INSTINCTIVE FIRING: AN INTERIM REPORT

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BACKGROUND

At the Infantry School, St. Maixent, Thomson and Houff were impressed with the "instinctive" firing instruction which they describe as follows: "in training for firing both pistol and submachine gun, the French place considerable emphasis on firing without the use of the sights of the weapon. Concerned about firing quickly, particularly at night, considerable instruction is given on snap shooting 'from the hip.' To aid in this training the school has equipped pistols, rifles, and submachine guns with a miniature spotlight clamped to the muzzle. The light beam switched by a trigger attachment indicates to both student and instructor where the shot or burst impacts. These are, of course, useful for short ranges only." (1)

FIRST MODEL

In order to evaluate this training method, a breadboard device was constructed using, wherever possible, standard laboratory equipments. A small experimenter's console was built to provide the necessary switching capability. Within the dashed lines, figure 1, appear the necessary elements of the method; target, rifle with light beam, and immediate feedback to the subject when the light beam strikes the target. The breadboard device had additional capabilities for designating one out of six targets and for timing the interval between target designation and triggering the rifle.

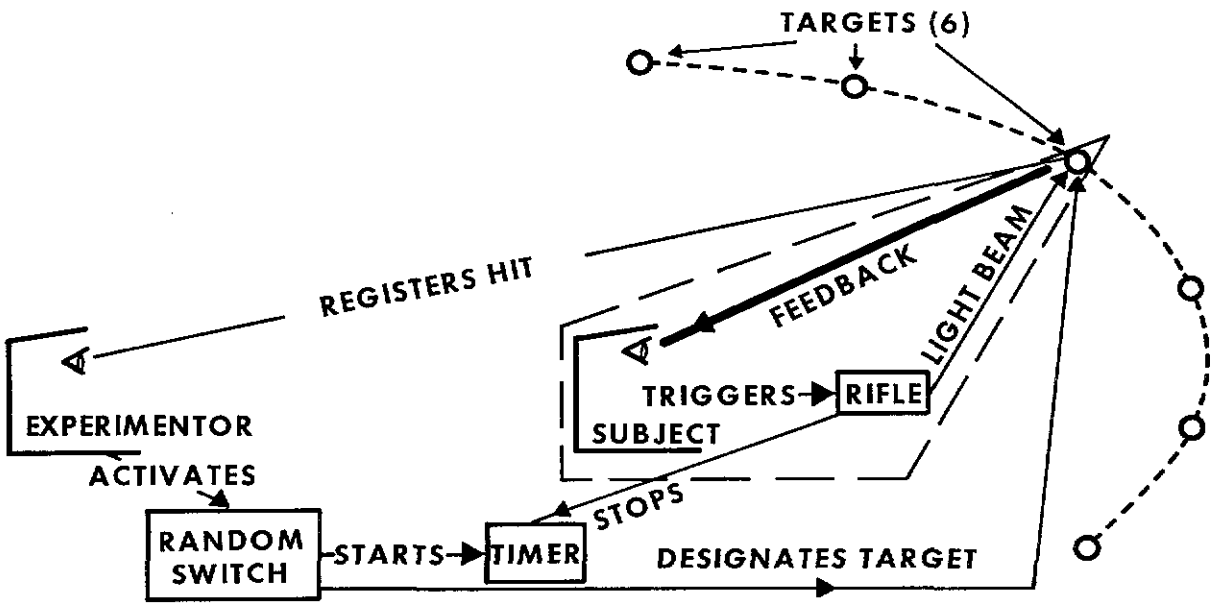

Figure 1. Project 7885-9
Instinctive Firing Trainer (Prototype)

EXPERIMENT ONE

Using six Marine cadremen from the Second Battalion at Garden City, New York, William Boney conducted the experiment reported in Table 1. The experiment demonstrated that practice on the device improved performance considerably, but it also showed a slight increase in the average time required to fire a round. The need for certain improvements in the equipment became evident including noise reduction, automation of some of the experimenter's operator functions, and providing a power source on the rifle to eliminate a wire connection to an external power source.

