

# Aptitude Tests to Assess the Suitability of Gentlemen Cadets for Allotment of Technical Arms/Services upon Commissioning at the Indian Military Academy (IMA), Dehradun

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Science of warfare maintains that man is more important than his weapon. Today, technology is changing very rapidly and weaponry is continuously evolving. It is the age of high technology and rapid improvement of weaponry. The defence forces of all the countries are forging ahead every day with improved systems and technology.<sup>1</sup> The fit between the man and his weapon is perhaps more important today than in any other time in the history of warfare. We cannot be adhering to the old colonial procedure for allocation of human capital to handle the fast and ever-changing technology of weapons.

According to psychology, man has a vast potential of talent.<sup>2</sup> It is important to explore the best talent and upgrade.<sup>3</sup> To enable this, it is imperative to move ahead of the times, adopt the latest trends to keep ourselves abreast with the world of inventions. It has necessitated to improve first the quality of leadership with appropriate aptitude to operate proficiently under stress of time and war and swiftly evolving challenges. Allocating technical arm/

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service to gentlemen cadets upon commissioning as officers on the basis of aptitude is an innovative idea whose time had come.

## NOMENCLATURE

ACC	Army Cadet College
AR	Abstract Reasoning
BA-ACC	Bachelor of Arts graduates from Army Cadet College
BE-CIV	Bachelor of Engineering – Civil Engineering
BA-DE	Bachelor of Arts – Direct Entry
BA-NDA	Bachelor of Arts from National Defence Academy
BE-E/M	Bachelor of Engineering – Electrical and Mechanical
BE-Others	Bachelor of Engineering in other fields of study
BSc-ACC	Bachelor of Science – Army Cadet College
BSc-DE	Bachelor of Science – Direct Entry
BSc-NDA	Bachelor of Science – National Defence Academy
CAPF	Central Armed Police Forces
CDS	Chief of Defence Staff of India
COAS	Chief of Army Staff
DAT	Differential Aptitude Test
DE	Gentleman Cadets from Direct Entry
DGMT	Director General Military Training
DIPR	Defence Institute of Psychological Research
DRDO	Defence Research and Development Organisation
DS	Directing Staff
EME	Electrical and Mechanical Engineering
GC	Gentleman Cadet
IAF	Indian Air Force
IAS	Indian Administrative Service
IDF	Israel Defence Forces
IMA	Indian Military Academy
IN	Indian Navy
MR	Mechanical Reasoning
NA	Numerical Ability
NDA	National Defence Academy
SAT	Scholastic Assessment Tests
SR	Spatial Reasoning
SSB	Services Selection Board
VCOA	Vice Chief of Army Staff

## INTRODUCTION

At the Indian Military Academy<sup>4</sup> (IMA), the Gentlemen Cadets (GCs) are commissioned upon completion of training into various arms/services of the Army such as Infantry, Armored, Artillery, Signals, Engineers, EME, to name a few. Each one today has highly sophisticated equipment<sup>5</sup> to discharge its specific assigned role in war and peace. Moreover, the ethos is peculiar to each arm/service.

Presently, the allotment of arm/service is done on the basis of personal choice and merit in order of passing out of GCs from our academies. This personal choice or the subjective bias may be determined by factors such as exposure or contact with some charismatic officers of particular arm/regiment, parental affiliation, comparative chances of promotion, service conditions, etc. Those who cannot get their choice due to low merit are allotted arms/services depending upon the availability of vacancies. This may, in turn breed dissatisfaction.

This study was an attempt towards determining a scientific basis for allotment of arm/service to GCs aiming at optimum professional growth of individual and the service, efficiency in training, gainful employment, and also conservation of the national resources—human and material.

