Personality Profile of an IAF Pilot : Its usefulness in Pilot Selection

N RAMACHANDRAN
JM WADHAWAN
V KUMAR
V CHANDRAMOHAN
PLN RAO

One hundred and seven highly rated fighter and transport pilots were assessed on an objective personality test for the purpose of finding out (a) if there existed any personality difference between transport and fighter pilots, and (b) to draw up a typical personality profile of a highly rated IAF pilot. Also, EEG findings of a selected group of pilots were compared with personality variables.

The results did not indicate any difference between fighter and transport pilots in terms of personality factors. A typical highly rated IAF pilot is above average in intelligence and emotional stability. He is neither a pronounced introvert nor an extravert. He could rather be termed a 'realist'. EEG findings did not show up any definitive relationship with personality variables. The utility of the personality profile is discussed in the context of current pilot selection procedure. The profile is compared against personality profiles of American airline pilots and Air Traffic Controllers.

ꟿHAT qualities make a successful flier has been a fascinating question, indeed. Researchers[1] have tried to find out a satisfactory answer to the problem However, the probable methodological differences adopted for various studies, short coming of the tools employed, differences in the socio-cultural milieu of the subjects involved and finally differences in the criteria of selection themselves could have contributed to conflicting type of answers to the above question.

In our country itself, characteristics of an ideal pilot per se are not studied in detail, for our selection procedure consists mainly of looking for an officer or a leader of men who has got some flying aptitude as evidenced through the scores of the Pilot Aptitude Battery Tests[1]. The personality assessment carried out in the Air Force Selection Boards (AFSBs) is both extensive and intensive[1] However, it does not adequately discriminate a pilot from officers of other branches of Armed Forces

Certainly, the stresses faced and coped up by these different types of officers could be different in frequency and amplitude.

Directorate of Psychological Research (DPR) initially identified 21 officer-like-qualities (personality variables) which subsequently were grouped into four manageable major factors[13]. The validity co-efficients of Pilot Aptitude tests were varying from time to time[8]. However, this procedure for assessing personality and aptitude has been in vogue for some time.

The supersonic age with high speed-multi role aircraft has brought in a new dimension to the modern day air warfare and the role of the pilot in it. Automation is the order of the day; multistage fail safe back up systems are incorporated in the aircraft; computers are there to carry out precise, repetitive operations in the process of data analysis. Yet the dividing line between failure and success of a mission is drawn by the man in the cockpit, a man who may not get more than one pass over an enemy target In a way he is a decision making warhead. Can he be the same personality-wise as the predecessor of his, who was flying piston engine aircraft, mostly based on visual cues? We may not be able to give a definitive answer to this question. However, an effort has been made with the following objectives in mind;

(a) To find out if there existed a qualitative or quantitative difference between the fighter and transport pilots in terms of personality factors.

(b) To draw up an objective profile of a modern day IAF Pilot.

(c) To compare the EEG findings of some of the pilots with selected personality variables.

The findings would be of help in supplementing the existing selection criteria.

Method and Material

One hundred seven highly rated transport and fighter pilots, taken from different squadrons of IAF constituted the sample of this study. The sample was representative of the highest 30% (capability wise) of the pilot population of IAF. The criterion rating was provided by the respective squadron commanders. Along with the selected sample a number of other pilots also were included in the study, although the data obtained from them were not included in the study.

The selected sample was administered a large number of personality and aptitude tests. Most of the aptitude tests were indigenous and were constructed at the Institute of Aviation Medicine, Bangalore. However, the combined aptitude and personality studies are reported eleswhere[10]. Among the objective personality tests, 16 PF test[9] was also included. This study is mainly based on the 16 PF findings.

16 PF Test

The Form C of the test[9] was used for the study. The test consisted of 105 questions and the items were multiple choice. The subject was to choose one of the answers from the three choices and mark accordingly in the answer sheet. Each subject was instructed not to leave any question unanswered. If any language difficulty was there, it was attended to. The raw score obtained were converted into a normalised standard score using the norms supplied by the test makers[10].

The 16 PF test is a multi dimensional set of sixteen questionnaire scales arranged in omnibus form[13]. It is comprehensive in coverage and gives information regarding a man's standing in 16 primary factors and 4 second order factors. On obtaining the standard score, a man's relative standing in each of the factors is expressed in a profile[9].

In addition to the 16 primary and 4 second order factors, there is an important score in this test, i.e. Motivation Distortion (MD) Score. A high MD score is indicative of lesser reliability of the individual score. Further, EEGs of a selected number of subjects were recorded in order to find out if alpha index was in any way related to personality variables as results of studies in this field have so far been far from conclusive.

