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VALIDATION AND ITEM SELECTION FOR THE ELECTRICITY AND RADIO INFORMATION TEST AT TRUAX FIELD, WISCONSIN

November 1944

I. GENERAL

Four forms each of both an Electrical Information and a Radio Information Test were developed as a part of a battery of tests intended for Reception Center use. Although an attempt was made during the construction of these tests to reduce the difficulty level so as to obtain an instrument suitable for differentiating within groups having no formal experience but differing in degree of informal experience, the tests were found, on trial, to be much too difficult for general reception center use. It was thought possible that further reduction in difficulty level could be obtained. Consequently, a single form involving both radio and electrical information was constructed. This test which was designated Electrical and Radio Information was also found to be too difficult for general Reception Center use and a validation study then in progress was discontinued. Since that time, it has been decided that information tests of this nature would be suitable and desirable for use in training centers and that the various studies relating to the information tests should be completed. The following report concerns the validation of the Electrical and Radio Information Test.

II. POPULATION

The population consists of 456 trainees in class 19 of the Radio and Repair course at the AAFTC, Truax Field, Wisconsin.

III. VARIABLES

A. From Army Records

1. AGCT standard score (form undesignated)
2. [illegible] standard score

   a.* MA Part I Army Grade
   b.* MA Part II Army Grade
   c.* MA Part III Army Grade

B. Electrical and Radio Information

Electrical and Radio Information is a test of 100 items. Electrical and radio items occur in about equal proportions. The test was constructed with an intentionally heavy weighting of functional rather than theoretical content. Diagrams and drawings were used extensively.

C. The Criteria

1. Final course grades

2.* Since a very large number of trainees whose performance in class 19 was considered marginally satisfactory were transferred to later classes, a rough estimate of the unsatisfactoriness of the trainees in this respect was obtained by assigning a value of 0 if no transfer was made and values of 1, 2 - - - - - N according to the difference between the number of the class in which he began and the number of the class in which he finally graduated.

IV. PROCEDURE

A. In the Field

Tests were administered by qualified personnel from this office.

B. In PRS

All variables were intercorrelated. The criterion (final grade) was used to divide the population into quintiles. Biserial and point biserial validities and item difficulties were also computed. For purposes of combination it was judged that the number of turnbacks were one-half as important as the final grade in computing an overall criterion. By formula for correlation of sums of standard scores, the correlation of the tests with a criterion weighted in this manner were computed.

* These variables are negative in that a low value indicates a high degree of possession of the ability or performance measured. In reporting results, however, all coefficients will be reported as positive, indicating what would be obtained if a high score were indicative of high ability.

V. RESULTS

The means, SD's and intercorrelations are presented as Table I.

TABLE I

MEANS, SD'S AND INTERCORRELATIONS OF THE LISTED VARIABLES IN 456 TRAINEES OF CLASS 19 OF THE RADIO AND REPAIR COURSE RAFTC, TUCAX FIELD, WISCONSIN

	1	2	3	4	5	6	7	8	9	10
Mean	39.9	11.8	114.1	116.4	2.1	2.3	2.3	.338	1.7	——
SD	16.8	1.4	11.7	14.1	.74	.81	.81	.37	2.6	——
1. Electrical & Radio Information		.282	.451	.537	.583	.316	.410	.604	.278	.815
2. Highest school grade completed			.393	.192	.276	.107	.159	.332	.137	.392
3. AGCT				.431	.451	.388	.370	.523	-.251	.583
4. AF Total					.668	.676	.669	.420	.274	.535
5. AM Part I						.327	.453	.432	.193	.516
6. AM Part II							.355	.377	.191	.365
7. AM Part III								.296	.193	.334
8. Final Grade									-.201	.831
9. No. of classes set back										.199
10. Final Grade plus # set backs										

The high validity of Electrical and Radio Information - especially against the combined criterion - is the most striking point of Table I. This test is the most valid predictor against any of the criteria. The negative relation between AGCT score and the number of turnbacks is interesting. This, of course, accounts for the very low AGCT validity against the combination of the two criteria. It is possible, of course, that there is direct contamination in this criterion in that AGCT may have been employed to determine whether an individual with low standing in the course would be retained or discharged from the school. If this were true this biasing factor tended to increase the correlation between AGCT and final grade since as the positive correlation between turnbacks and course grade indicates, the turnbacks tended to obtain higher final grades than the non-turnbacks.

No matter how the relationship between AGCT and turnbacks is interpreted, the low SD of AGCT (note that it is appreciably lower than that of [illegible]) indicates that AGCT would probably be considerably more valid in an unselected population. Probably its use in conjunction with a test similar to Electrical and Radio Information would be justifiable.