## APTITUDE – A WORD ABOUT IT

An aptitude is a component of competence to do certain type of work. Outstanding aptitude is talent. Merriam-Webster has defined 'Aptitude' in the Dictionary of Students as 'natural ability either naive or acquired. A special ability is natural aptitude'. The College Dictionary has defined it as 'capability, ability, natural or acquired, capacity for something, talent, inclination, tendency or a special fitness'. Warren, in the Dictionary of Psychology<sup>6</sup> has defined aptitude as 'condition or set of characteristics regarded as symptomatic of individual ability to acquire with training some skill or knowledge'. Freeman defines it as 'a personal ability with restricted range', whereas Traxler considers it as 'present condition indicative of the future potentialities'.

Aptitude is sounder conceptually, useful practically, predicts differentially, and predicts training level accurately. Aptitude test is an examination or survey to determine an individual's ability or propensity to succeed in a given activity. Aptitude predicts the ease and speed with which one acquires new skills and knowledge. Different careers and jobs require different patterns of aptitudes.

Furthermore, aptitude tests are linked with skills to carry out and perform the specific duties and roles being offered. Aptitude Tests<sup>7</sup> are used in pre-

employment selection process<sup>8</sup> intended primarily for technical jobs and military positions. While Scholastic Tests<sup>9</sup> (or Scholastic Assessment Tests) are achievement test and they measure capacity to retain, the aptitude tests predict one's capacity to perform or ability to learn a skill.

### RATIONAILE OF THE STUDY

When a choice is given, a person with a particular aptitude will join the profession of his/her choice. At IMA, for example, when a GC standing higher in order of merit is given his first choice and opts for Engineers, he may not be a better engineer because his choice may be determined by extraneous factors. A good soldier is not necessarily a good engineer as well. The consequences of putting a square peg into a round hole can be significantly high. Conversely, the right aptitude can significantly enhance performance.

Accurate assessment of aptitude at the time of entry becomes even more important, mistakes in overestimating potential more costly.<sup>10</sup> The inputs from aptitude tests provide better qualified selection standards.

### STUDY AREA

The authors informed the Commandant, IMA of the drawbacks and challenges of the existing system and apprised him of the possible new approaches to improve the efficiency of the young leaders of our forces that are not only efficient and scientifically sound but also evidence-based, and data-driven. Moreover, such selection procedures were being adopted by several countries<sup>11</sup> for allocation of manpower to technical arms/services to improve their fighting efficiency/ functioning in war and during peace.

After due deliberations, the Commandant gave the requisite approval to go ahead to plan, design, and implement the research study.<sup>12</sup> It was a colossal job since there were no arms/services specific aptitude tests suiting our service conditions. However, at the same time the Indian Army had to make a beginning somewhere. It was the first-ever research work on aptitude tests undertaken at IMA by an officer posted on its strength as a psychologist.

It was decided to deal first with the most decisive 'Front-runner' technical arms/services namely Engineers and EME. The Commandant had desired to include Corps of Signals also, however, Signals had to be dropped at that time due to non-availability of sufficient sample population of GCs with desired qualification at IMA.

## OBJECTIVES OF THE STUDY

The objectives of the study were two-fold:

- a. To establish the relationship<sup>13</sup> between aptitudes<sup>14</sup> and academic qualification/ achievement of professional group of engineers<sup>15</sup> amongst technical graduates who had joined IMA from various entries for commission in technical arms/services.
- b. Validate if aptitude tests can be used as dependable predictors of success for allocation of engineering graduates to Corps of Engineers and EME.

In other words, the study was designed to establish a clear correlation between the academic qualifications and aptitude of GCs opting for allotment to the Corps of Engineers and EME; and if the selected tools were the right measures for this.

## METHODOLOGY

- **Design of the study:**

In the event of non-availability of suitable aptitude tests, the authors developed a study design that segmented and re-grouped all available technical graduate GCs that had joined IMA to seek commission in technical arms/services, as the sample population. Further, four relevant aptitude tests were selected out of a battery of nine Differential Aptitude Tests<sup>16</sup> (DAT) available (refer to Table 1). Of the two factors, i.e., academic qualification and aptitude, one was controlled and we had to now match the other, i.e., the aptitude to the academic qualifications to establish a clear relationship, or the lack of it between the two. This also made the study logical and more efficient to administer.

