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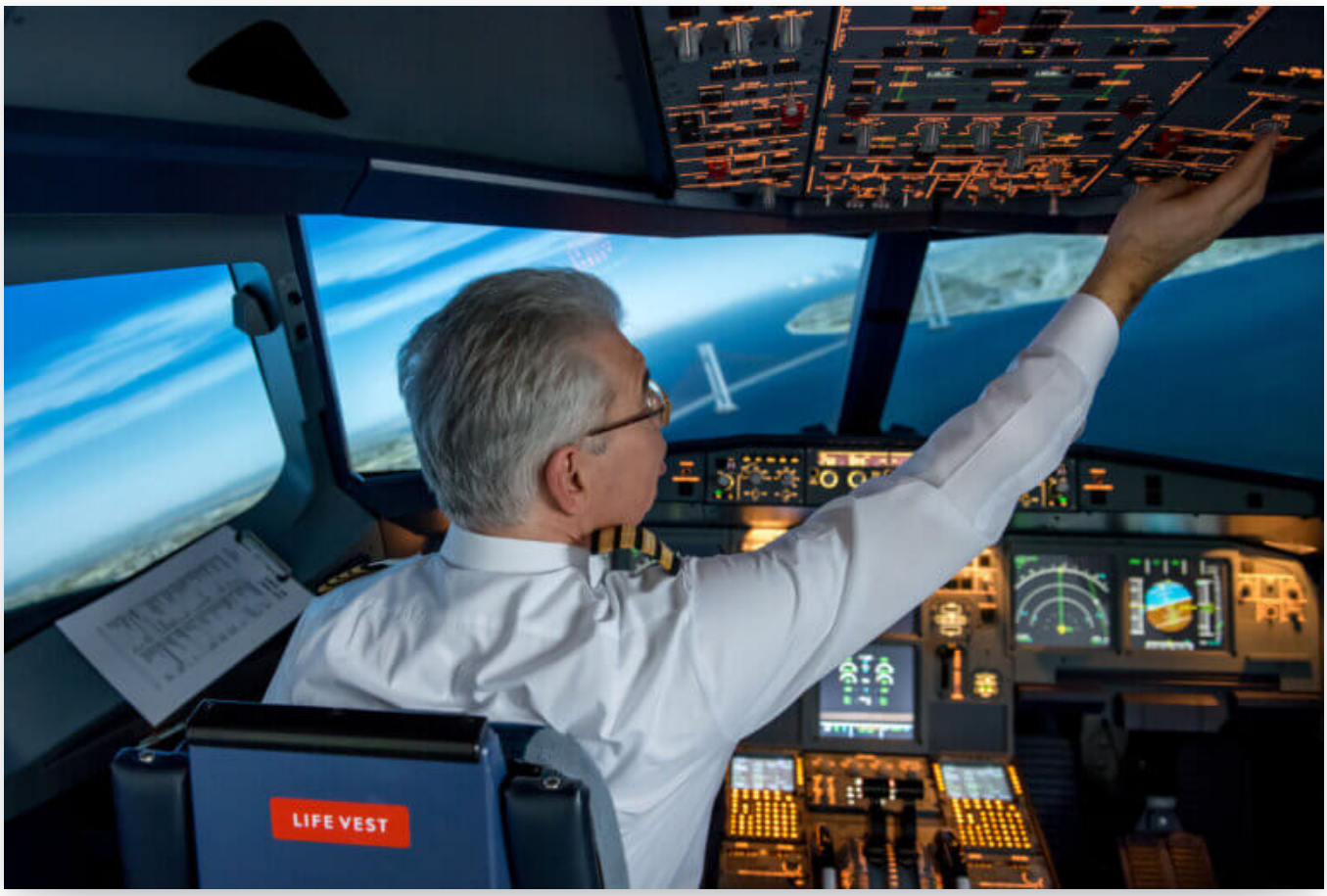
AVIATION PSYCHOLOGY AND HUMAN FACTORS

Neuroscience studies suggest that pilots display a unique pattern of brain functional connectivity

BY ERIC W. DOLAN - NOVEMBER 14, 2020



activity between different areas of the brain, and the findings suggest that pilots tend to have enhanced cognitive flexibility compared to their non-flying counterparts.

"Civil aviation is a distinctive career. Pilots work in a complex, dynamic information environment. They must be aware of all the relevant information regarding this environment and recognize their meaning and importance," said the authors of the new research in an article published in *PLOS One*.

Because of the cognitive demands placed on pilots, the researchers hypothesized that they would display a different pattern of brain connectivity compared to non-pilots.

The researchers used resting-state functional magnetic resonance imaging, a widely used tool for investigating spontaneous brain activity, to examine important neurocognitive networks in 26 pilots and 24 non-flying individuals who had a similar level of education.

Fourteen of the pilots were flight instructors from the Civil Aviation Flight University of China, while 12 pilots were first officers at airlines.

Compared to the control group, the pilots exhibited decreased functional connectivity *within* the central executive network and enhanced functional connections *between* the central executive network, salience network, and default mode network.

The decreased connectivity within the central executive network, which is associated with self-control and appraisal of threatening stimuli, "might enable the network to have more diverse functions," the researchers said. On the other hand, the increased connectivity between the central executive network, salience network, and default mode network might be related to general cognitive performance.

In a similar study, published in *Frontiers in Neuroscience*, the researchers found that pilots also exhibited increased resting-state functional connectivity *within* the default mode network. The network has been referred to as the brain's "autopilot" because of its link to mind-wandering and self-referential thought. It also appears to play an important role in switching between cognitive tasks.

of all conditions in real time, and be ready to deal with various potential emergencies," the researchers explains.

"These processes include continuous cognitive transitions, which are exactly the function of the DMN. Daily flying practice may activate the pilot's DMN repeatedly and, ultimately, strengthen its activation level during the resting state."

The study, "Increased functional dynamics in civil aviation pilots: Evidence from a neuroimaging study", was authored by Xi Chen, Quanchuan Wang, Cheng Luo, Yong Yang, Hao Jiang, Xiangmei Guo, Xipeng Chen, Jiazhong Yang, and Kaijun Xu.

The study, "Altered Default Mode Network Dynamics in Civil Aviation Pilots", was authored by Xi Chen, Kaijun Xu, Yong Yang, Quanchuan Wang, Hao Jiang, Xiangmei Guo, Xipeng Chen, Jiazhong Yang, and Cheng Luo.

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