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FOR AVIATION PSYCHOLOGY
Worldwide Support

Psychological Assessment of Aviation Personnel

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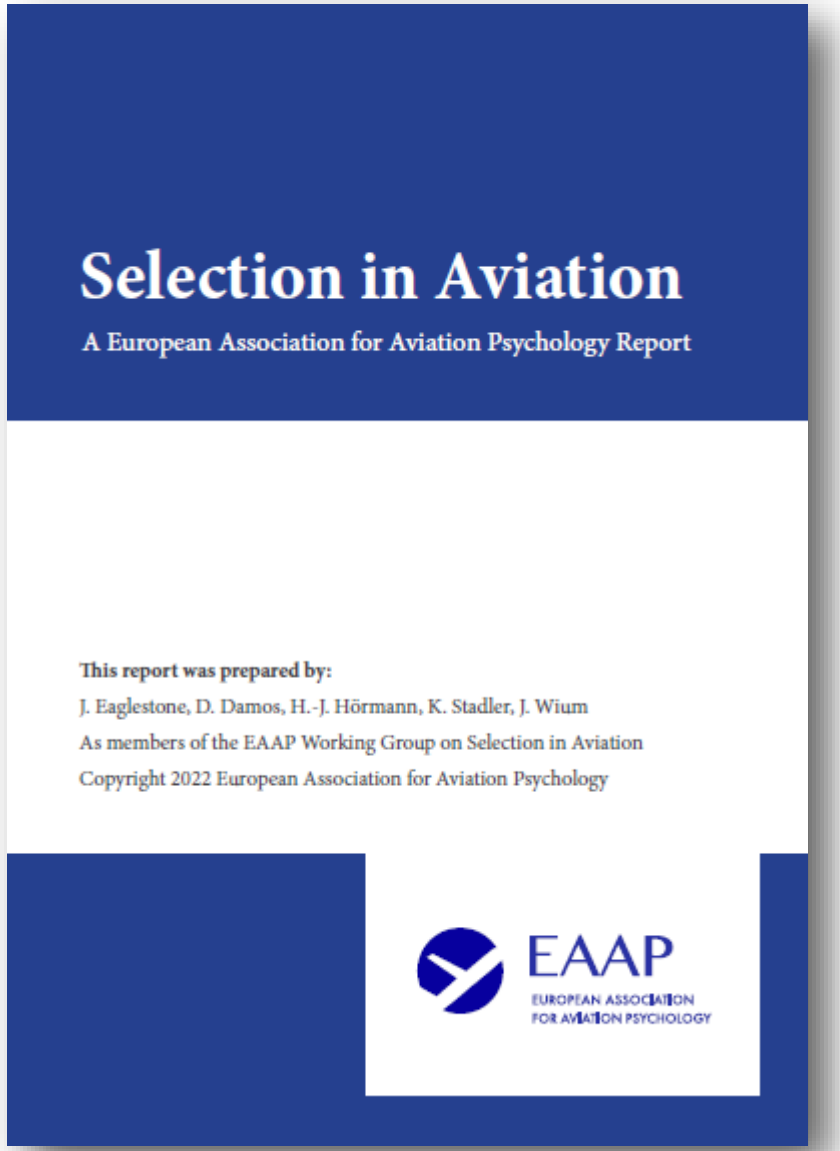
- The views and opinions expressed in this presentation are those of the authors and do not necessarily reflect the position of any organizations, agencies, or companies the author is employed by.

Key terms

- **Psychological Assessment.**
- Any form of systematic information gathering using psychological methodology.
- Used to identify the required attributes for a role in applicants.
- Can be any form of selection method (e.g. interviews) or selection instrument (e.g. specific cognitive test) and more



Context of assessment

- Aeromedical examination
- Evaluation of suspected impairment
- Pre-employment testing

Why do we assess?