**Table I:** Tools selected for the study

***DIFFERENTIAL APTITUDE TESTS (DAT)*** by George K. Bennett, Harold G. Seashore and Alexander G. Wessman were selected for this study.<sup>17</sup>

*The DAT is an instrument that measures a person's abilities and skills such as verbal numerical ability, abstract reasoning, mechanical reasoning, and space relations. The DAT is suitable for group administration and is the only reliable and valid test in the field. It is used with adults looking at a wide range of career and planning options, including some industrial firms.*

*DAT also means that the tests are differential, i.e., there is no overlapping. It therefore helps in clearly differentiating those being tested. The tests are performed under exam conditions and are strictly timed. All questions have a definite right or wrong answer. The questions become progressively more difficult and very few candidates usually complete the entire test. DAT has a battery of nine tests but only the relevant ones, as under were selected for the study:*

**a. Mechanical Reasoning Test (MR)<sup>18</sup>:** *This determines the mechanical aptitude, i.e., it measures the ability to understand basic mechanical principles of machinery, tools, and motion. Each item consists of a pictorially presented mechanical situation and a simply worded question. Items require reasoning rather than special knowledge.*

*Those who do well in this test find it easy to learn how to repair and operate complex devices. Occupations such as mechanic, engineering, electrician, and machine operator are among those that require good mechanical reasoning.*

**b. Numerical Ability Test (NA)<sup>19</sup>:** *It determines the numerical ability or measures the ability of the subject to perform mathematical reasoning. In order to ensure that, reasoning, rather than a computational facility is stressed.*

*Numerical reasoning is important for success in courses such as accounting, actuary, economics, engineering, trades such as electrician, and carpentry as well as banking, insurance, computing, and surveying. Those with high numerical reasoning will enjoy using numerical/statistical data and use these creatively and accurately.*

**c. Abstract Reasoning Test (AR)<sup>20</sup>:** *This a non-verbal test of intelligence and it purports to determine the abstract reasoning that is a measure of an individual's logical, analytical, and conceptual skills. It assesses how well individuals can reason geometric shapes or design. Each test item is a geometric series in which the elements change according to a given rule. The subject is asked to infer the rule/s that are operating and predict next step in the series.*

*This skill is important in occupations that require the ability to see relationships among objects in terms of their size, shape, position, and quantities, and where the ability to analyse dynamic changes and project them forward in time. Examples include computer programming, architecture, and mechanics, as well as law, medicine and economics.*

**d. Space Reasoning Test (SR)<sup>21</sup>:** *It is also a non-verbal test and measures intelligence. It, however requires no analysis or reasoning and is purely a reflection of how a person manipulates mental images.*

This test measures the ability to visualise a three-dimensional object from a two-dimensional pattern and to visualise how this object would look if rotated in space. Each problem shows one pattern, followed by four three-dimensional figures. The subject is required to choose the one figure that can be made from the pattern.

Occupations in which an individual is required to imagine how an object would look if made from a given pattern include architecture, commercial design, civil and mechanical engineering, medicine, physiotherapy, and dentistry.

*The last two tests were relevant to establish validity of the study and also in aligning with other available standard resources.*

- **Sample population:**

The next step was to group the sample population of 211 Technical Graduate GCs into three distinct groups, as below:

a. **Criterion Group:** Bachelor of Engineering—Electrical/Mechanical (BE-E/M) and Bachelor of Engineering—Civil (BE-CIV) were fully qualified in their respective fields. Now we had only to establish their aptitude with the help of DAT and this would establish its relationship with their academic qualifications. This group was therefore labelled as the ‘Criterion Group’ and comprised of technical graduates with academic achievement of BE-E/M and BE-CIV.