The reliability of the test is well known[3]. However, the validity of the application of the American General population norm to a selected Indian population was to be tested if the study had to yield any meaningful results. An earlier Indian standardisation of the test on collegemen[11] was found to be of no use in this study, hence a new study was envisaged. Tables I and II and Figures 1 and 2 show the results of this study. Fig. 1 shows the frequency polygon drawn for the frequency distribution of 16 PF primary factor scores and the theoretically fitted

Fig.-1 Scores on A to Q₄

Fig.-2 Scores on A to Q₄
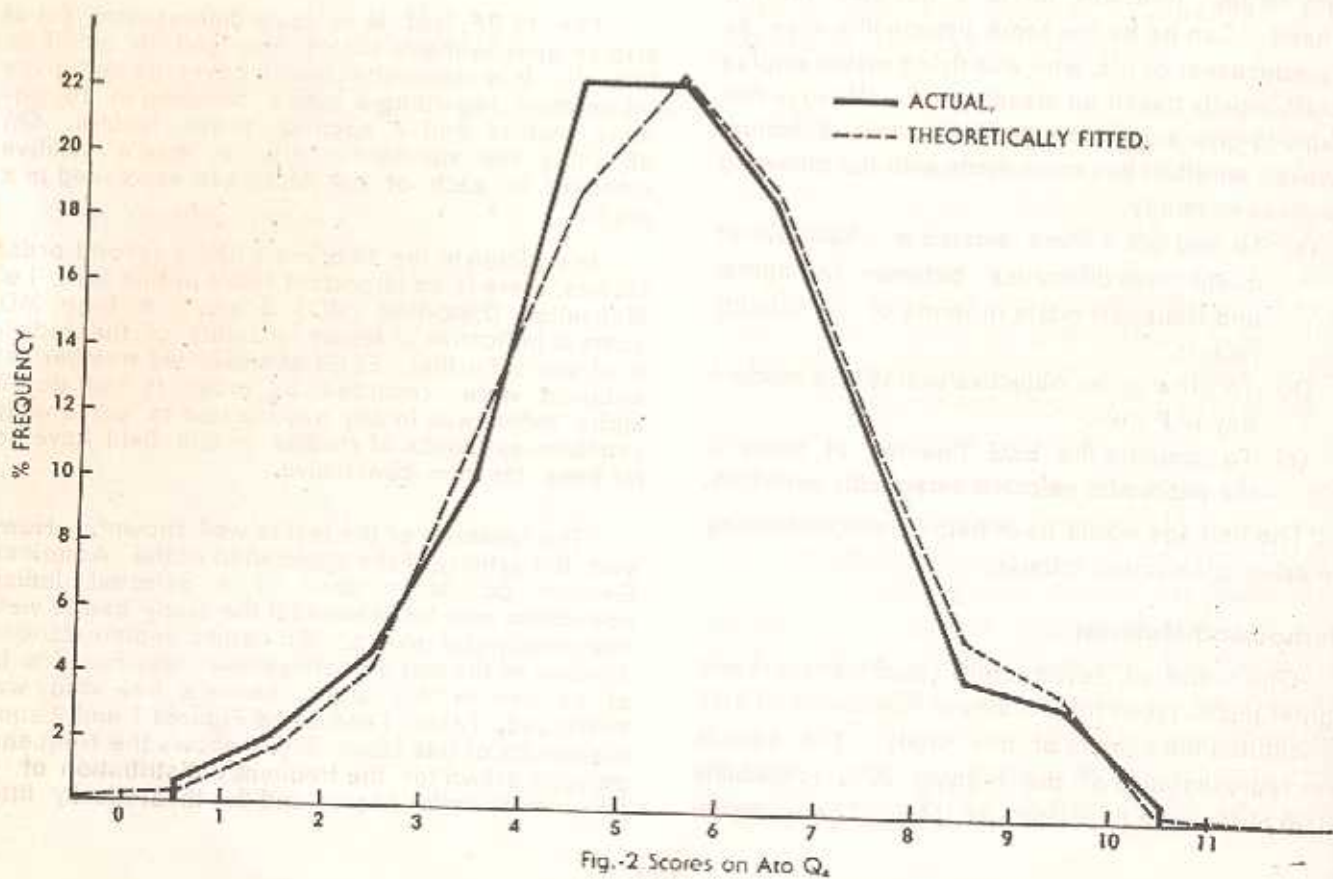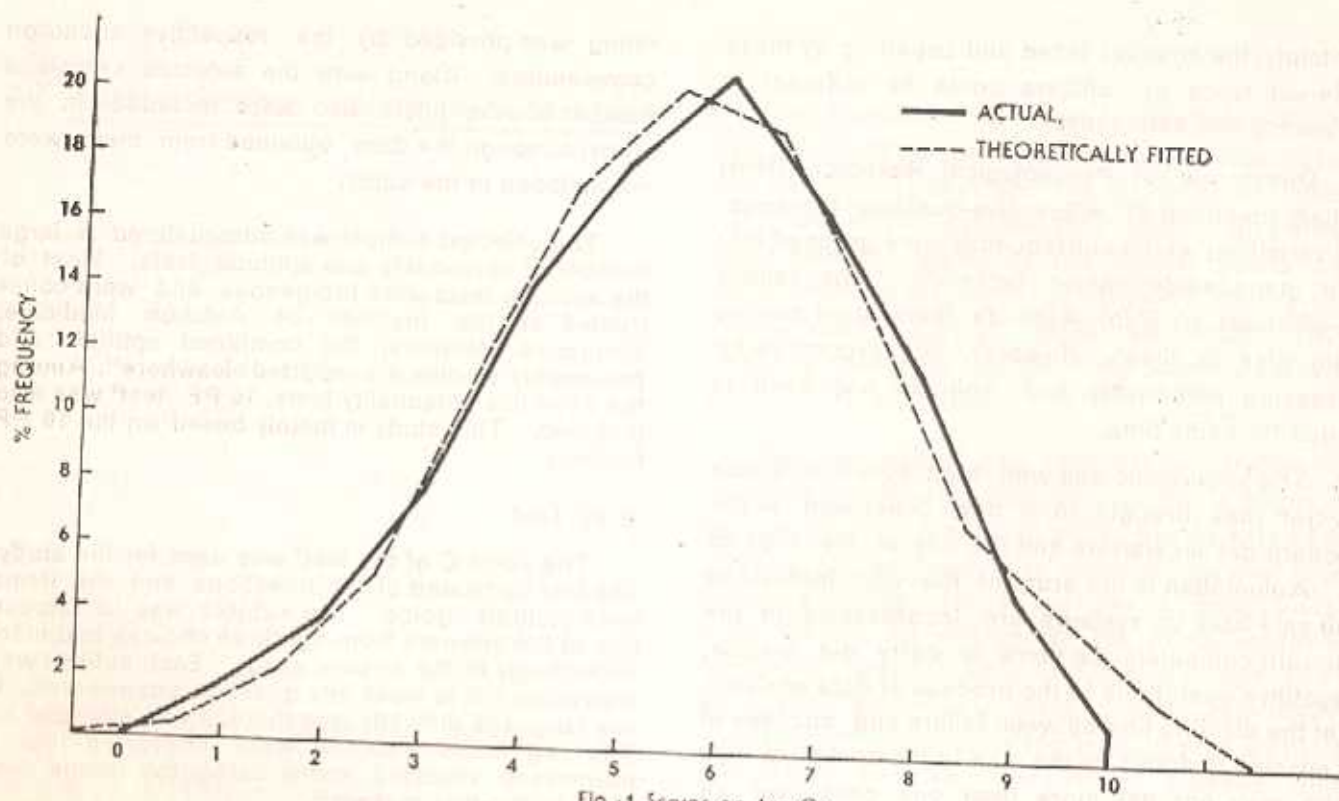
normal curve. It is evident from the graph that the actual frequencies have been almost identical with the expected normal frequencies. Figure 2 shows the actual frequency distribution and the theoretically fitted normal curve for 16 PF second order factors. Here again there is the overall impression of the measured scores following a near normal distribution except for the plateau around scores 4 and 5. It was evident from the foregoing that the American norms could safely be used for this study as well No significant cross cultural difference was noticed. Probably our pilot population might not be quiet alien to the western cultural ethos as evidenced from the score distribution pattern which was similar both for the primary and second order factors.

