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MILITARY MEDICINE II

THE COMBAT LOAD OF THE INFANTRY RIFLEMAN
Field Trials to Evaluate the Relative Merits
of
Fighting Order and Battle Order

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THE COMBAT LOAD OF THE INFANTRY RIFLEMAN

Field Trials to Evaluate the Relative Merits of Fighting Order and Battle Order

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INTRODUCTION

What the Infantry soldier will carry, how much, and how, are all age old problems particularly important to the foot soldier. For the most part, these questions have been answered by expediency and the experience of commanders in the field. In 1908 the presently stereotyped pattern of web equipment was adopted by the British Army, and with some slight modifications remains the prototype for current Canadian Army web equipment. With the years, however, tactical procedures and weapons have undergone revision and change. Although the arrangement of webbing known as 'Battle Order' is the officially recognized combat arrangement, Canadian troops have used initiative in overcoming some of the disadvantages of this order. The result has been the evolution of an order known as 'Fighting Order'. The major difference is the elimination of the small pack of battle order and simplification of the over-shoulder straps (straps, supporting) with the substitution of the gas cape roll which is carried attached to the waist belt at the small of the back. It is desirable and important to know the relative handicap imposed on men by these orders. The following report describes an investigation carried out during July, 1952 to obtain this information.

METHODS

Episodes in the normal tactical training programme of the infantry were used in the evaluation. An attempt was made in this study to assess both orders with particular reference to mobility, stability and freedom of action of the infantryman. An infantry platoon consisting of 32 men exclusive of officers and non-commissioned officers was assigned for the study. The group was composed of officer candidates undergoing their second

summer training period. At the time of the exercises, this group had been currently in training for a period of two months.

For the purpose of the trials, the group of 32 men was divided into two groups of 16, the assignment being made at random with the aid of random sampling numbers. The main purpose of the groups was to introduce the spirit of competition. All men, however, performed the required exercises with both battle order and fighting order, and each man, therefore, could be used in a comparison of his own performance in both orders. This modification of the statistical method (such that comparisons are drawn from the differences in performance of the same individual) reduces the experimental error, and is known as Student's method. Its use permits economy in the number of subjects and time expended for the amount of information obtained. The statistical significance of the mean differences for each procedure as carried out by this method was also estimated.

FIELD MANOEUVRES - OBSERVATIONS AND RESULTS

Sprinting

Mobility was evaluated in terms of the speed with which the men could sprint distances of 25, 50, and 100 yards (Table II). These sprints were run on two consecutive days. Time was measured to the nearest tenth of a second. The results are given in Table I. An analysis of these results reveals a highly significant difference between battle and fighting order in time required to travel these distances on foot. This difference indicates the superiority of fighting order. A further point, however, was revealed in the series of personal interviews. The men pointed out that in battle

order 100 yards at top speed was the limit of their endurance. They felt that it would have been impossible to continue at top speed had the distance been extended farther. In fighting order, however, the men expressed the view that after 100 yards they still had an adequate reserve of strength. This result can be applied directly to the tactical procedure known as Fire and Movement. Under these circumstances, troops are required to move forward in bounds between successive firing positions under covering fire. During each bound forward, the men are exposed to enemy fire. To the men involved, fractions of a second assume real importance, and might in fact spell the difference between remaining operative or becoming a casualty.



Fig. 1. BATTLE ORDER. Note particularly complete disarrangement of equipment resulting from falling. Pick and helmet positions incapacitate the infantryman.

Jumping

Special ramps of 3,4,5, and 6 feet heights were constructed and the men were required to jump from each height in both orders (Table III). The type of landing made by each man was rated arbitrarily in terms of whether the subject completed the jump successfully, went down on one hand or knee, fell on both knees, or fell on all fours or prone.

In this exercise the necessarily arbitrary method of assessing performance failed to indicate any significant difference between the two orders (Table II). However, as illustrated in Fig. 1, the method of securing the pick or shovel in battle order is hazardous. As the soldier hits the ground in the prone position every thing on his back, including the pick, tends to move forward. In the actual instance photographed, the pick has barely failed to deliver a knockout blow to the back of the head, while vision has been obscured by the displaced helmet.

Assault Course

The group went through an assault course in which an effort was made to evaluate each individual's performance over a series of selected obstacles as well as noting his overall time for the complete course (Table IV).

