

# LOOKING FOR CHUCK AND PT: AN EVIDENCE-BASED APPROACH TO ASSESSING HELICOPTER PILOTS

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This paper describes the use of an evidence-based approach to the assessment of commercial rotary-wing pilots. Following the four category protocol set out by Briner and Rousseau (2011), a robust psychological assessment process was developed covering intellectual ability, mental wellbeing, the Big 5 personality dimensions and critical incident analysis. Findings from each component are discussed, particularly the findings on the personality characteristics using the Big 5 dimensions. Findings of high Conscientiousness and very low Neuroticism were shown to mirror similar findings in the literature, while a higher than expected incidence of social withdrawal needs more investigation. Implications for future assessment processes and research are described.

Having received an assignment from a North Sea helicopter operator for in-depth psychological assessment of helicopter pilots and co-pilots they were recruiting, we decided to take an evidence-based approach following Briner and Rousseau's (2011) suggestions. This included their suggested 4 key information sources;

- Practitioner expertise and judgment
- Critical evaluation of the best available research
- Evidence from the local context
- Perspectives of those who may be affected by the intervention decision

Activities under each of these headings are described. Based on each of these sources, and in alignment with the company's process used elsewhere in the world, we settled on an assessment process that met both our desire to be evidence-based and the client's requirements for a robust, cost and time effective process.

During our review of the relevant literature and best available research, we found few studies that defined either a robust assessment process for selecting rotary-wing pilots or a clear indication of the desirable psychological characteristics. Two papers (Grice (2006) and Grice and Katz (2008)) came closest to providing a clear template of the personality dimensions typical of pilots in a military (US Army Air Corps) setting, and they differentiated the personality characteristics of pilots using the Big 5 dimensions across a number of rotary-wing mission platforms including attack, transport and utility aircraft.

## **The assessment process**

The process combined the following elements:

- A measure of intelligence – Raven’s Advanced Progressive Matrices (Raven, Raven and Court (1998))
- A measure of mental wellbeing – the GHQ28 (Goldberg and Williams (1988))
- A measure of personality – the Big Five Inventory (John, Donahue and Kentle (1991))
- An in-depth structured interview including critical incident analysis (Flanagan (1954)) and a strengths-based inquiry (Linley et.al. (2007)). The interview questions were developed using an evidence-based approach based on research into the characteristics of safe and unsafe pilots (FAA (2008)).

### Sample characteristics

Table 1 below shows the number and gender of pilots in the study sample at 1<sup>st</sup> January 2013. By the time of presentation this sample will be larger. Comparison is made to the most recent statistical account available of the number of pilots holding the basic qualification required by the company – Commercial Pilot’s License (Helicopter) (CPL (H)) – as listed by the UK Civil Aviation Authority (CAA 2008).

Table 1.  
*Totals and Gender Balance of the Sample*

	Sample	%	2008 CAA	%
Female	3	4%	23	4%
Male	53	96%	617	96%
Total	56	100%	640	100%

Table 2. shows the average age and flying hours of the sample, again with a comparison to the 2008 CAA summary statistics.

Table 2.  
*Average Age and Flying Hours of the Sample.*

	Average	Range	2008 CAA	Range
Age	36	21-55	35	20 - 61
Hours	2250	100 - 7500		

## Findings from the assessment process

### Raven's Advanced Progressive Matrices

This test is recognized as one of the best assessment tools for assessing general intellectual capability. It is non-verbal and free from educational, cultural and gender bias. The version used here was developed to differentiate between people of superior intellectual capability. The test comprises two parts, Set 1 which consists of 12 items and is given untimed, acting as a training set. Set 2 consists of 36 similar items of increasing difficulty, and has a time limit of 40 minutes.

The average score for this sample on Set 1 was 11.08, SD 1.09, and on Set 2 the average score was 24.92, SD 4.71. On Set 1 the range of scores was 8 to 12, and on Set 2 12 to 34. Most pilots are therefore of average intelligence or above, and low scores on Set 2 (i.e. less than 16) were an exclusion criterion for the selection process.

