilot performance, Eye movement