Table 1. Instinctive Firing Study

EXPERIMENT – 1

SUBJECTS – 6 MARINES

6 TARGETS ---------- 720 ROUNDS

	FIRST 30 ROUNDS	FINAL 30 ROUNDS	GAIN
HITS (PERCENTAGE)	70%	94%	24%
TIME (SECS/ROUND)	1.32 SECS	1.47 SECS	-0.15 SECS

THE SIX TARGETS WERE APPROXIMATELY 30 FT FROM SUBJECT'S POSITION, ARRANGED IN A SEMI-CIRCLE.

SECOND MODEL

Based upon the additional requirements revealed in Experiment 1, a prototype model of the Instinctive Firing Trainer was developed. Figure 1 indicates the sequence of activities in the training cycle. Figure 2 is a photograph showing console, weapon, and one target. The trainer is composed of three main components: the targets, the weapon, and the instructor's console.

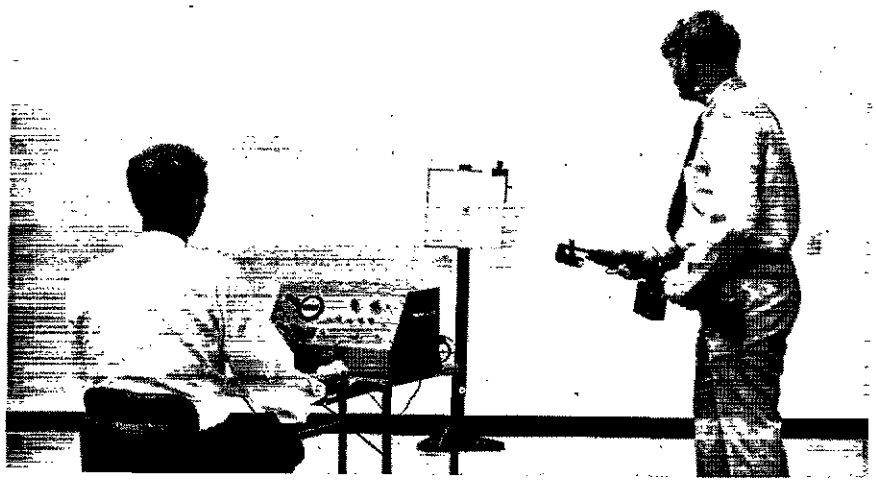

Figure 2. Instinctive Firing Trainer (Prototype)

The targets are six 14" square pieces of wood mounted on stands. Each target is painted a light yellow so that it will reflect light. The height of targets can be varied by changing position on the target stand. Each target is equipped with a visual and auditory target indicator. The visual indicator is a small pen light which can be moved to any position on the perimeter of the target. The auditory target indicator is an easily perceived buzzer. The buzzer and lights are connected to six toggle switches on the instructor's console. The buzzer and light on any particular target can be presented independently or together.

The weapon is a standard M14 rifle equipped with a small spotlight projector and a specially designed magazine (figure 3). The lamp assembly is a cylinder which clips onto the rifle. The lamp itself produces 15 candle power and is activated by a switch on the trigger guard of the rifle. The size of the projected spot of light can be varied by changing the lenses in the lamp assembly. The duration of the light is approximately 250 milliseconds. Power for the lamp is provided by a battery in the specially designed magazine assembly. In addition to the battery, the magazine contains a time delay circuit and a small radio transmitter. The radio transmitter is activated, along with the lamp, when the trigger is pulled. The signal from the transmitter is used to stop the timer in the instructor's console.

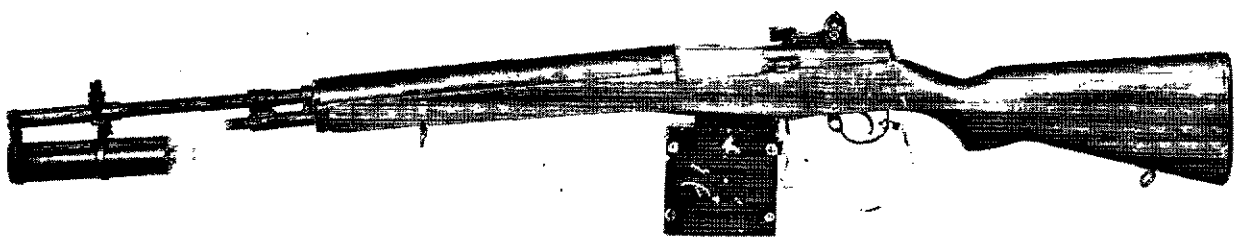

Figure 3. M14 Rifle Modified for Instinctive Firing

The training is done in a semi-darkened room. The trainee is instructed to hold the weapon at a low port arms position. When a target is presented the trainee lowers the rifle to a position in which he can fire from the hip. He is instructed to move his body weight toward the designated target by making one step toward the target and to pull the trigger as quickly as possible. The targets are positioned in a semicircle in front of the trainee.