Table I
Actual frequencies of 16 PF scores (A to Q4) and theoretically derived normal frequencies for the Selected pilot group of subjects.

16 PF Score Interval	Actual Frequency No.	%	Theoretical Normal Frequency No.	%
0	1	0.1	2.4	0.1
0.1 — 1	29	1.7	9.2	0.6
1.1 — 2	65	3.8	33.3	2
2.1 — 3	119	6.9	88.3	5.2
3.1 — 4	244	14.2	186.4	10.9
4.1 — 5	308	18	295.7	17.3
5.1 — 6	357	20.8	349.7	20.4
6.1 — 7	289	16.9	327.5	19.1
7.1 — 8	186	10.9	229.2	13.4
8.1 — 9	92	5.4	120.5	7
9.1 — 10	22	1.3	50.1	2.9
			15.4	0.9
			4.3	0.2

Table II
Actual frequencies of 16 PF scores (I to IV) and theoretically derived normal frequencies in the selected pilot group of subjects.

16 PF Score interval	Actual Frequency No.	%	Theoretical Normal Frequency No.	%
			0.3	0.1
0 — 0.9	2	0.5	1.9	0.4
1 — 1.9	9	2.1	7.6	1.8
2 — 2.9	24	5.6	22.9	5.4
3 — 3.9	43	10.1	50.7	11.8
4 — 4.9	96	22.4	81.8	19.1
5 — 5.9	96	22.4	97.6	22.8
6 — 6.9	80	18.7	81.8	19.1
7 — 7.9	50	11.7	50.7	11.8
8 — 8.9	18	4.2	22.9	5.4
9 — 9.9	7	1.6	7.6	1.8
0 — 10.9	3	0.7	1.9	0.4
			0.3	0.1

Results

Tables III to VII and Figures 3 to 6 give the results of the study.

Table III
Mean, SD and mean differences Fighter and Transport pilots

PF	Fighter Mean	SD	Transport Mean	SD	Mean Differences
A	5.6	2.0	5.8	1.6	−0.2
B	6.9	1.8	6.0	1.9	0.9
C	6.5	1.8	6.0	1.9	0.5
E	5.5	1.8	5.1	2.0	0.4
F	4.8	1.7	4.7	2.3	0.1
G	6.1	1.6	5.8	1.7	0.3
H	5.8	2.2	5.8	2.2	0
I	5.1	1.7	5.3	1.8	−0.2
L	5.9	2.0	6.3	1.9	−0.4
M	5.0	1.9	5.1	1.7	−0.1
N	5.3	2.0	5.7	1.9	−0.4
O	5.7	2.0	5.1	1.7	0.6
Q1	5.6	1.7	5.5	1.9	0.1
Q2	6.7	1.5	6.2	1.8	0.5
Q3	5.6	1.7	6.6	1.8	0
Q4	5.6	1.6	6.1	1.7	−0.5
I	5.2	1.6	5.5	1.7	−0.4
II	5.1	1.8	5 5	2.1	−0.3
III	5.8	1.6	5 5	1.6	0.3
IV	5.7	1.7	5.4	1.8	0.3

— : Higher mean in Transport.
+ : Higher mean in Fighter.

Table IV
Mean and SD values of 16 PF Scores in the combined Group of Pilots (n = 107)

16 PF Parameters	Mean	SD
A	5.7	1.9
B	6.4	1.9
C	6.2	1.9
E	5.3	1.9
F	4.8	2.0
G	5.9	1.6
H	5.8	2.2
I	5.2	1.8
L	6.1	2.0
M	5.0	1.8
N	5.5	1.9
O	5.4	1.9
Q1	5.6	1.8
Q2	6.5	1.6
Q3	5.6	1.7
Q4	5.8	1.7
I	5.3	1.7
II	5.2	1.9
III	5.6	1.6
IV	5.5	1.8