Nine obstacles in the assault course were selected, two others being eliminated after the following pertinent observations. The first of these was a twenty-foot length of corrugated iron tubing through which the men were required to crawl. In fighting order, the men were able to negotiate this length of tube. In battle order, it was practically impossible. Obviously, had this obstacle been included, the preference would have been for fighting order. The second obstacle consisted of a rope fifteen feet above the ground suspended between two trees. The men were required to climb a knotted rope to the fifteen foot level, thence across to the other tree and down another length of rope to the ground. This was eliminated because of the hazard involved in a possible fall from the fifteen foot height to the ground. With unpredictable positioning of the pick or shovel, grievous bodily harm to the test subjects might easily have resulted.

The nine obstacles included in these observations were as follows (in order of location in the course):

1. A jump across a six foot ditch filled with water from a mound which permitted only one pace,
2. A plank suspended by two ropes above a water-filled ditch,
3. A short log over water,

4. A seven foot wall,
5. A running jump across a water-filled ditch,
6. A jump down from a five and a half foot level attained by an open log staircase,
7. A low passage through underlying brush,
8. A series of six overhead bars. The subject passed through this obstacle by swinging from one bar to the next. The bars were located over a pool of water,
9. A vertical ladder approximately twelve feet in height.

Observers assessed the performance of the test subjects at all obstacles excepting the wall (4), the brush (7), and the ladder (9) which served general delaying functions. The mode of assessment was the same as used in the jumping trials.

The results of the study of the individual hazards, one, two, three, five, and six and eight are given in Table III. Stability on landing from the jump of Obstacle 6 showed a decided advantage in favour of fighting order. In the case of Obstacle 8, consisting of overhead bars which require freedom for movement of the pectoral girdle and arms, there was also a decided advantage in favour of fighting order.

The time required to negotiate the entire course is listed for each individual in Table IV. The average time required in fighting order was less than that in battle order. This difference, however, under the conditions of the test did not attain statistical significance.

Barbed Wire Negotiation

A test of the ability of the men in both orders to negotiate triple concertina barbed wire, followed by single concertina barbed wire was carried out in teams (Table VI). Four teams of eight men each performed the exercise both in battle order and in fighting order. The times taken by each team are given in Table VI. The average time of passage for men in fighting order was much less than that for battle order, the difference being statistically significant.

Fig. 2. BATTLE ORDER. Illustrates need for freedom of arm movement.



Grenade Lobbing

An attempt was made to evaluate freedom of action during grenade lobbing by measuring the distance and accuracy with which the grenades were thrown. This attempt was unsuccessful because of the difficulty in separating the actual differences in performance from the improvement in performance with practice. No conclusions were drawn concerning the relative merits of the



Fig. 3. BATTLE ORDER. Small pack is snagged by barbed wire.

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two orders in this exercise and the data on this exercise are not included in this report.

Swimming

A swimming exercise in battle and fighting orders was carried out with seventeen men of the group who could swim. The men were required to swim 30 feet in each order. In addition to the observation of his performance, the subjects expressed their views on the relative merits of each order for this exercise.

Nine of the seventeen men voiced preference for the fighting order arrangement. Of these, however, two required rescue in battle order and several others found it extremely difficult to swim while in this order. The other eight had no preference.

PERSONAL INTERVIEWS

Towards the conclusion of the exercises, the men were interviewed individually and privately. They expressed their views and preferences freely and pertinent observations are noted in Table I.

The comments of the men cover many points already noted but there are also many important additions. The preference for the fighting order arrangement was unanimous.

CONCLUSIONS

The results of field trials demonstrate conclusively the superiority of the fighting order arrangement over that of currently used battle order. Fighting order permits greater mobility, increased stability and less restriction of movement.

TABLE I
Evaluation of Mobility in Sprinting Manoeuvres

	FIGHTING ORDER	BATTLE ORDER
Weight Distribution	Stable	Difficult to keep in position
Strain (localized)	None	Shoulder muscles under constant strain
Adjustments Required	None	Continuous: belt rides up in front as pack slips down. 'D' hooks unfasten
Freedom of Movement	Moderate restriction	Severe restriction of shoulder and arm movements
Mobility (sprints)	Good	More effort and time required to get under way. Period of maximum effort short
Breathing	Unrestricted	Restricted
Crawling (under)	Moderate difficulty	Practically impossible under certain conditions
Going to Ground	Some movement of tools. Load generally stable	Pack rides forward and requires readjustment. Pick and shovel dangerous
Swimming	Arms and breathing somewhat restricted	Arms restricted, breathing difficult
Barbed Wire	Minor snagging	Pack snags badly

