

Air Traffic Controller assistance systems for attention direction: comparing visual, acoustical, and tactile feedback

Maik Friedrich¹, Bernhard Weber¹, Simon Schätzle¹, Hendrik Oberheid³,
Carsten Preusche¹, & Barbara Deml²
¹German Aerospace Centre
²University of Magdeburg
³Aeronautical Information Service Centre
Germany

Abstract

Modern aircraft have the capability to perform fuel-efficient and noise-reduced continuous descent approaches (CDA). Using these capabilities for approaching today's airports would mean that CDA-traffic and conventional non CDA-traffic would have to be synchronized by the air traffic controller (ATCo). ATCos can be supported when merging both aircraft streams by providing assistance systems that direct attention towards relevant events in merging operations. By actively directing the ATCos' attention potential, complacency effects might be diminished. In the present experiment, a visual, an acoustical and a tactile assistance system were tested in a micro world simulation with 55 participants. Participants had to merge CDA and non CDA-traffic shortly before landing. Non CDA-traffic was controlled via radio communication, while CDA traffic had to be monitored at the same time. Whenever a CDA airplane passed a critical waypoint, visual, acoustical, or tactile feedback was given to maintain a sufficient level of situation awareness. Visual feedback was presented via aircraft label blinking; acoustical feedback was given via radio and tactile feedback was given via a vibrotactile feedback device attached to the wrist. Indeed, results indicate that additional feedback about the CDA traffic has a positive effect on visual attention and situation awareness. Practical implications are discussed.

Introduction

How to manage modern technology is an important challenge that every society has to face. There is a need to use and manage existing technologies in a safe and efficient way; and then to make progress by introducing new technologies. Introducing new technologies is usually expected to provide benefit through improved efficiency, more safety or handling a growing demand for a limited resource. New technology in the area of air traffic management combines these three expected benefits at the cost of higher system complexity and new features of the user interface that an operator has to understand and manage. According to predicted growth of worldwide aviation traffic (Eurocontrol, 2008) the resource airspace

In D. de Waard, N. Merat, A.H. Jamson, Y. Barnard, and O.M.J. Carsten (Eds.) (2012). *Human Factors of Systems and Technology* (pp. 119 - 128). Maastricht, the Netherlands: Shaker Publishing.