Table III shows the mean, standard deviation and significance of mean difference between the fighter and transport groups. No statistical significance is noticed, although in absolute terms Factors B (intelligence) and C (emotional stability) show a higher loading on the fighter pilot. The same table is translated into profile form in figure 3. Transport group shows a tendency to be more suspicious of other's motivations whereas fighter group seems to be more self-sufficient.
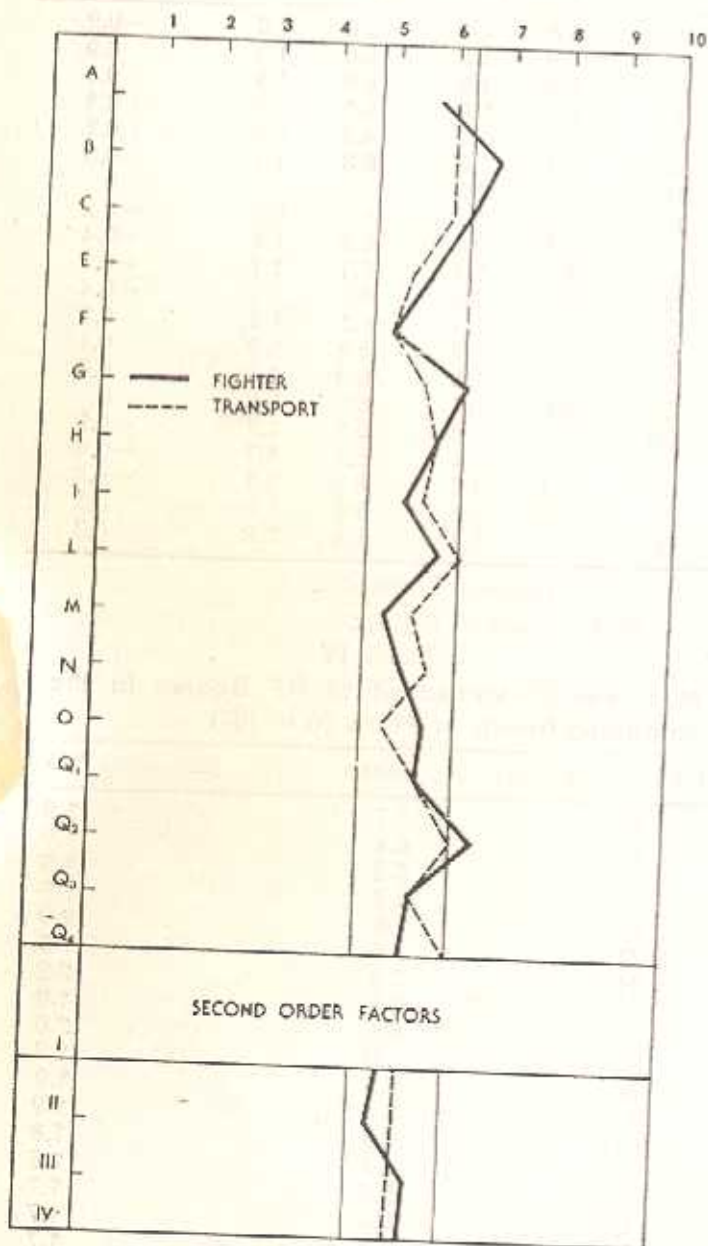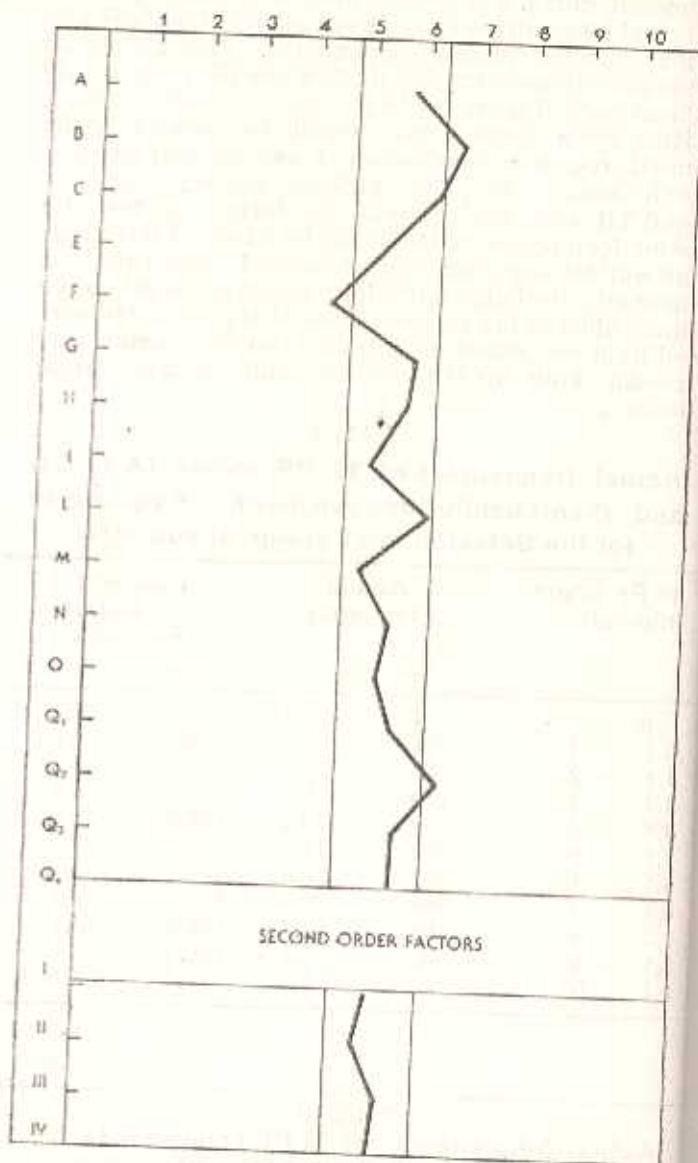

Fig. 3. FIGHTER AND TRANSPORT PROFILE

Fig. 4 IAF PILOT PROFILE

As no significant satistical difference in the personality pattern of both the groups was seen the scores were combined and the results are reflected in Table IV and Figure 4. This profile is the typical personality profile of highly rated Indian Air Force pilot. The most salient features are that he is adjusted, shows introverted tendencies, though not clearcut, and is not highly aggressive.

Discussion

From Table III and Figure 3 it is seen that there is no statistically significant difference between the fighter and transport pilot groups on any of the primary factors or second order factors. There is a marginal difference in absolute terms for two factors, viz., intelligence and emotional stability in both of which fighter group shows higher scores. However, the transport group is not below average in the factors. Transport group seem to be a little more self-opinionated compared to others. Likewise fighter group shows more self-sufficiency. However, none of the differences is significant. The probable reasons are :

(a) The initial selection criteria applied for all were the same, i.e., selection was made for pilots as a whole and no further differential selection norm was used.

