

VALIDATION OF THE BRITISH ARMY RECRUIT BATTERY (BARB) AGAINST PHASE 2 MILITARY TRAINING

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1. Background

The British Army Recruit Battery (BARB) is one of the main selection tools for entry into the British Army. BARB is an item-generated, general-ability test which is delivered and scored by computer. The composite score derived from the scores on the BARB sub-tests is called the General Trainability Index (GTI). BARB has been in use since July 1992. In 1995, DERA Centre for Human Sciences was tasked by the Directorate of Army Recruiting (DAR) to validate BARB against Phase 1 military training. For most soldiers, British Army training is broken down into two stages. The first stage, Phase 1 training, is common to all recruits and lasts for ten weeks. There is an emphasis on physical fitness and learning basic soldiering skills. It is during Phase I training that recruits begin the transition from civilian to soldier.

2. Phase 1 Training

Holroyd, Atherton & Wright (1995) found a correlation of .26 ($p < .01$) between BARB and overall effectiveness at Phase 1 training. Factors such as physical fitness, motivation, cultural adjustment and military compatibility are significant contributing factors to success at Phase 1 training. Phase 1 training does not place a great mental demands on recruits. This explains the moderate correlation of .26. There were, however, stronger correlations (.25 to .49) between BARB and performance in a number of written tests at Phase 1 training. Performance on these tests is more likely to be mediated by cognitive ability.

3. Phase 2 Training

Those recruits that complete Phase I training advance to Phase 2 training. This is specialised trade training within a particular arm or service. Unlike Phase 1 training, which has a common syllabus for all recruits, each Phase 2 training course differs in duration, capacity, content and performance assessment. In general, Phase 2 training is more mentally demanding than Phase 1 training and thus it was expected that there would be a higher correlation between BARB and performance at Phase 2 training than there was against Phase 1 training. In some corps, such as the Royal Engineers or Royal Signals, recruits take a common Phase 2 course and go on to specialise in a particular job at the next level of training, Phase 3.

In October, 1995, DERA Centre for Human Sciences was tasked by DAR to validate Phase 2 training against BARB. Table 1 shows the arms and services that were visited, the sample size collected, the length of training and the type of performance measures collected.

Table 1: Phase 2 training courses and performance measures collected

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Course	Duration	Sample Size	Type of Performance Measures
Royal Artillery (All courses combined)	8 weeks	381	i. Written theory test scores ii. Overall effectiveness rating
Royal Engineer Combat Engineers Class 3	11 weeks	583	i. Three written theory test scores ii. Field-based practical scores iii. Overall total scores
Infantry Combat Infantryman Course	12 weeks	699	i. 15 Performance effectiveness ratings
Royal Logistics Corps Supply Specialist	3 weeks	327	i. 5 Progress test scores ii. 2 Written theory test scores
Royal Logistics Corps Supply Controllers	3 weeks	90	i. Number of first time passes
Army Medical Services Combat Medical Technician Class 3	5 weeks	272	i. Two written theory test scores
Adjutant General's Corps Military Clerk Class 3	6 weeks	65	i. 4 Intrain Exercise scores ii. Numerical Test scores iii. Written theory test scores

4. Validation study results

The criterion data collected falls into five main categories. These are:

- a. Written theory test scores
- b. Effectiveness ratings
- c. Field based practical scores
- d. Paper based exercise scores
- e. Number of first time passes.

Table 2 shows the correlations between recruits' GTI scores and their corresponding training performance scores. All the correlation coefficients have been corrected for the effects of range restriction.

5. Written Theory Tests and BARB

In general BARB is a very good predictor of performance on written theory tests across the arms and services that participated in the study. The only exception to this is the Army Medical Services (AMS), where there is only a moderate correlation between GTI score and performance on the written tests. Recruits in Phase 2 AMS training take two written theory tests. Both papers test recall of factual information rather than applied knowledge. This may be one reason for the reduced correlation.

Table 2: Correlations between GTI scores and training performance measures

	Written Theory Test Scores	Effectiveness Ratings	Field Based Practical Scores	Paper Based Exercise Score	Number of first time passes
RA (All courses combined)	.45** (N=295)	.35** (N=368)			
RA Signals Basic Course	.56** (N=129)	.52** (N=121)			
RE	.19** to .35** (N=510).		0.15* (N--583)		
Infantry		.00 to .25** (N=699)			
RLC (Supply Specialists)	.21** to .29** (N=202)			.03 to .34** (N=157)	
RLC (Supply Controllers)					.38* (N=90)
AMS	.14 to .22* (N=265)				
AGC	.42* to .65** (N=65)			.01 to .24 (N=65)	

*p<.05, ** p<.01

6. Effectiveness Ratings and BARB

There is a strong correlation between GTI score and the effectiveness rating given to recruits training in the Royal Artillery. The correlations between GTI score and the Infantry effectiveness ratings are not as strong, ranging from .00 to .25. The Infantry have a range of performance dimensions. These can be seen in Table 3.