At the beginning of each trial, the instructor pushes the randomization button. This button stops the random switching mechanism and the appropriate light, representing the target to be presented, is displayed on the instructor's console (figure 4). Next the instructor pushes the target presentation button, and a light or buzzer on the designated target is activated. The timer is also started and the trial counter indicates another trial. The trainee points the weapon toward the target and pulls the trigger, activating the light as well as the radio transmitter. The signal from the transmitter stops the timer. The instructor watches the target and calls out immediately if the light hit the target. The instructor also records all hits by pushing the button on the hit counter. The instructor then records the reaction time, resets the timer, and is ready for the next trial. The time between trials is varied.

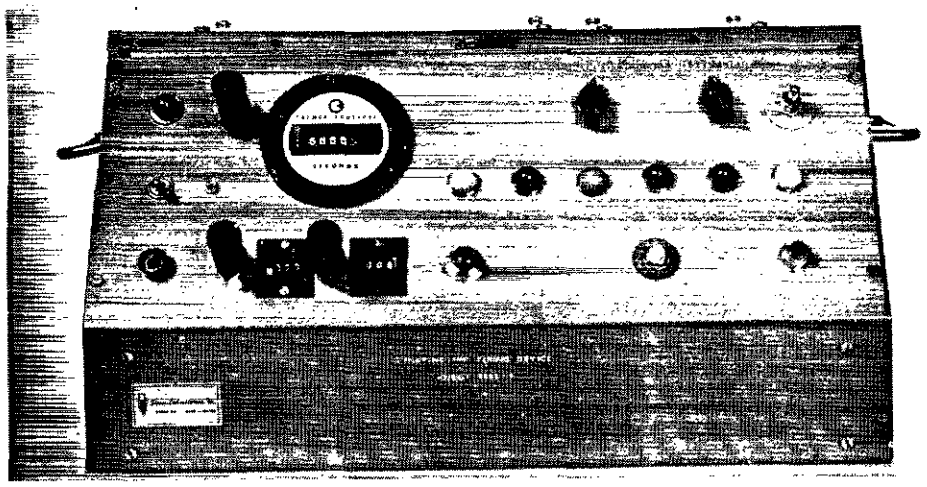

Figure 4. Console, Instinctive Firing Trainer (Prototype)

FURTHER EXPERIMENTS

Experimentation was not resumed until the Center completed its move to Orlando. Then Wiley and Coker [2] conducted a series of three experiments. Experiment 2 was designed to study the time difference uncovered in Experiment 1. Two groups of college students were given 150 training rounds. One group was instructed to strive for accuracy, the other for speed. Because of a malfunction in one of the targets, only five were used instead of six as in Experiment 1. Table 2 presents the results. Not only was the speed group faster, it was also more accurate.

Experiment 3 was a transfer of training study. (Table 3.) Three groups given differential amounts of training on the device were tested in live firing against a control group trained on the rifle. Except for the 450 rounds group, the experimental clearly outperformed the control group. If we take the percent efficiency of the rifle training as 100, the percent efficiency of the device training ranged from 97 to 118 with a mean of 110.

Table 2

EXPERIMENT – 2

SUBJECTS – 8 COLLEGE STUDENTS

INSTRUCTIONS GIVEN	TARGETS	ROUNDS	HITS	TIME
ACCURACY INSTRUCTIONS	5	150	72%	1.40 SECS
SPEED INSTRUCTIONS	5	150	77%	1.20 SECS

THE FIVE TARGETS FOR HALF THE ROUNDS FOR EACH GROUP WERE POSITIONED: THREE AT 15 FT AWAY AND TWO AT 30 FT. THIS PLACEMENT WAS REVERSED FOR THE REMAINING HALF OF ROUNDS.

