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ARMY PERSONNEL RESEARCH OFFICE WASHINGTON DC  
ANALYSIS AND SELECTION OF ITEMS FOR BIOCHEM AND CHEMICAL INFORM--ETC(U)  
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Research Memorandum 65-1

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**ANALYSIS AND SELECTION OF ITEMS FOR  
BIOCHEM AND CHEMICAL INFORMATION TESTS**

April 1965

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ANALYSIS AND SELECTION OF ITEMS  
FOR BIOCHEM AND CHEMICAL INFORMATION TESTS

Technical information tests have been among the most effective differential predictors in the Army Classification Battery (Helme, 1960; Helme and Fitch, 1962). As part of the effort to enhance differential prediction of MOS groups, a large pool of items was constructed to measure information in biology and chemistry (Denton, 1961). These items were tried out on general enlisted input samples and on enlisted input to Army school training courses in the chemical and medical MOS groups in order to select the most valid items of appropriate difficulty for experimental tests of operational length. This report describes results of such initial tryout.

PROCEDURES

VARIABLES

Three sets of experimental pools of 103 items each were constructed and assembled in Biochem Information Tests BC-LX (PT 3952), BC-LY (PT 3953), and BC-LZ (PT 3954). From the same pool of items--and appearing in the same booklets as well as in separate test form--a Chemical Information Test of 50 items was assembled for tryout in the entry training course (MOS 530) at the U. S. Army Chemical School. In addition, ACB scores were obtained. Final course grades were also obtained as criterion measures for each validation sample.

SAMPLES

There were three general enlisted input samples, one form of the Biochem Information Test being given to each sample. A single validation sample was administered the Chemical Information Test, while nine MOS samples in the medical field were given one form of the Biochem Test. Table 1 shows the number of cases and MOS included in each sample.

ANALYSIS

Difficulty level of each correct alternative was obtained from a general enlisted input sample. Validity coefficients (point-biserial) were obtained by correlation of item with final course grade in the Medical MOS. In the single Chemical MOS, three criteria were available: total grade on written examinations, total grade on course performance measures, and final course grade, a combination of the two. Items were selected on the basis of validity across all criteria, with the restriction that items with extreme p-values in the general input samples were excluded.

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## RESULTS AND CONCLUSIONS

From the Biochem tests, two 30-item measures were selected. Table 2 shows the difficulty levels and validity coefficients of the items selected. Table 3 gives the 20 items selected for the Chemical Information Test.

Sufficient items of appropriate difficulty and promising validity were obtained to warrant a more comprehensive tryout of two Biochem Information Tests, BC-1A and BC-1B. These tests have been included in a 14-test battery, the Army Differential MOS Battery, now being validated on about 30,000 enlisted men representing over 150 Army school courses and training programs. The Chemical Information Test is of more limited potential use, to be tried out if the other measures in the experimental battery fail to yield improved differential prediction for courses in the 53 MOS group (Chemical) and the course training men for MOS 905 (Petroleum Laboratory Specialist) and 904 (Chemical Laboratory Specialist).

Table 1

SAMPLES USED IN SELECTING ITEMS FOR BIOCHEM  
AND CHEMICAL INFORMATION TESTS

Sample	MOS	N	ITEM DATA	
OX	006 - Recruit	186	Difficulty estimates: BC-1XandCIT	
OY	↓ ↓	190	↓ ↓ BC-1Y	
OZ	↓ ↓	187	↓ ↓ BC-1Z	
1	530-Chemical Operations Helper	96	Validity estimates: CIT	
2X	910-Medical Corpsman	231	↓ ↓	
2Y	↓ ↓	233		
2Z	↓ ↓	218		
3X	911-Medical Aidman	96		
3Y	↓ ↓	88		
3Z	↓ ↓	79		
4X	{ 917-Dental Assistant	{ 51	BC-1X	
4Y		{ 931-Medical Laboratory Specialist	{ 65	BC-1Y
4Z		{ 933-Preventive Medicine Specialist	{ 46	BC-1Z
		{ 935-X-Ray Specialist	{	