### GHQ 28

This is a well established screening tool to detect those likely to have, or to be at risk of, developing psychiatric disorders. Based on the full GHQ, the version used here measures 4 factors;

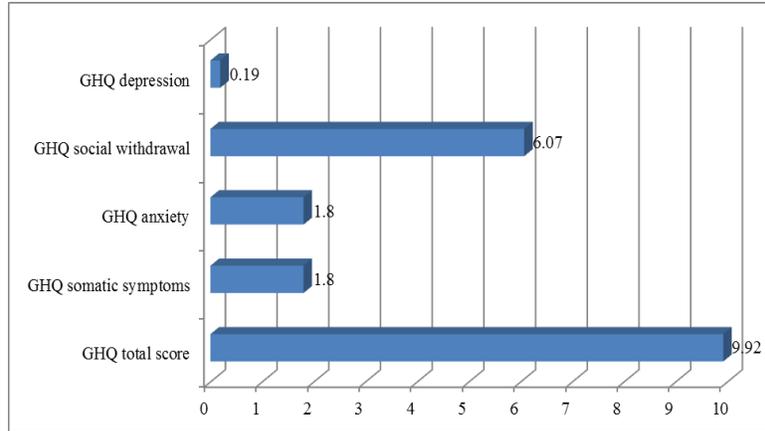
- Somatic symptoms
- Anxiety
- Social dysfunction
- Severe depression and suicidal tendencies

The GHQ 28 is scored two ways on the four point scale of symptom frequency – the so-called GHQ scoring (0011) and a Likert type scale (0123). “Caseness”- that is the likely presence of significant psychiatric morbidity - is a score of 4 or more using GHQ scoring, or 23/24 on the Likert scale. Figure 1 below shows the average scores on the total scale, and on each of the four component scales.

Figure 1. shows that pilots in general do not reach “Caseness”, and comparison to the scores of comparable general populations shows a low incidence of psychiatric symptoms. In particular the scores on Severe Depression and Suicidal Tendencies are – thankfully – very low. By contrast the scores on Social Dysfunction, which includes social and work performance, are slightly higher than expected and significantly different from the other subscales scores. This may be attributed to the fact that almost all of the pilots sampled were actively looking for employment – hence the assessment – and often were unemployed or coming to the end of a previously very active military career.

**Figure 1.**

Average total and subscale scores on the GHQ.



## **Big Five Inventory**

Because of the robustness of the research findings concerning the usefulness of the Big 5 model of personality, we included a direct measure of the 5 dimensions as part of the assessment process. We chose to use the Big Five Inventory (BFI) (John, Donahue and Kentle (1991); John, Naumann and Soto (2008)). The reasons for this were that the BFI possesses robust statistical properties and is quick to complete and score, allowing questioning of answers during the interview process. Figure 2 below shows the average scores for this sample on each of the 5 dimensions, with a comparison expected score for the general population.

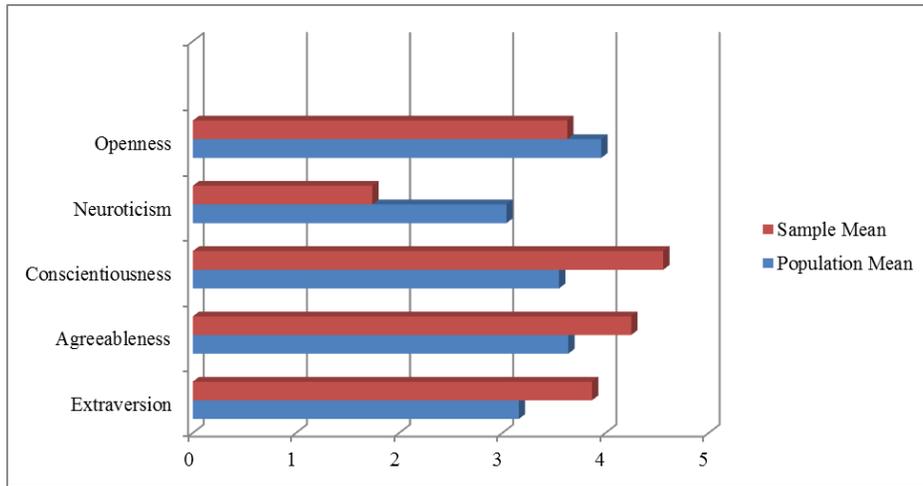
The finding in this sample mirror those obtained by Grice (2006). Grice used the NEO-PI to measure the Big 5 dimensions so a direct comparison is not possible, although Table 3. below shows the direction of the scores on each of the Big 5 classified into Low, Average or High. There are consistencies in these findings. Typically both samples of rotary-wing pilots show a lower than average score on Neuroticism – they tend to be calm, resilient and emotionally stable people who cope well under pressure. The other key characteristic is a very high level of Conscientiousness – they tend to be organized, methodical, procedure-driven and hard-working. The current sample also scores higher than expected on Agreeableness – they tend to be easy to get on with, well-mannered and committed to working well in a team.