This group consisted of Type 1 and 2 (refer to Table 2) and were kept as a distinct and exclusive group to observe if there existed any direct correlation.

b. **Confirmatory Group:** This group, BE-Others consisted of Bachelor of Engineering— Other than BE-E/M and BE-CIV, such as BE-Telecom, MSc-Physics, etc. They did not have specific academic achievement of electrical, mechanical or civil engineering. We hypothesised that this group will not show any definite correlation between academic qualifications and aptitude. This group was therefore labelled as ‘Confirmatory Group’ and comprised of technical graduates: BE-Others and BA (Bachelor of Arts) from all different entries (BA-ACC, BA-NDA & BA-DE). This consisted of Type 3, 4, 5 and 6.

c. **Observation Group:** This group comprised of GCs with BSc (Bachelor of Science) as their academic qualification. With this group, we purposely

kept the possibility open for any new relationship that might emerge between these science graduates and their aptitude under observation. The name of this group was therefore ‘Observation Group’ to observe the behaviour of the tests on them and comprised of Type 7, 8, and 9.

**Why were these three groups formed?** The first group (Criterion Group) was expected to confirm a relationship between academic qualification and aptitude; the Confirmatory Group was intended to confirm the non-existence of any relationship; while the third group (Observation Group) was intended to keep the doors open to any possibility of a relationship to emerge.

**Table 2** Grouping criteria of sample population based on academic achievement

S. NO.	ACADEMIC QUALIFICATION	SAMPLE SIZE	GROUPING CRITERIA
1.	BE-E/M	19	CRITERION GROUP
2.	BE-CIV	39	
3.	BE-Others	16	
4.	BA-ACC	08	CONFIRMATORY GROUP
5.	BA-NDA	17	
6.	BA-DE	17	
7.	BSc-ACC	08	OBSERVATION GROUP
8.	BSc-NDA	43	
9.	BSc-DE	44	
TOTAL		211 GCs across three distinct groups	

• **Administration of the test:**

Date & time: 11–13 November 1987 Time: Afternoon session Place: Examination Hall, IMA

Supervision: Directing Staff (DS) from battalions and academic staff

**KEY RESULTS, INTERPRETATION AND DISCUSSION**

In a nutshell, the following were the topline results of the study:

- Criterion Group confirmed the relationship of respective academic qualification with aptitude for both BE-E/M and BE-CIV. This means that from amongst all groups tested, BE-E/M demonstrated better aptitude for EME while BE-CIV had better aptitude for Corps of Engineers.

- Confirmatory Group showed the absence of any relationship between academic qualification and aptitude under study. This means that BE-Others and BA graduates had no aptitude for either Mechanical/Electrical or Civil Engineering roles.
- Observation Group showed no relationship whatsoever of academic qualification and aptitude under study. This means there was no aptitude shown even by science graduates for Mechanical/Electrical or Civil Engineering roles.

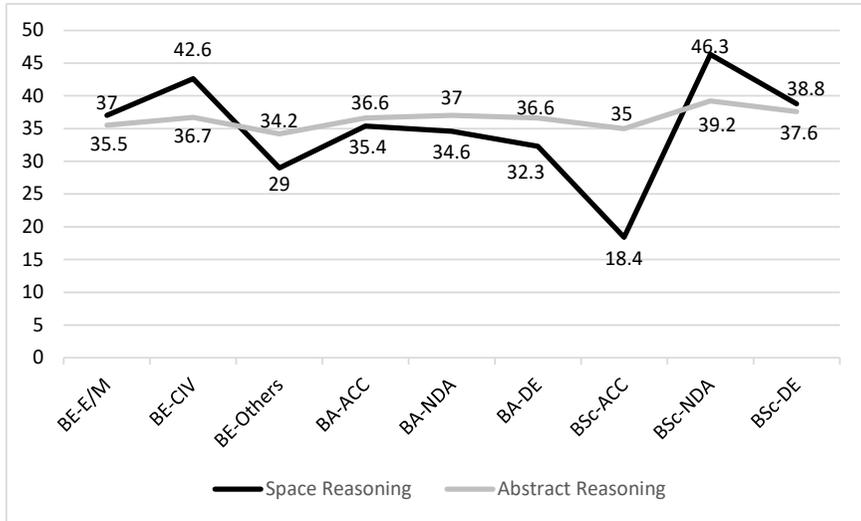
The following section provides a more in-depth analysis of the correlation between academic qualifications of various groups on basis of the four individual tests:

