

Aviation Psychology: Practice and Research

Edit by Klaus-Martin Goeters

This easy-reading 380-page textbook is a pleasant departure for the dozens of topics in the field of Aviation Psychology; it presents an up-to-date review of the main areas in this field. It contains current thinking from specialists involved in research, training and operational practice. Quite a few issues from this book are subjects that were first presented to aviation psychologists in Crief, Scotland for an EAAP conference. The book contains six parts and covers the following topics: Human Engineering, Occupational Demands, Selection of Aviation Personnel, Human Factors Training, Clinical Psychology, Accident Investigation and prevention.

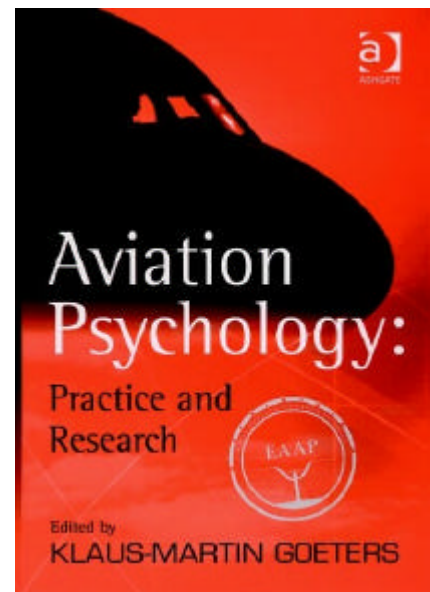
A book review by Lucas van Gerwen

In the well-established aviation system the importance of sound human factors practices, based on good aviation psychology research, is obvious from the incidents and accidents that resulted out of its neglect. In a field as highly specialized as this, with different highly specialized contributors, it should be obvious that that the book consists of separate articles. This means that the chapters can be read independently of one other or as elements of the book as a whole. You can start with the chapter you think is most important to you before reading the previous chapters. That is the way I read this book, I started with part five, in the "Clinical Psychology" part of the book.

But, like I said above, the book contains six parts and starts in part one with Human Engineering, in which the reader learns (in four chapters) about human-centered automation as well as human factors issues in aircraft certification. The chapter that highlights the importance of human/machine interfaces and interactions is not only interesting for most of us involved in aviation but is almost a must for those human operators who are actively involved

in aircraft guidance or control. Part two, Occupational Demands, contains only one chapter in which Goeters, Maschke and Eissfeldt describe the development of a job analysis technique that is adjusted to the present demands of pilots and traffic controllers. It also reports the results of recent job analysis surveys, and the implications for selection and training. The results show that some ability requirements are increased (psychomotor abilities connected with mouse handling), and some are reduced (speech and voice abilities, social/interactive abilities, and even some cognitive abilities such as Selective Attention and Time-Sharing). You will also find the top ten job requirements of airline pilots and of air traffic controllers mentioned in this part.

Part three, Selection of Aviation Personnel consists of seven chapters (6 – 12). Results derived by job analysis methods are presented in this part and serve as basic information in the design of selection and training programs. In selection, computerized testing or behavior-oriented assessments are challenging approaches for personnel



recruitment. It is covered by a chapter from Huelmann and Oubaid, 'computer assisted testing' (CAT) and how it is used in the psychological department of the German Aerospace Center in Hamburg. The history, advantages and drawbacks of CAT are described, as is an outlook to future use of CAT. The DLR offers pre-information and preparatory test material on the internet. In doing so, they increase the fairness among test-takers and make the results more reliable and valid. Apart from social interactional skills, creativity and design, CAT seems to be the best strategy for reliable predictions in aviation psychology.

This part also gives us the cost-benefit analyses in selection, revealing convincing results and enabling organizations to save huge amounts of inappropriate training investments by the application of proper selection tests.

Part four deals with Human Factors Training in nine chapters. The NOTECHS method is clearly described which helps to access CRM capabilities in training and can also be used to measure training effect in systematic validation studies. It shows how a well-developed CRM training programme is able to improve non-technical skills which I believe are a must for good air-manship

Although operational personnel in aviation should be able to cope with stress more efficiently than other occupational groups, individual problems might develop as reactions to traumatic influences. Either a psychological evaluation or a proper treatment of both is then required as described in three chapters of part five "Clinical Psychology". In this part, Stelling gives a brief and clear description of the new guidelines for medical and psychological requirements, as specified in the Joint Aviation Requirements – Flight Crew Licensing Part 3 (JAR – FCL 3). It is noted that the implementation of psychology in the new European aviation regulations is very welcome. The assessment of psychological criteria is composed out of the following parts: Life History and Events, Operational Abilities, Personality Factors, Rules when Making a Diagnostic Decision and Rules and Consequences. Stelling has two well-argued points of criticism to the new regulations. In his opinion the weight of psychiatric and neurology examinations are in no proportion to the reasons for a psychological examination, since the overwhelming majority of problem cases are to be found within the normal ranges of behaviour. He also states that the required standard of a psychological evaluation is not enough from the aviation psychological point of view and that empirical and scientific backgrounds are essential to perform a fair and qualified psychological review, and to guarantee the safety of aviation in Europe. In addition, Roth gives an extensive and very informative overview of PTSD, its treatment and prevention, mainly in military situations. Symptoms and diagnostic criteria are described, as are some practical examples. Critical Incident Stress Management (CISR) is described and found to be very important in preventing PTSD. It is concluded that preventing PTSD also requires a proper psychological preparation to specific military situations, an accompanying person in the stressful environment, and follow-up debriefings.

Johannes and Salnitski explain how the HEALLY system is a valuable addition, of non-intrusive physiological measurement, to the subjective ratings and observations of pilots' psychophysiological state. The goal is integration of information provided by different physiological parameters to provide a single common indicator in a field-applicable system. Research and analysis are presented to show how the HEALLY system enables the reduction of raw data to meaningful information that provides the possibility for long-term monitoring and fast information telemetry.

The last part, part six deals with 'Accident Investigation and Prevention' and covers two chapters.

Here we find described the historical evolution Safety Investigation has made. Up to the 1970's focus laid on individual errors made by pilots, controllers or maintenance, where as through the 1980's accidents were seen as a result of team errors (pilot, controller and maintenance). Since the 1990's human error is viewed as an intrinsic component of cognitive processes, and thus accidents are seen as failures of the organisation. This line of thinking has had great impact on safety investigation, as described comprehensively by Hayward & Lowe, and resulted up till now in the "Systemic Occurrence Analysis Method" which deals with questions about why and how an incident or

accident happened, and what action can be taken across the organisation and/or system to prevent it from happening again, based on the work of Reason (2001).

This chapter demonstrates the systemic approach to accident investigation by including a case study of the Singapore Airlines flight SQ006 that crashed on October 31, 2001 in Taipei, Taiwan. Two reports about this accident are described and highlight the line of safety investigation in our time, by turning attention to critical latent conditions instead of focusing on crew error. Adjustments in the organisation are plausible and thus turning the tragic accident into an opportunity to grow.

To conclude: This is an interesting and well-written textbook, providing the essential issues and the main areas in the field of aviation psychology of today.

About the author: Klaus-Martin Goeters (MSc. and PhD. In Psychology) is a recently retired head of Department of Aviation and Space Psychology at the German Aerospace Center (DLR) in Hamburg, Germany. His professional activities include research on the psychological selection of operational personnel (pilots, air traffic controllers and astronauts). I know him as a hard working Board Member of the European Association for Aviation Psychology.

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