# The efficacy of advanced visual display technologies in simulated airborne command and control environments

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**Abstract**

Increases in information availability have elevated the issue of display cluttering in application domains in which display space is limited. To remediate this problem, evaluations of potential display technologies should be conducted. This paper discusses the examination of head-mounted displays (HMDs) and a multi-layer display (MLD) in a simulated airborne command and control environment. Eight participants engaged in tasks in which they were required to retrieve information presented on one of several display technologies. This information was available via two types of HMD, on paper, on the MLD, or on the primary display. The results indicated that the HMDs and MLD tested did not in general deliver a performance benefit over the other methods of information retrieval. However, the MLD did produce a decrease in the subjective rating of mental workload and a perceived improvement on several post-experimental scales.

**Introduction**

Command and control is defined by US Air Force doctrine as "the exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission" (US Air Force, 1997, pp. 79-80). At the tactical level, command and control for air assets in the US Air Force is accomplished by the weapons section of an Airborne Warning and Control System (AWACS) or Joint Surveillance and Target Attack Radar System, or an analogous ground-based platform (Williams, 1997). Although the missions of these systems are not identical, there is significant overlap in the roles of the weapons section personnel assigned to them. These air battle managers are responsible for the tactical direction of air assets involved in strategic attack, interdiction, counter-air, and close support missions, and the coordination of activities such as air refueling and combat search and rescue. Although most of the direction and coordination is done by means of voice communications, the situation awareness (SA) required to do them well is provided almost exclusively through the visual modality, either on a display monitor or on printed media.

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