The item difficulties and biserial and point biserial validities are presented in Table II.

TABLE II

BISERIAL AND POINT BISERIAL ITEM VALIDITIES AND DIFFICULTIES FOR THE ELECTRICAL AND RADIO INFORMATION TEST WITHIN A POPULATION OF 456 TRAINEES OF CLASS 19 OF THE RADIO AND REPAIR COURSE AAFTC, TRUAX FIELD, WISCONSIN

Item No.	Difficulty	Validity: Biserial	Validity: Point Biserial	Item No.	Difficulty	Validity: Biserial	Validity: Point Biserial
4	.80	.19	.13	44*	.66	.44	.34
5*	.85	.41	.27	45*	.60	.46	.36
6	.89	.39	.24	46*	.79	.56	.39
7*	.94	.49	.25	47*	.87	.44	.28
8	.73	.18	.13	48	.81	.23	.16
9	.56	.15	.12	49*	.35	.38	.35
10*	.40	.40	.32	50	.42	.03	.02
11	.72	.35	.26	51*	.46	.51	.40
12	.49	.21	.17	52	.47	.16	.13
13	.31	.32	.22	53	.83	.38	.26
14	.31	.17	.13	54*	.69	.57	.43
15*	.76	.51	.37	55	.65	.14	.11
16	[illegible]	[illegible]	.15	56	.40	.21	.17
17	[illegible]	[illegible]	.43	57*	.61	.42	.33
18	.62	.50	.39	58*	.83	.44	.29
19	.75	.00	.00	59	.13	.14	.09
20	.75	-.10	-.08	60	.22	-.08	-.05
21	.64	.07	.06	61	.37	.31	.24
22	.81	.05	.03	62	.66	.37	.28
23	.60	.17	.13	63*	.64	.53	.42
24*	.47	.52	.42	64	.37	.19	.15
25	.62	.18	.15	65*	.37	.46	.36
26	.47	.18	.14	66*	.53	.55	.44
27	.62	.20	.25	67*	.65	.49	.38
28	.72	.32	.24	68	.71	.02	.02
29	.67	.47	.36	69	.28	.14	.10
30	.45	.14	.11	70	.62	.37	.29
31	.65	.24	.19	71	.28	.20	.15
32	.7	.08	.04	72*	.78	.42	.30
33	.66	.38	.30	73	.73	.23	.17
34	.72	.37	.28	74*	.44	.41	.32
35*	.83	.50	.33	75*	.58	.50	.39
36	.33	.18	.14	76	.67	.39	.30
37	.50	.16	.13	77	.67	.55	.42
38	.41	-.15	-.12	78	.48	.17	.13
39	.44	.15	.12	79*	.60	.40	.32
40	.72	.22	.17	80	.29	.30	.23
41	.53	.19	.15	81*	49	.57	.45
42	.53	.24	.19	82	.58	.36	.28
43	.64	.38	.29	83*	62	.45	.35

Item No.	Difficulty	Validity Biserial	Validity Point Biserial	Item No.	Difficulty	Validity Biserial	Validity Point Biserial
84*	.55	.48	.38	94	.29	.22	.16
85*	.42	.62	.49	95*	.46	.42	.34
86	.34	.00	.00	96	.38	.32	.25
87*	.64	.40	.31	97*	.33	.40	.31
88*	.51	.44	.35	98	.35	.18	.14
89	.58	.31	.24	99	.33	.30	.23
90*	.62	.48	.38	100	.21	.05	.03
91*	.42	.38	.30	101	.28	.11	.08
92*	.62	.42	.33	102	.15	.38	.25
93	.35	.21	.16	103	.6	-.14	-.07

* Items tentatively selected for inclusion in a final form or in further experimental forms.

VI. CONCLUSIONS

1. The Electrical and Radio Information test is highly valid in predicting success in a Radio Repair training course.

2. The proper relation of AGCT to test(s) of Electrical and/or Radio Information Test in a battery for optimal selection could not be exactly determined although a low weighting or a low critical score for AGCT seemed to be indicated.

3. Item analysis data presented suggest that the more valid items would comprise a highly valid test.

VII. RECOMMENDATIONS

1. The more valid items of the foregoing test should be integrated with those from the four Electrical Information and the four Radio Information forms in developing a further experimental test or tests for final use. More detailed recommendations will be made in the final project report.

VIII. TECHNICIANS

1. Field Work

Lt. Albert Berg

2. Preparation of Report

H. E. Brogden

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Validation and Item Selection for the Electricity and Radio Information Test at Truax Field, Wisconsin

3 July 46 × Performance Tests

× Validation

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