- Numeric Aptitude (NA) and Mechanical Aptitude (MA):** Table 3 indicates Rank Position and Mean Raw Scores. In the test results of NA and MR, a positive correlation between BE-E/M and BE-CIV of the Criterion Group is clearly indicated. Further, we see that BE-E/M showed better results in MR and BE-CIV showed better results in NA. The Numerical Aptitude and Mechanical Aptitude test results for BE-E/M and BE-CIV are thus differentiated clearly. This is because of the differential characteristic of the DAT selected.

**Table 3** Rank position and Mean Raw Scores

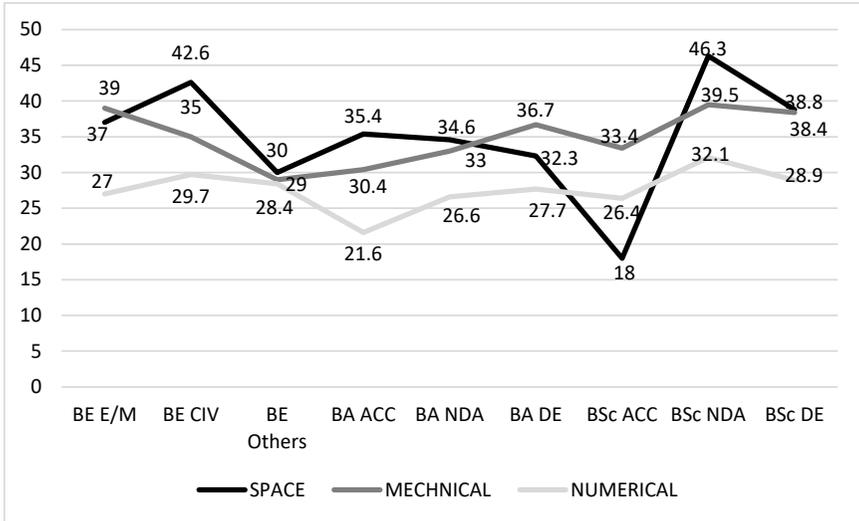
S. No.	DESCRIPTION	SAMPLE SIZE	Mean Raw Score				Rank Position on basis of Score			
			SR	AR	NA	MR	SR	AR	NA	MR
1.	BE-E/M	19	37	35.5	27	39	4	7	5	2
2.	BE-CIV	39	42.5	36.7	29.7	35	2	4	2	5
3.	BE-Others	16	29	34.2	28.4	30	8	9	4	9
4.	<u>BA-ACC</u>	8	35.4	36.6	21.6	30.4	5	5.5	9	8
5.	BA-NDA	17	34.6	37	26.6	33	6	3	7	7
6.	BA-DE	17	32.3	36.6	26.7	36.7	7	5.5	6	4
7.	BSc-ACC	8	18.4	35	26.4	33.4	9	8	8	6
8.	BSc-NDA	43	46.3	39.2	32.1	39.5	1	1	1	1
9.	BSc-DE	44	38.8	37.6	28.9	38.4	3	2	3	3

- b. **Abstract Reasoning (AR) and Space Reasoning (SR):** These tests measure general intelligence and all groups responded in an almost similar pattern. The range of scores amongst the three groups for AR is 34.2 to 39.2, which is a narrow band and confirms to the expectation because the entire sample of GCs had previously been screened through Services Selection Boards (SSB) by adopting a uniform selection criterion. The lack of fluctuation further confirms the validity of the test and its administration. Further, the correlation (Pearson Rank Method<sup>22</sup>) between SR and AR is +.77 and this confirms validity of SR with respect to AR (Figure 1).