Benefits of assessment

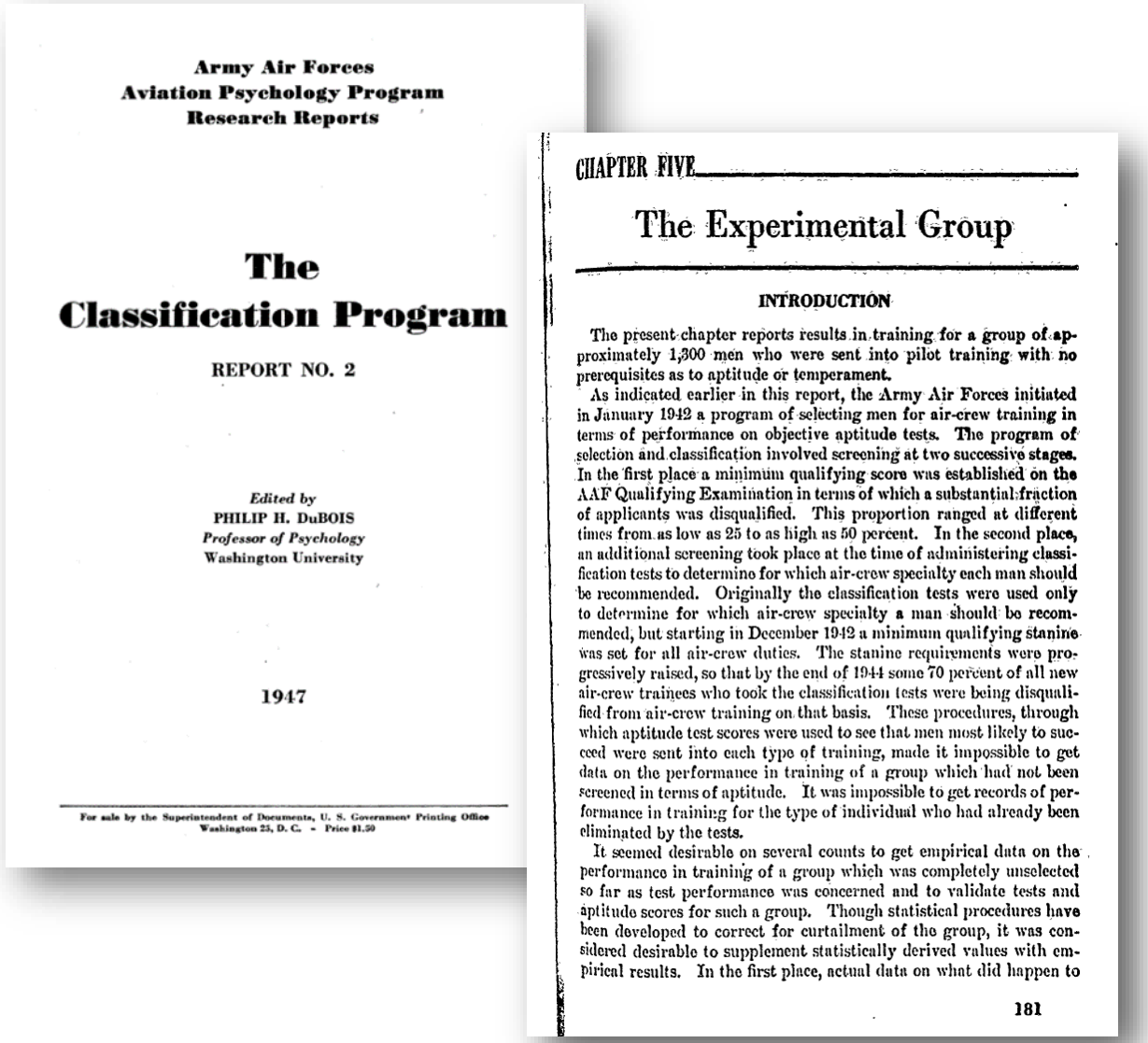
- **Competence**
- **Cost-effectiveness**
- **Legal requirements**
- **Safety**

Competence

- The intent of the assessment is to determine if the individual possesses the necessary competence to perform in the role.

- Does that matter that much? Why not just select those interested, or even everyone who applies, and train them?

Army Air Force Aviation Psychology Program



Army Air Forces
Aviation Psychology Program
Research Reports

The Classification Program

REPORT NO. 2

Edited by
PHILIP H. DuBOIS
Professor of Psychology
Washington University

1947

For sale by the Superintendent of Documents, U. S. Government Printing Office
Washington 25, D. C. - Price $1.50

CHAPTER FIVE

The Experimental Group

INTRODUCTION

The present chapter reports results in training for a group of approximately 1,300 men who were sent into pilot training with no prerequisites as to aptitude or temperament.

As indicated earlier in this report, the Army Air Forces initiated in January 1942 a program of selecting men for air-crew training in terms of performance on objective aptitude tests. The program of selection and classification involved screening at two successive stages. In the first place a minimum qualifying score was established on the AAF Qualifying Examination in terms of which a substantial fraction of applicants was disqualified. This proportion ranged at different times from as low as 25 to as high as 50 percent. In the second place, an additional screening took place at the time of administering classification tests to determine for which air-crew specialty each man should be recommended. Originally the classification tests were used only to determine for which air-crew specialty a man should be recommended, but starting in December 1942 a minimum qualifying stanine was set for all air-crew duties. The stanine requirements were progressively raised, so that by the end of 1944 some 70 percent of all new air-crew trainees who took the classification tests were being disqualified from air-crew training on that basis. These procedures, through which aptitude test scores were used to see that men most likely to succeed were sent into each type of training, made it impossible to get data on the performance in training of a group which had not been screened in terms of aptitude. It was impossible to get records of performance in training for the type of individual who had already been eliminated by the tests.

It seemed desirable on several counts to get empirical data on the performance in training of a group which was completely unselected so far as test performance was concerned and to validate tests and aptitude scores for such a group. Though statistical procedures have been developed to correct for curtailment of the group, it was considered desirable to supplement statistically derived values with empirical results. In the first place, actual data on what did happen to

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Competence

- In 1943 the US Army Air Force decided to see what the pass rate of pilot cadets would be if test score requirements were waived. Applicants were still tested, but instead of being rejected because of low scores 1,311 cadets were chosen on first-come-first-served basis. This group received the same training as the previous years.