GENERAL COMMENT:

The Helmet is regarded by men as an item designed to test equanimity. Its weight is excessive, and it is a hazard in water. *Pick and Shovel* are heavy and insecure in both orders. Redesign is required and special provision should be made for carrying them. *Basic Pouches'* 'D' hooks tend to unfasten easily. Closure is impossible when filled with Bren magazines or bomb loads. *Water Bottle and Mess Tins* bounce excessively. In fighting order water bottle is available on belt. In battle order it is carried in small pack and is much less accessible.

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TABLE II
Sprints
Time in Seconds

	June 30, 1952.		50 yards		100 yards	
	Battle Order	Fighting Order	Battle Order	Fighting Order	Battle Order	Fighting Order
1.	4.4	5.3 (slipped)	7.6	7.8	15.7	15.3
2.	5.0	4.5	8.5	8.1	17.6	16.8
3.	4.6	4.3	8.2	7.7	16.6	15.6
4.	5.2	4.3	9.3	8.4	17.8	17.5
5.	4.9	4.3	9.0	8.0	18.6	16.5
6.	4.6	4.2	8.6	7.9	16.1	15.7
7.	4.7	4.5	8.5	8.0	17.1	16.2
8.	4.8	4.3	8.8	8.3	16.8	15.8
9.	5.2	4.5	9.3	9.0	19.0	17.5
10.	4.8	4.7	8.8	8.5	17.1	16.4
11.	4.5	4.2	8.1	8.2	16.3	15.4
12.	4.8	4.5	8.5	8.2	16.5	16.3
13.	4.8	4.6	9.0	8.7	19.0	17.8
14.	4.5	4.5	8.1	7.6	15.9	15.5
15.	4.5	4.3	8.1	7.9	17.2	15.8
16.	5.4	4.7	9.5	8.7	18.3	17.8
July 1, 1952.						
17.	4.9	4.5	8.7	7.7	16.3	15.6
18.	4.7	4.7	8.4	8.6	17.1	17.9
19.	4.3	4.3	7.8	7.9	14.8	15.0
20.	4.8	4.7	8.7	8.3	17.5	17.2
21.	(4.8)		(8.5)		(17.1)	
22.	4.5	4.2	8.5	8.0	14.9	15.4
23.	4.5	4.7	8.1	8.5	15.8	17.5
24.	4.5	4.8	8.2	7.7	15.2	15.6
25.	4.9	4.8	9.2	9.0	17.7	18.3
26.	4.3	4.8	7.7	7.8	15.8	15.4
27.	4.4	4.7	8.2	7.3	15.1	14.8
28.	4.7	4.5	9.0	7.9	16.8	15.8
29.	4.5	4.5	8.5	8.4	16.7	17.2
30.	4.6	4.5	8.2	8.3	15.7	15.9
31.	4.3	4.4	8.2	8.1	15.8	17.1
32.	4.9	4.7	8.9	8.9	19.1	17.6
TOTAL	145.5	140.5	264.2	253.4	519.9	508.2

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TABLE III
 Jumps from 3', 4', 5', 6' Ramps
 Evaluation of Landing

	BATTLE ORDER				FIGHTING ORDER			
	3'	4'	5'	6'	3'	4'	5'	6'
1.	0	0	0	0	0	0	0	0
2.	0	0	0	-1	0	0	0	0
3.	0	0	0	0	0	0	0	0
4.	0	0	0	0	0	-1	0	-2
								after 2 paces
5.	0	0	0	0	0	0	0	0
6.	0	0	0	-1	0	0	0	0
7.	0	0	0	-4	0	0	0	-4
8.	0	0	-1	-1	0	0	0	0
9.	0	0	0	0	0	0	0	0
10.	0	0	-1	0	0	0	0	0
11.	0	0	0	0	0	0	0	-1
12.	0	0	0	-4	0	0	-2	-
13.	0	0	0	0	0	0	-2	-4
14.	0	0	0	-1	-4	0	0	0
15.	0	0	0	0	0	0	0	0
16.	0	0	-1	-4	-1	0	0	-2
17.	0	0	0	0	0	0	0	0
18.	0	0	0	0	0	0	0	0
19.	0	0	0	0	-2	0	0	0
20.	0	0	0	0	0	0	0	0
21.	0	0	0	0	0	0	0	0
22.	0	0	0	0	0	-2	0	0
23.	0	0	0	0	0	0	0	0
24.	-4	0	-2	-2	0	0	0	-1
25.	0	0	-2	-4	0	0	-2	0
26.	0	0	0	-2	0	0	0	0
27.	0	0	0	0	0	0	0	0
28.	0	0	-4	-	0	-4	0	0
29.	0	0	0	0	0	0	0	0
30.	0	0	0	0	0	0	0	0
31.	0	0	0	0	0	0	0	-1
32.	0	0	0	0	0	0	0	-2
	-4	0	-11	-24	-7	-7	-6	-17