The Infantry performance ratings that correlate most strongly with GTI scores are maturity, common sense and weapon handling (see Table 3). Both common sense and maturity could be expected to have a relationship with general intelligence. The correlation between weapon handling and GTI scores could also be expected as good performance in weapon handling requires recruits to effect procedures, follow instructions and apply knowledge that has been acquired during training.

Although significant, most of the other correlations are at best moderate in size. Whilst it could be argued that the mental demands of Infantry training are less than those in other arms, and that as a consequence GTI should have less of a relationship with training success, the fact that many weaker recruits are given remedial training, may serve to mask BARB's ability to predict training success. The observed correlations may therefore underestimate the true relationship between BARB and training performance.

Table 3: Correlations between the 16 performance ratings, the underlying performance dimensions and GTI Scores

Infantry Rating Dimension	GTI Score	GTI Score (Corrected)
Team Spirit	0.09*	-
Self Confidence	0.19**	0.21**
Keeness and Attitude	0.08*	-
Discipline	0.02	-
Appearance and Bearing	0.11**	0.12**
Drill	0.15**	0.16**
Personal Administration	0.16**	0.17**
Weapon Handling	0.22**	0.24**
Shooting	0.10**	0.11**
Fieldcraft	0.15**	0.16**
Toughness	0.07	-
Physical Fitness	0.00	-
Maturity	0.21**	0.23**
Common Sense	0.21**	0.23**
Leadership Potential	0.16**	0.17**
Overall Rating	0.17**	0.19**
Worldliness Factor	0.23 **	0.25 **
Physical Dexterity Factor	-0.03	-

*p<.05, ** p<.01

The Infantry's performance dimensions were factor analysed and yielded two factors. The first was a "worldliness" factor. Leadership potential, common sense, maturity and self confidence loaded heavily onto this factor. The second factor was a physical dexterity factor. There was a reasonably strong relationship between GTI scores and the "worldliness" factor whilst there was effectively no relationship between GTI scores and the physical dexterity factor. Since BARB is a measure of general mental ability it would not be expected to correlate with physical fitness or toughness. This also explains why the correlations with the other performance dimensions such as team spirit and discipline are weak since achieving a good rating on these dimensions is not likely to be dependent on general intelligence.

7. Field-based practicals, Paper-based exercises and BARB

The correlations between field-based practicals, paper-based exercises and BARB range

from weak to moderate. There are a number of explanations for this. Firstly, the criterion data for field-based practicals and paper-based exercises tends to be skewed, and with a narrow range. It is often the case that a high proportion of recruits will receive the highest mark or grade on an exercise or practical. This will restrict the size of the correlation. Because practicals and exercises are used to assess competence in a particular area, it is feasible for a large number of recruits to receive a high mark or grade if they have demonstrated the required level of competence. Also, some recruits may be given additional training before taking the practical/exercises. This cannot be accounted for in the data. Secondly, some practicals, for example those taken by Class 3 Combat Engineers, do not just rely on intelligence but also manual dexterity, which BARB would not be expected to predict.

However, the correlations between BARB and field based practicals remain a little disappointing, when considering previous validation studies involving field-based assessments. Collis (1993) investigated the validity of the ABC Tests (a paper-and-pencil analogue of BARB) against performance scores from various Royal Navy training courses. Collis found strong correlations between ABC test scores and Royal Marine field-based assessments (see Table 4). These results suggest that the paper-and-pencil analogue of BARB, the ABC Tests, can effectively predict performance in field-based exercises. This may, in part, be due to improved criterion measures.

Table 4: Correlations between ABC Test scores and Royal Marine field assessments (N=165)

Criterion	ABC Tests
Exercises	.54
Field Firing	.46
Weapons	.41

8. Conclusions

Overall, BARB was found to be a good predictor of performance on Phase 2 written tests and of effectiveness ratings given to recruits during training. BARB did not predict the performance on practicals/exercises as well as it predicted performance on written tests. BARB was also found to be a stronger predictor of performance against Phase 2 training than Phase 1 training.

Since validating a selection test should be an ongoing process, DERA (CHS) are continuing to collect data from the Phase 2 training courses that participated in this study as well as expanding the range of Phase 2 training courses. The overall sample size has nearly tripled since the 1995 study. All selection and training information is now held on a database at DERA (CHS). This information will be useful for a variety of studies.

Future work relating to BARB is listed below:

- a. Validation of the BARB sub-tests against Phase 2 training.

- b. Examination of the fairness of BARB on the basis of sex and ethnicity.
- c. Development of a profiling system for selection that combines BARB scores, academic qualifications, personal qualities assessment profile (PQAP) scores, physical fitness standards and biographical information.

9. References

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 [Back to Table of Contents](#)

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