LESS MOTION SICKNESS WITH AN EXTENDED ARTIFICIAL HORIZON

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Motion sickness may reduce both passenger comfort and crew performance. Countermeasures are dominated by medication with specific and often unwanted side effects. In this paper a new way of reducing the severity of sickness due to motion is presented, i.e., by presenting an artificial Earth fixed visual frame of reference including the future trajectory to be followed.

To that end, 11 subjects participated in a motion trial using our 6DoF Desdemona motion platform three times using a balanced within subjects design. One time the platform moved for 20 minutes according a trajectory flown by a licensed pilot using a desk-top flight simulator and a small business aircraft flying at low altitude and much turbulence. This profile was slightly adapted to fit within the Desdemona motion envelope. In this condition subjects sat in the Desdemona gondola only watching its interior, and rating their sickness every 5 minutes. This setup was repeated another time using exactly the same motion, but while viewing an artificial imagery projected right in front of them. The imagery consisted of a 3D matrix of stars moving instantaneously opposite the gondola motion so as to present an Earth fixed visual frame of reference. Yet another time, the imagery was extended by means of a rollercoaster like track, or highway-in-the-sky, showing the trajectory to be flown, thus allowing anticipation.

With respect to the condition with no visual motion, it was found that viewing the stars-only imagery did reduce sickness severity by a factor of 1.6. Viewing the anticipatory trajectory in addition reduced the sickness severity by a factor of 4.2. These effects were highly significant.

Using current technology and displays available in most commercial aircraft, passenger comfort can thus be increased considerably. The largest effect, however, using anticipatory information in addition, and being larger than what may be realized using medication, may not be feasible yet in aviation, but can be realized on ships using wave radar and a ship motion model. The imagery is in addition anticipated to increase the situation awareness of pilots when projected in the background of otherwise idle display parts present in the cockpit.