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TABLE IV
Assault Course
Obstacles

Hazard No.	1		2		3		5		6		8	
Order	jump Battle Fight.		plank Battle Fight.		log Battle Fight.		running jump Battle Fight.		jump down Battle Fight.		overhead bars Battle Fight.	
1.	-1	-1	0	0	0	0	0	-1	0	0	0	0
2.	-2	-2	0	0	0	0	0	-2	-2	0	-4	0
3.	-2	0	0	0	0	0	0	0	0	0	0	0
4.	-2	-1	0	0	0	0	-1	0	0	0	-2	-2
5.	-2	-1	0	0	0	0	-1	0	0	0	0	0
6.	-2	-2	0	0	0	0	-2	-2	-1	0	0	0
7.	-1	-1	0	0	0	0	0	0	-2	0	-2	0
8.	-1	0	0	0	0	0	-1	0	0	0	-2	0
9.	-1	-4	0	0	0	0	-1	-1	0	0	-4	0
10.	-2	-2	0	0	0	0	0	0	0	0	0	0
11.	-1	-4	0	0	0	0	0	0	0	0	0	0
12.	-2	0	0	0	0	0	0	0	0	0	-4	0
13.	-2	-2	0	0	0	0	-2	0	-4	0	-4	0
14.	-2	-2	0	0	0	0	0	0	0	0	0	0
15.	-2	-4	0	0	0	0	-1	0	0	0	-2	-4
16.	-4	-1	0	0	0	0	-1	0	-1	0	0	0
17.	0	-2	0	0	0	0	-4	0	0	0	0	0
18.	-1	-2	0	0	0	0	-1	-1	-4	0	0	-1
19.	0	0	0	0	0	0	0	0	0	0	0	0
20.	-2	-2	0	0	0	0	0	0	0	0	-4	0
21.	absent	-	-	-	-	-	-	-	-	-	-	-
22.	0	0	0	0	0	0	0	0	0	0	0	0
23.	0	-4	0	0	0	0	0	0	0	0	-4	-2
24.	-4	-1	0	0	0	0	0	-1	injured		-	-1
25.	-4	0	-1	0	0	0	-1	-2	0	0	0	0
26.	0	0	0	0	0	0	0	0	0	0	0	0
27.	0	0	0	0	0	0	0	0	0	0	0	0
28.	0	0	0	0	0	0	0	0	0	0	-4	0
29.	0	-1	0	0	0	0	0	0	0	0	0	0
30.	-1	-1	0	0	0	0	0	0	0	0	0	0
31.	-1	0	0	0	0	0	0	0	0	0	0	0
32.	-2	-4	0	0	0	0	0	0	0	0	-1	0
	-44	-44	-1	0	0	0	-16	-10	-14	0	-37	-10

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TABLE V
Assault Course

Subject	BATTLE ORDER	FIGHTING ORDER
	Time (Seconds)	Time (Seconds)
1	100	96
2	190	149
3	170	150
4	190	150
5	260	163
6	210	170
7	210	150
8	210	130
9	191	210
10	200	214
11	185	139
12	186	177
13	210	255
14	140	200
15	200	180
16	120	172
17	144	180
18	146	130
19	116	140
20	230	230
21		
22	139	150
23	153	150
24		
25	213	250
26	145	160
27	201	150
28	164	120
29	200	170
30	156	150
31	151	160
32	158	180

TABLE VI
Triple Concertina and Single Concertina

Subject	BATTLE ORDER	FIGHTING ORDER
	Time (Seconds)	Time (Seconds)
1-8	339	139
9-16	558	144
17-24	223	199
25-32	234	187


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