**Figure 1** Abstract and Space Reasoning Tests

- c. **Numeric Ability (NA), Mechanical Reasoning (MR) and Space Reasoning (SR) Tests:** As seen in Figure 2, the trend of the graph of MR and NA are identical except in case of BE-E/M and BE-CIV that show forward and downward, indicating quite an opposite trend. This test shows the differential characteristic because of difference in academic backgrounds and qualifications.



**Figure 2** Numerical & Mechanical Abilities and Space Reasoning Tests

d. **Validation of Study Hypothesis:** BE-E/M have shown themselves high up in MR whereas BE-CIV are low (Table 3). Similarly, BE-CIV are high up in NR and SR whereas BE-E/M are low. There is a clear positive relationship emerging between academic qualification and aptitude that confirms the study hypothesis.

**Table 3** Positive relationship between academic achievement and aptitude of GCs in sample group

	Academic Qualification	Technical Graduate Engineers	Aptitude
a.	BE-E/M	EME (Corps of Electrical & Mechanical Engineering)	MR Aptitude
b.	BE-CIV	Engineers (Corps of Engineers)	NA Aptitude + SR Aptitude

### CONCLUSIONS

From the study of individual test on various groups, the following key conclusions emerged:

1. The total sample population of GCs at IMA is of homogenous general intelligence as they have all been screened and selected through Service Selection Boards (SSB).

2. BE-E/M graduates performed better than BE-CIV in Mechanical Aptitude Test indicating a better aptitude for EME.
3. BE-CIV were better than BE-E/M in Numerical Aptitude Test & Space Reasoning Test thereby indicating their better suitability for Corps of Engineers.
4. BE-Others, BAs and BScs were lower in score than BE-CIV and BE-E/M in all the four tests which means they lacked any specific aptitude for EME or Corps of Engineers.

The study thus clearly established a positive relationship between academic qualification and particular aptitude of the specialised groups of engineers opting for arms/services (Engineers and EME). It is presumed that its reverse will also hold good and serve as a predictor.

Lastly, the selected aptitude tests were found to be dependable predictors of success and a reliable tool for scientifically assessing suitability of GCs (technical graduates) for allotment to Corps of Engineers and EME. They are also easy to administer, scalable, and help in eliminating potential biases attributable to extraneous factors.

### RELEVANCE OF THE STUDY

As we can see from the ongoing Russia–Ukraine war, the methods of warfare are changing. Today is the age of high technology and rapid improvement and sophistication of weaponry. Future wars will not be fought by only holding on to the ground. Drones and futuristic weapon systems powered by Artificial Intelligence and other emerging technologies are changing the very complexion of the battlefield. Many powerful armies of the world are realising this and are working on new approaches, strategies and doctrines.

Currently, the 1.2 million strong Indian Army is in the direction of correcting its tooth-to-tail ratio. In the military, the T3R ratio is the ratio of combat units (infantry and mechanized forces) and support services (logistics, maintenance, medical). While the army is moving to reduce its support personnel, it could do even better to further optimise human resources by allocating arms/services based on aptitude.

Given this scenario, the study has far-reaching applications and implications, specifically to the army and military services to align human resource to specific tasks/responsibilities to optimise output and human achievement and satisfaction. A notable example is that of the Israel Defense Forces (IDF) that changed its classification system in 1953

upon appointment of Moshe Dayan<sup>23</sup> as its Chief of Staff. Before that, the better educated youngsters found their way to staff jobs, while others were allocated to field units where service conditions were tougher. IDF commenced the use of psychological tests to determine aptitude for various roles and fighting units began receiving the cream of every new crop, thereby optimising Israel's limited human resources.

The concept and approach of aptitude tests is equally applicable to all the three services and can help bolster the offensive acumen of the front-runner technical Indian forces.