(b) No universally applicable differential classification norm is known to be applied at Air Force Academy level.

(c) Both the groups were highly rated ; in two highly rated groups, where rating criteria were more or less the same, differences could be minimal.

In an unpublished study[15] it is reported that fighter pilots performed better in several aptitude tests like numerical ability, mechanical comprehension etc. These factors could have contributed to flying skill but as far as basic personality structure is concerned no difference could be noticed

Then why the apparent, overt difference in the behaviour patterns of both the groups ? More often this difference is perceptible to many as to suggest a basic difference between the two groups in personality. Environmental influence could be the reason for this difference. A fighter pilot is to project an image of a dashing, go getting, cavalier, who dares devil in the execution of his duty. He is supposed to be an extravert, outgoing and uninhibited. This social milieu of the fighter squadron, developed into an ethos over a long period of time, has to have an unmistakable impact on the young pilot inducted into a fighter squadron. He should live up to an image; in other words he is developing into what is known as a 'social stereotype'. As a matter of fact, the fighter pilot sample taken for this study does not conform to the cavalier, dashing extravert; he shows more introvert tendencies; yet he gives equal attention to external environment and internal feelings. However, it may be noted that the fighter group had lesser number of clear cut introverts as compared to the other group (Tables V and VI).

Table V
Frequency distribution of factors for the fighter pilots

16 PF Standard Score	A	B	C	E	F	G	H	I	L	M	N	O	Q1	Q2	Q3	Q4	I	II	III	IV
0																	1			1
1	1	-	1	-	2	1	1	3	-	1	1	-	2	-	-	-	1	3	1	-
2	3	1	1	3	4	-	3	1	3	4	4	3	1	-	1	2	1	5	2	2
3	5	-	1	5	8	2	4	2	3	8	7	4	3	-	4	4	8	2	3	4
4	6	4	5	9	6	5	6	12	7	11	6	11	7	4	9	6	12	16	8	12
5	13	8	4	11	11	9	14	15	11	9	18	9	12	4	12	14	13	14	16	14
6	9	14	14	8	18	15	8	10	10	11	14	7	4	19	14	15	12	6	16	10
7	8	2	13	11	4	15	5	9	8	6	7	11	24	13	8	7	7	5	6	8
8	4	15	9	8	1	5	8	2	6	3	6	6	1	6	3	4	-	3	1	3
9	6	8	6	-	1	3	2	-	5	1	2	3	1	8	4	3	-	1	2	-
10	-	3	1	-	-	-	4	1	2	1	-	1	-	1	-	-	-	-	-	1

Table VI
Frequency distribution of personality factors for the Transport Pilots

Transport Pilots (n = 52)

A	B	C	E	F	G	H	I	L	M	N	O	Q1	Q2	Q3	Q4	I	II	III	IV
-	1	-	-	-	-	-	-	-	-	-	2	1	-	-	-	2	-	1	1
-	-	-	2	7	-	1	1	1	1	-	2	1	2	1	1	1	10	-	3
1	2	-	5	2	1	4	-	3	4	4	1	7	3	1	1	7	6	8	5
4	3	2	2	8	4	5	6	3	3	7	4	7	7	11	9	10	9	14	15
7	4	9	10	7	7	7	16	2	8	7	12	5	7	9	13	11	6	10	12
8	14	10	11	6	9	4	5	9	15	7	15	10	14	12	10	10	10	9	7
12	12	7	9	10	15	5	9	12	12	11	7	14	13	10	8	7	6	7	4
11	4	13	6	5	7	15	10	8	4	8	6	5	8	6	8	2	3	3	3
8	6	6	6	5	6	6	14	14	4	12	1	1	2	8	4	2	1	-	1
1	7	3	1	1	2	4	2	2	1	-	3	-	2	5	2	-	1	-	-
-	-	1	-	1	1	1	-	1	-	-	-	-	2	-	1	-	-	-	-

In the light of the above it was prudent to draw up a combined personality profile. Table IV and figure 4 show the combined profile which is the typical highly rated IAF pilot's personality profile. The most salient features are; he is adjusted, neither a clear cut introvert or an extravert; nor is he subdued or overtly aggressive. He is above average in abstract thinking, and his stress tolerance or ego strength is higher than of the general population. He is fairly resilient and decisive. He is slightly tense, but not debilitatingly. He is more practical, sober, and dependable. This, then is the typical highly rated pilot of IAF. On many scores standard deviation is fairly high indicating a high rate of dispersion in the group. Yet for practical purposes, the summated profile will be of some utility. At selection stage one need not look an outstanding individual who is head and shoulders above average in intelligence and should have higher ego strength or stress tolerance. In facing higher intelligence will aid a proper cognitive stress, higher intelligence will aid a proper cognitive appraisal of the various stress coping strategies, and higher ego strength will take away the affective edge of the threat. Contrary to general belief he need not be an extravert; nor should he be an introvert. As is evident from the table and profile he should be a 'realist'.

