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Hierarchical Pressure In The Cockpit: An ERP Study

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Content

Many accident reports have stressed the fact that first officers sometimes follow risky choices made by captains, resulting in the mitigation of flight safety. While this tendency is well known in the field of aviation, few studies have examined the impact of captains' influence on first officers' decision-making and the associated neural correlates. The present study aimed to investigate the extent to which first officers are influenced by captains when the latter adopt a risky behavior. Student pilots who were about to complete their training participated in this study. In the first part of the experiment, they were presented with 50 different landing situations (i.e., pictures of Primary Flight Display, PFD). There were four types of landing situations: safe situations, moderate-risk uncertain situations, high-risk uncertain situations and explicitly perilous situations – where a landing would inevitably lead to an accident. In the first part of the experiment, participants were asked to decide alone whether they wanted to continue to land or to go around. After the first part of the experiment, an A380 captain of Air France entered the room to present himself after being described by the experimenter as a great pilot with high flying experience and expertise. After this hierarchy induction phase, the captain left the room and the participants were explained that their task would be to decide whether to land or not as a crew this time. Participants were presented with the same PFD situations as the first part and were once again asked to indicate whether they would like to land or not, knowing that this "pre-choice" would not be communicated to the captain. Afterwards, they received a feedback from the captain indicating whether he wanted to land or not. The captain adopted a risky behavior consisting in trying to land in every situation except the explicitly perilous situations. Participants were then presented again with the PFD, their pre-choice and the captain's choice and had the possibility to either validate their pre-choice or change their decision, knowing that this time their decision would be communicated to the captain. Preliminary behavioral results revealed that, overall, participants chose to land 15% more frequently when making the decision with the captain than alone. This increase was mostly explained by the increased risk taken by participants in both types of uncertain situations when the captain was present. While electrophysiological data are still under analysis, we predict that we may observe greater N200 amplitudes in response to the captain's feedbacks when they are in conflict with the participants compared to when they are not. The present study may enable to develop new trainings for both student pilots and first officers to help them maintain their initial safe decisions even when they are in contradiction with an experienced captain and improve flight safety.

Keywords : Eye tracking, EEG, fNIRS, Other measurement methods, Brain computer Interfaces