- At the end of their training only 23% had successfully graduated from advanced flight training as opposed to 63.4% who graduated the following years after traditional selection. Of the 150 cadets that were admitted with the lowest test scores not a single one managed to graduate (Dubois, 1947).

Cost-effectiveness

- This increased competence is also reflected in assessment being more cost-effective as individuals are more likely to pass training and pass training quicker.
- Duke and Ree (1996) showed that no extra flying hours were needed for those scoring in the highest 40 percentiles of the initial selection procedure. The negative correlation between selection scores and flying hours needed was -0.27.
- Goeters and Maschke (2004) estimated that the savings for selecting a successful airline pilot from licensed applicants could be around $150,000 (€125,000, adjusted for inflation).

Return on Investment

- When expressed as a return on investment, the good selection of ab initio pilots returns more than €450 in savings to the company per Euro spent - giving it an ROI of 45,170%.

- For already licensed pilots the savings are less but still significant, or about €28 in savings per Euro spent on selection giving an ROI of 2,871% (Goeters & Maschke, 2004).

Legal Requirements

- Another reason to perform selection are legal requirements.

- EASA's Commission Regulation 2018/1042 states that all flight crew members shall go through a (non-clinical) psychological assessment before commencing line-flying.

Legal Requirements

- According to its Acceptable Means of Compliance (AMC1 CAT.GEN.MPA.175.b) this requires assessment of
  - Cognitive abilities
  - Personality traits
  - Operational and Professional competences
  - Crew Resource Management social competences

Legal Requirements

- The assessment should be based on a **job analysis**.

- The assessment should be undertaken **at least 24 months before commencing line flying**.
  - If more than 24 months have passed, then an updated risk assessment based on data gathered from previous operational experience and continuous human performance monitoring since the last psychological assessment should be performed.

Legal Requirements

- With regards to the psychological assessment, the following should be **documented**
  - The procedure followed
  - The personnel involved
  - The assessment criteria
  - The assessment instruments
  - Validity period

Legal Requirements

- **Overseen or directly performed** by an **aviation psychologist**
  - Or more specifically “by a psychologist with acquired knowledge in aviation relevant to the flight crew’s operating environment and with expertise in psychological assessment, and where possible, the psychological selection of aviation personnel”.

Legal Requirements

- The assessment should be **validated**.
- This means that individual differences in the assessment have to be related to corresponding differences in job performance.
- To put it simply, we need to show that the assessment can distinguish between the good and the bad.

Other Legal Requirements

- Local legislation
- Requirements against adverse impact
- Data protection, data access and right to be forgotten
- Profiling and automatic decision making

Safety

- Does selection lead to choosing more safe employees?
- Aviation safety is such a robust system that it can be difficult to directly link issues to safety results.
- What does the evidence say?

Army Air Force Aviation Psychology Program

- Analysing the data of the “un-selected” group of applicants who were tested but admitted on a first-come-first-serve basis.
- Those who scored in the lowest ⅓ of scores, were 300% more likely to have accidents than the top ⅓.
- There were 4 fatalities from accidents (of 1,311 cadets). All four were from the lowest ⅓ (Flanagan, 1948).
  - All would have been denied entry into the program under other circumstances.

Indian Air Force Selection Boards

- 282 pilots who had been involved in an accident due to pilot error were matched with 333 pilots of the same age and flying experience who had remained “accident free”.
- These groups were then compared on their initial selection scores (“Flying Aptitude Scores”).
- The “Accident free” group scored significantly better on their selection scores ($p<0.05$) than those who had been involved in an accident (Kalpana et al., 2009).

Evidence outside of aviation

- There is considerable evidence to support that personality can predict “unsafe behaviors” (Beus. Dhanani and McCord, 2014) for general workplace accidents.

- Selection has also been shown to predict driving accidents for petroleum-product transport drivers (Arthur, Barrett & Doverspike, 1990) and general drivers (Arthur, Barrett & Alexander, 1991).

Current practices in selection

- Prevalence of selection for aviation roles is difficult to estimate. EASA mandates psychological testing for pilots but their use for other safety-sensitive personnel is not mandated.

- EASA has recently closed their assessment of the new pilot selection requirement and will publish their report soon.

- In addition to that, EAAP performed he “Common Practices in Selection” in 2020 and will repeat that survey this fall. (Höermann, Stadler & Wium, 2022)

How do we improve selection?

- Not all selection is equal.
- A good selection system …
  - has done a proper job analysis – relating selection criteria to job (and training) demands
  - uses a well-designed selection system
  - uses valid and reliable selection instruments that are based on appropriate norms
  - performs a validation of the selection system
- EAAP's "Selection in Aviation: A European Association for Aviation Psychology Report" discusses these issues in more detail.

Thank you for listening

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