Aptitude tests are vital for organisations in the civil sector as well, for selection of human resources for recruitment in various technical verticals and to optimise the hiring process.<sup>24</sup> Human resources can give a competitive edge to any organisation and this is a multipurpose tool in the hands of human resource and administration department that is easy to administer and implement. Aptitude Tests can also be useful for screening and counselling for admission in engineering colleges to avoid misfit students.

In India's current quest for self-reliance, these aptitude tests can be useful for deep selection and promotions for jobs such as for defence production under 'Make in India'<sup>25</sup> and '*Atmanirbhar Bharat Abhiyan*',<sup>26</sup> and help establish the defence production hub in India.

Going forward, this research study gives direction to other scholars to test, design and devise suitable aptitude tests for other arms/services of the army and for the Indian Air Force (IAF), the Indian Navy (IN) and also our CAPFs.

Scholars must envision and work towards expanding this study to test and devise aptitude tests for all arms/services. It is hoped that the Indian Armed Forces will one day be proud to have a well-defined, structured, and established scientific procedure for allocation of all officers commissioning from its Military Academies.

### WAY FORWARD

In June 2019, Gen Bipin Rawat, COAS (later CDS) invited the authors to his office in South Block, New Delhi to understand and discuss the study. He evinced keen interest and promised to take the initiative forward by including all arms and services of the Indian Army. With his unfortunate and untimely demise, this initiative lost a true champion.

Considering the importance and appropriateness of aptitude tests in assessing the suitability of GCs for allotment of arms/services, the current leadership of the army and associated organisations such as DIPR/DRDO can appropriately scale-up and expand this study and take it forward. Suitable modifications can be considered, as follows:

- a. A detailed job analysis should be carried out for all arms and services in one go, so as to identify overlapping and distinct abilities required for each of the arms/services.
- b. Identification of abilities should be complemented with job analysis data besides other statistical techniques mentioned in this study.
- c. Differential Aptitude Tests (DAT) might have a limitation as they might not cover specific aptitudes for different arms/services.
- d. Development of Aptitude Tests should follow the scientific steps of psychometric testing.

Although this study was initially conducted more than three decades back and has received recognition of the military leadership and scientific community, this initiative now needs to be fast-tracked to ensure a scientific basis of allotment of arms/services to officers of the Indian Army.

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## NOTES

1. Zeev Schiff, *A History of the Israeli Army 1874 to the Present*, Sidgwick & Jackson, London, available at <https://www.abebooks.com/History-Israeli-Army-1874-Present-Zeev/19341216993/b>, accessed on 6 June 2023.
2. Assessment of Human Characteristics - E. Kelly Lewell, Basic Concepts in Psychology Series. Brooks-Cole Publishing Co., Belmont, California (1968) <https://www.amazon.com/Assessment-Human-Characteristics-Concepts-Psychol/dp/0818589000>, accessed on 6 June 2023.
3. M. Komarovskiy, *Quotes in Anastasi, A Differential Psychology*, New York, MacMillan, 1958, available at <https://journals.sagepub.com/doi/abs/10.1177/001316445901900431>, accessed on 6 June 2023.
4. Indian Military Academy, Dehradun, India, available at [https://en.wikipedia.org/wiki/Indian\\_Military\\_Academy](https://en.wikipedia.org/wiki/Indian_Military_Academy), accessed on 6 June 2023.
5. Lt Gen Harbaksh Singh VtC, Manpower Vs. Sophistication, USI Journal, April–June 1988, available at <https://usiofindia.org/publication/usi-journal/manpower-versus-sophistication/>, accessed on 19 July 2021; and ‘IndoPak War 1965: Man Vs machine’, available at <https://www.financialexpress.com/business/defence-indo-pak-war1965-man-vs-machine-2760051/>, accessed on 6 June 2023.
6. Howard C. Warren, Dictionary of Psychology, 1935, available at <https://www.goodreads.com/book/show/40831086-dictionary-of-psychology>, accessed on 6 June 2023.
7. Aptitude Assessment Test, available at <https://psychometric-success.com/content/aptitude-tests/test-types/aptitude-tests>, accessed on 6 June 2023.
8. EL Tolbert, *An Introduction to Guidance*, Little Brown & Coy, Boston, Toronto, available at <https://www.worldcat.org/title/introduction-to-guidance/oclc/898303958?referer=di&ht=edition>, accessed on 6 June 2023.
9. Scholastic Assessment Test, available at <https://www.encyclopedia.com/medicine/encyclopedias-almanacs-transcripts-and-maps/scholastic-assessment-test>, accessed on 6 June 2023.
10. An improved differential army classification system, Technical Research Report 1177, Milton H. Maier and Edmund F. Fuchs, U.S. Army Behavior and Systems Research Laboratory, available at <https://apps.dtic.mil/sti/pdfs/AD0748802.pdf>, accessed on 6 June 2023.
11. Michael B. Oren, *Six Days of War: June 1967 and the Making of the Modern Middle East*, OUP, 2002, available at <https://cmc.marmot.org/Record/.b20763827>, accessed on 6 June 2023.
12. Minutes of the 57th I/88 meeting of the Army Cadet College, Academic Committee (JNU) held on 2 February 1988 in the Chetwode Building, IMA, Dehradun.
13. Frank J. McGuigan, *Experimental Psychology - A Methodological Approach*, Prentice Hall of India, New Delhi, 1969, available at <http://196.204.161.168/en/OPAC/Home/RecordDetails?bibid=773891>, accessed on 6 June 2023.