## **Discussion**

This paper is work in progress and the findings outlined here are preliminary data that may change as the sample grows. Similarly there is more information that can be gained from the assessment process through analysis of the critical incident reports and more particularly the strengths-based enquiry. Preliminary analysis of each individual's stated strengths shows a potential strong correlation with the Big 5 personality dimensions.

**Figure 2.**

BFI average scores of each dimension for the sample with comparison expected average scores for the general population.



**Table 3.**

High level categorization of Big 5 personality dimensions compared to those put found by Grice (2006) in a US Army Air Corps sample

<i>Factor</i>	<i>US Army Total</i>	<i>US Army C&amp;U</i>	<i>Current Sample</i>
<i>Extraversion</i>	<i>Average</i>	<i>Average</i>	<i>Average</i>
<i>Agreeableness</i>	<i>Average</i>	<i>Average</i>	<i>High</i>
<i>Conscientiousness</i>	<i>Average</i>	<i>High</i>	<i>High</i>
<i>Neuroticism</i>	<i>Low</i>	<i>Low</i>	<i>Low</i>
<i>Openness</i>	<i>Low</i>	<i>Low</i>	<i>Average</i>

Despite the initial status of the current findings it does appear that there are strong defining characteristics of rotary-wing pilots that are useful as a reference point in selection and training.

## References (Level 1 Heading)

- Briner, R.B. and Rousseau, D.M. (2011): Evidence-based I-O Psychology: Not There Yet. *Industrial and Organizational Psychology* 4, 3-22.
- Civil Aviation Authority (2008). UK CAA Flight crew licence age profile as at 1 January 2008. London, England: Civil Aviation Authority. Retrieved from [http://www.caa.co.uk/docs/175/UK\\_CAA\\_Flight\\_Crew\\_Licence\\_Age\\_Profile\\_as\\_at\\_1\\_January\\_2008v2.pdf](http://www.caa.co.uk/docs/175/UK_CAA_Flight_Crew_Licence_Age_Profile_as_at_1_January_2008v2.pdf).
- Federal Aviation Administration (2008). *Pilot's Handbook of Aeronautical Knowledge*. Oklahoma City, OK: US Dept. of Transportation Federal Aviation Administration, Airman Testing Standards Branch.
- Flanagan, J.C. (1954): The critical incident technique. *Psychological Bulletin* 51, 4, 327-358.
- Ganesh A. and Joseph C. (2005): Personality studies in aircrew: An overview. *Indian Journal of Aerospace Medicine*, 49, 1, 54-62.
- Goldberg, D. and Williams, P. (1988) *A Users Guide to the General Health Questionnaire*. Windsor, UK: NFER-Nelson Publishing Company Ltd.
- Grice, R.L. (2006): *Personality profiles of experienced US Army aviators across mission platforms*. Ph.D. Thesis. Lynchburg VA: Liberty University.
- Grice, R.L. and Katz, L.C. (2008) Personality Profiles of U.S. Army Initial Entry Rotary Wing Students Versus Career Aviators: *USARI Technical Report No. 1208*. Arlington VA: United States Army Research Institute.
- John, O.P., Donahue, E.M., and Kentle, R.L. (1991). *The Big Five Inventory – Versions 4a and 54*. Berkeley, CA: University of California, Berkeley, Institute of Personality and Social Research.
- John, O.P., Naumann, L.P., and Soto, C.J. (2008). Paradigm shift to the integrative Big Five trait taxonomy: History, measurement, and conceptual issues. In O.P. John, R.W. Robins & L.A. Pervin (Eds.) *Handbook of personality: Theory and research* (pp. 114-158). New York, NY: Guilford Press.
- Linley, P.A., Maltby, J., Wood, A.M., Joseph, S., Harrington, S., Peterson, C., Park, N., and Seligman, M.E.P. (2007) Character strengths in the United Kingdom: The VIA Inventory of Strengths. *Personality and Individual Differences* 43, 341-351.
- Raven, J., Raven, J.C., and Court, J.H. (1998) *Manual for Raven's Progressive Matrices and Vocabulary Scales*. San Antonio, TX: Pearson.