Figure 5 shows a comparison of IAF pilot personality profile and the American Airline pilot profile[4]. The pattern is more or less the same except in the magnitude of the scores. One notable difference is that American pilots tend to be more extraverted compared to the IAF pilots.
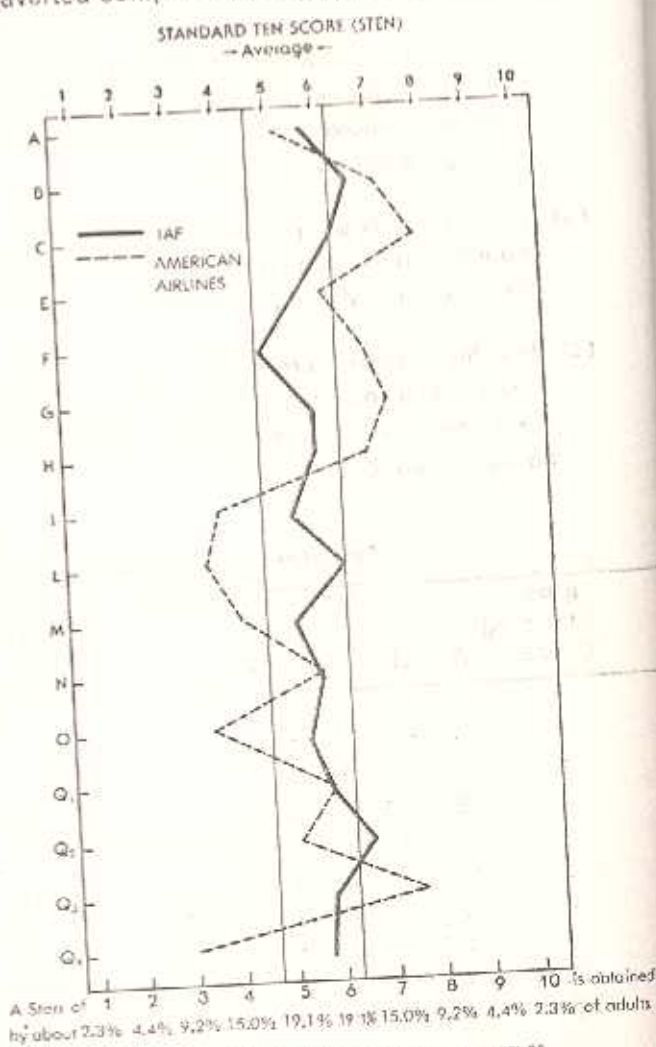

Fig. 5 IAF AND AMERICAN AIRLINE PILOT PROFILES.

Figure 6 shows a comparison between the IAF pilot profile and personality profile from the Air Traffic Control (ATC) operators of an Indian Airport[6]. The ATC population was comparatively higher in age and lower in educational qualifications. The differences in the profile pattern is self-evident.

STANDARD TEN SCORE (STEN)
→ Average ←

A Sten of 1 2 3 4 5 6 7 8 9 10 —is obtained by about 2.3% 4.4% 9.2% 15.0% 19.1% 19.1% 15.0% 9.2% 4.4% 2.3% of adults
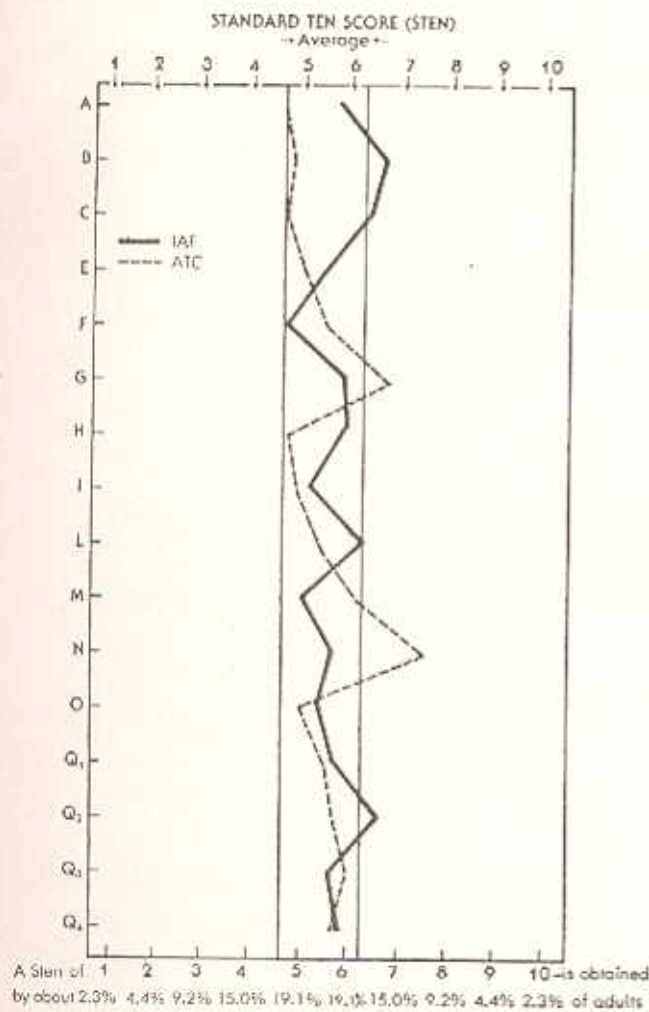
Fig. 6 IAF PILOT PROFILE AND ATC PROFILES.