14. George K. Bennett, Harold G. Seashore, and Alexander G. Wesman, *The Differential Aptitude Tests: Manual, 3rd Edition*, New York, The Psychological Corpn, available at <https://psycnet.apa.org/record/2005-13615-002>, accessed on 6 June 2023.
15. Michael M. Omize, 'The DAT as a predictor of success in a High School of Engineering program', *Educational & Psychological Measurement*, available at <https://journals.sagepub.com/doi/abs/10.1177/001316448004000132>, accessed on 6 June 2023.
16. George K. Bennett, Harold G. Seashore, and Alexander G. Wesman, *Manual for the Differential Aptitude Tests – 3rd Edition*, New York, The Psychological Corpn, available at <https://psycnet.apa.org/record/2005-13615-002>, accessed on 6 June 2023.
17. HE Garrett, *Statistics in Psychology & Education*, Vakils Feffer & Siemens, Ltd., Mumbai, available at <https://www.amazon.in/Statistics-Psychology-Education-Henry-Garrett/dp/818925300X>, accessed on 6 June 2023.
18. Mechanical Reasoning Test, available at <https://psychometric-success.com/content/aptitude-tests/test-types/mechanical-reasoning>, accessed on 6 June 2023.
19. Numerical Ability Tests, available at <https://psychometric-success.com/content/aptitude-tests/test-types/numerical-reasoning#what-is-a-numerical-aptitude-test>, accessed on 6 June 2023.
20. Abstract Reasoning Tests, available at <https://psychometric-success.com/content/aptitude-tests/test-types/free-practice-abstract-reasoning-tests>, accessed on 6 June 2023.
21. Spatial Reasoning Tests, available at <https://psychometric-success.com/content/aptitude-tests/test-types/practice-spatial-ability-tests>, accessed on 6 June 2023.
22. Pearson Rank Method, available at <https://archive.org/details/statisticsinpsyc00henr>, accessed on 6 June 2023.
23. Moshe Dayan, Encyclopaedia Britannica, available at <https://www.britannica.com/biography/Moshe-Dayan>, accessed on 6 June 2023.
24. SC Mittal, Chairman Staff Selection Commission: Workshop on Interviewing Skills, *Employment News*, 10 September 1988.
25. Make in India, available at <https://www.makeinindia.com>, accessed on 6 June 2023.
26. *Atmanirbhar Bharat Abhiyan*, Self-Reliant India Campaign, available at <https://www.investindia.gov.in/atmanirbhar-bharat-abhiyaan>, accessed on 6 June 2023.