Table 2

DIFFICULTY LEVEL AND VALIDITY INDICES  
OF ITEMS SELECTED FOR BIOCHEM INFORMATION TESTS

BC-A Item	Source			Validity Coefficients			BC-B Item	Source			Validity Coefficients		
	Form		P	MOS 910	MOS 911	Other MOS		Form		P	MOS 910	MOS 911	Other MOS
	Item	No						Item	No				
1	Z	4	87	16	12	60	1	Z	47	80	24	16	19
2	Y	37	73	27	30	12	2	Z	44	79	13	12	45
3	Z	101	72	18	23	26	3	X	6	71	23	23	24
4	X	24	70	21	08	41	4	Z	72	66	23	34	29
5	Z	64	65	22	21	51	5	Z	23	64	15	41	15
6	X	17	59	30	08	31	6	Z	48	60	19	32	35
7	X	34	75	10	17	35	7	Z	2	59	16	40	42
8	X	38	65	27	22	28	8	X	75	59	23	29	43
9	X	28	51	16	25	21	9	X	1	58	21	26	23
10	X	29	47	16	08	42	10	X	62	57	23	37	30
11	X	37	38	05	18	43	11	Y	30	56	28	45	29
12	X	42	55	19	07	36	12	Z	5	54	19	15	41
13	X	99	59	33	25	38	13	Z	71	53	23	40	06
14	Y	1	57	21	23	18	14	Z	73	53	22	29	39

Table 2 (continued)

BC-A Item	Validity Coefficients				BC-B Item	Validity Coefficients						
	Source		MOS 910	Other MOS		Source		MOS 910	Other MOS			
	Form	Item No	p	Form		Item No	p	Form	Item No			
15	X	46	53	25	22	56	X	86	52	25	20	42
16	X	45	52	22	25	20	X	90	52	16	17	27
17	Z	17	54	22	32	50	Z	35	52	20	45	12
18	Y	86	52	23	30	33	Z	90	52	22	29	44
19	Z	15	52	21	19	51	Y	17	51	15	27	18
20	X	12	51	22	26	22	Y	3	50	17	32	33
21	X	67	51	20	25	51	X	81	49	24	25	43
22	Z	55	50	13	31	46	Y	74	49	26	39	12
23	X	49	50	13	12	33	Y	7	48	16	24	17
24	Z	41	49	14	26	28	Y	43	47	24	39	09
25	Z	63	48	13	45	28	Z	102	46	20	18	55
26	X	41	45	23	24	34	X	103	44	10	21	25
27	X	73	44	30	41	27	Y	82	44	23	16	27
28	Y	77	43	24	23	23	X	95	56	25	34	42
29	Z	38	43	23	09	46	Y	99	41	10	22	36
30	Y	94	42	22	22	38	X	94	38	12	12	43

Table 3

DIFFICULTY LEVEL AND VALIDITY INDICES  
OF ITEMS SELECTED FOR CHEMICAL INFORMATION TEST

Item	Source CIT Item No.	Biochem		p-value		r <sub>pb</sub> (MOS 530)		Total
				MOS 006	MOS 530	Written	Performance	
	Form	Item No.						
1	8	X	10	86	90	37	40	40
2	3	Z	6	91	84	36	32	36
3	37	Y	72	80	84	42	23	40
4	21	Z	23	64	67	36	32	37
5	9	X	11	54	66	38	25	38
6	30	X	67	51	67	33	18	32
7	2	Z	5	54	57	32	21	32
8	19	Z	17	57	49	48	27	46
9	44	Z	55	50	53	31	19	31
10	26	Y	39	48	55	45	29	44
11	10	X	12	44	54	37	16	35
12	39	X	81	49	44	44	21	42
13	48	Y	92	47	43	36	27	36
14	36	Y	66	44	45	36	18	34
15	32	Z	76	35	44	43	24	41
16	5	Y	6	35	41	38	14	35
17	46	Y	89	41	34	33	20	33
18	45	Y	88	26	35	46	25	44
19	40	X	70	26	32	44	14	40
20	27	Y	40	20	35	38	18	37

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