Analysis of controller-pilot communication for future concepts of remote airport control

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Aim

The qualitative analysis of radio communication, as the main input device of tower controllers, to provide a reliable air-traffic-control service on an airport are often neglected in simulator studies. A reason for this can be seen in the fact that such data analyses are time consuming and a lot of expert knowledge is needed, to transcript those data sets. Cardosi (1993) used a qualitative approach for controller-pilot communication to investigate readback errors while quantitative data analysis of radio communication data was mainly used to predict workload (Manning et al. 2001).

Within this paper the content of radio communication data from Human-in-the-Loop (HITL) simulations is analysed to understand, how the quality of radio communication between tower controllers and pilots is influenced by the simultaneous control of two airports, or rather the blind out of the far view. Radio communication data were gathered and analysed to investigate the influence on errors of confusion (slips), delays due to traffic at the other airport, omission of additional information and requesting of pilot-reports as workload reducing strategies.

Background

This study was conducted within the Project RAiCE (Remote Air Traffic Control Center) at the Institute of Flight Guidance, German Aerospace Center (DLR). A new work environment for remote control of multiple small-sized airports was developed (Fürstenau et al. 2009). 12 professional tower controllers participated in a HITL-Simulation study to research about novel cognitive demands (i.e. switching between airport reference values) for such new work environments.

Method

Controllers were asked to operate two airports simultaneously, while (1) both airports were visible, or rather (2) one was blinded out, compared to operating one airport (baseline). Radio communication data were transcripted and classified to focus on a quantitative analysis of different classes of radio communication contents. Therefore the software Videograph was used (Rimmele, 2009).

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Results

Significant statistical effects, provoked by the experimental conditions, could only be found for the transmission of wind information. However strong interindividual differences between controllers became apparent. Individual strategies, developed at the controllers' base airport, seem to have a stronger influence compared to the experimental conditions.

Conclusion & Application

The content of radio communication remains stable, even if one controller operates two airports. Individual strategies among controllers, learnt and developed at their base airport, seem to have a stronger influence on radio communication compared to the experimental conditions.

The analysis of the quality of the radio communication can be used for the evaluation of "quality of service", given by ATC.

Literature

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