The relationship between personality variables and EEG findings is shown in Table VII. Here pattern A EEG is characterised with good alpha pattern, independent of the time percentage. Pattern B EEG is characterised by either low alpha activity, EEG slowing or flat low voltage record. Class I is normal in the strictest sense. Class II is almost akin to pattern B.

Of the 20 subjects, 18 fell into AI category. No comparison of the group is possible with others due to the paucity of numbers in B II and B III. However, from the analysis of the AI category it appears that high alpha index seems to go with introvert tendencies, better adjustment, and independence although the results are not quite clear cut. Like other studies, no conclusive evidence can be drawn from these finding also.

As has been told earlier at selection stage the OLQ factors or personality variables are given an extensive look into. However, the weightage given for each factor is the same. It is understood that efforts are being made to give differential weightage to different factors. In this context the results of this study will be of some use. It may be understood that this study primarily has aimed at identifying the factors that are prominently manifested in highly rated pilots, fighter or transport. It is not suggested that this test should be used at selection stage. It is true, the motivation distortion (MD) score for this sample was within the tolerable limits, and to that extent the subjects were honest to themselves, and it may not be the same if it is used at the selection stage. It would not be out of place to mention that the subjects of this study were

Table VII

Relationship of personality variables and EEG patterns and classes

EEG Pattern and classes	n	Mean Alpha Index	Personality variables			
			I	II	III	IV
A I	18	75.5	5.0	4.8	5.3	6.3
B II and B III	2	29.3	5.9	5.2	5.2	3.3

Personality Variables :

I : Higher the score, higher the anxiety.
II : Higher the score, higher the extraversion tendencies.
III : Higher the score, higher the alert poize.
IV : Higher the score, higher the 'independence'.

given their test profiles and to them the profile was an eye opener, and each one agreed that it gave quite an insight into themselves.

Recommendations

The IAF pilot personality profile may be used as an additional information supplementing the selection criteria adopted in the AFSBs. A periodic review of the personality profiles of the Squadron pilots will be of great help to the squadron commander to 'know' his pilots better. The information may be made available to the pilots themselves also, so that it will give them a better insight into themselves. The fall-out in terms of benefits accruing from the suggested survey will be much higher than the required cost input.

References

1. Blazey W : Aircrew selection procedure in IAF. Av Med. 20 : 2, 1975.

. Cattell R B : Personality : a systematic theoretical and factual study. Mc Graw Hill 1950.

3. Cattell RB Eber HW and Tatsuokaj MM : Hand book for the 16 PF Personality Factor Questionnaire—1970.

4. Cullen JF and Yeager JC : Airline pilot's profile, cited in Ref. 3.

5. Deshmukh SP and Ramachandran N : A study of psycho-physiological factors involved in ATC at HAL Airport, Bangalore, IAM Project Report No. 114/8/80.

6. DPR Report No. 372 : Follow-up of AF officers of flying branch at job performance stage, 1980.

7. IP AT Manual for Forms A, B, C and D, 1962.

8. IP AT 16 PF Test Profile, 1963.

9. IPAT 16 PF Test Form C. 1969.

10. IPAT—norms for forms C & D Tabular supplement No 2, 1972.

11. Kapoor S D : A comparative study of 16 PF at Banares and Punjab, cited in 3.

12. PRW Note No. 3 : Qualities of an average officer, 1953.

13. PRW Note No. 139 : Multiple factor analysis of personality ratings, 1935.

14. Trites DK and Kubala AL: Characteristics of successful pilots J Av Med 28 : 34, 1957.

15. Wadhawan JM, Ramachandran N, Chandramohan V. and Rao PLN : Identification of personality and aptitudinal factors that make a successful fighter and transport pilot—its application to selection procedures. AFMRC Project 1053/78 (unpublished)