Table 3

EXPERIMENT – 3

SUBJECTS – COLLEGE STUDENTS

GROUPS	ROUNDS FIRED (TRAINING)	PERCENT HITS (TRAINING)	PERCENT HITS (3) (TEST) – 120 RND	PERCENT EFFCY
EXPERIMENTAL (1)				
5 PERSONS	150	85	70	118
5 PERSONS	300	86	69	117
5 PERSONS	450	83	57	97
	AVERAGES	85	65	110
CONTROL (2)				
5 PERSONS	300	60	59	100

TARGETS USED WERE THREE LIFE-SIZED E-TYPE SILHOUETTE POP-UP TARGETS PLACED 45 FEET FROM SUBJECT - ONE DIRECTLY IN FRONT AND THE OTHER TWO 30 DEGREES TO LEFT AND RIGHT.

(1) EXPERIMENTAL GROUPS WERE TRAINED ON M14 LIGHT-EQUIPPED RIFLE DEVICE
(2) CONTROL GROUP WAS TRAINED ON 22 CAL RIFLE FIRING LONG-RIFLE AMMO
(3) ALL GROUPS WERE TESTED ON THE 22 CAL RIFLE FIRING LONG-RIFLE AMMO

Experiment 4 was similar to Experiment 3 except that a pretest session with the rifle was used to match the two groups. In addition, this session was used for training in proper handling of the rifle for accuracy of the rifle for accuracy of fire. Table 4 presents the results. Again the device group outperformed the rifle group at about the same percent efficiency level.

Table 4. Instinctive Firing Study

EXPERIMENT — 4

SUBJECTS — COLLEGE STUDENTS

GROUPS	PERCENT HITS PRETEST-30 RND	PERCENT HITS PRACTICE-300 RND	PERCENT HITS TEST-120 RND	PERCENT EFFCY
EXPERIMENTAL				
5 PERSONS	47	95	88	110
CONTROL				
5 PERSONS	45	76	79	100

TARGETS AND RIFLES WERE SAME AS USED IN EXPERIMENT NO. 3

DISCUSSION.

In the four experiments, it was demonstrated that the instinctive firing method does improve performance, and that the improvement in performance transfer to the actual rifle situation. Various insights were gained on methods of instruction; in fact, instructional methods were major influences in Experiments 2 and 4. It is also clear that the type, number, and placement of targets can be used to vary the difficulty of the task.

The small size of the experimental groups, ranging from five to eight subjects. precludes the possibility of demonstrating the reliability of the observed differences. The number of subjects used would have to be much larger to demonstrate statistical significance. However, the results throughout the four experiments are consistent and encouraging enough to justify continuing effort in this instructional method.

A factor in the experiments that was difficult to control was previous experience with small arms. Recognizing this, the experimenters averaged prior experience over the groups. In this connection, Olmstead [4] found that out of a group of 824 basic trainees at five Army centers, 69% had had civilian experience with fire arms further illustrating the difficulty of controlling this factor.

The rifle used for testing performance was 22 caliber, but it has been demonstrated by Hirsch [3] and by others that performance on small caliber weapons correlates highly with performance on heavier weapons. In fact, the U.S. Army Infantry School has been using commercial air rifles with BB ammunition in what is termed the Quick Kill method. This cost-saving and effective method is similar in concept to instinctive firing as indicated in the following: "This method of fire known in the Army as "Quick Kill" has been developed and refined for military purposes from the method known previously as "Instinct Shooting". It is as simple as pointing the finger. The shooter does NOT air; he does NOT track; he does NOT lead. He looks at his target, NOT the weapon, and the gun becomes an extension of his eyes—as when he points his finger, the finger becomes an extension of his eyes." [5] Both approaches are effective, but each offers a different set of advantages suggesting perhaps the use of both methods supplementing each other in basic rifle markmanship. The method employing the instinctive firing device offers complete safety and all weather training capability. Other than the device itself, the only requirement is a semi-darkened room large enough to place targets at reasonable distances.

Training effectiveness has been demonstrated. In live firing, device-trained troups outperform rifle-trained groups by attaining approximately ten percent more hits. Cost effectiveness is also of prime importance. The cost of fabricating the prototype model including magazines and lens cylinders for three rifles was less than $1500. Making a liberal allowance for the cost of electric current, and for replacing lamps and batteries, the cost of firing 2000 simulated rounds is estimated at fifty cents. An equal number of rounds for the M16 and M14 would amount to $160 and $180 respectively. To this must be added other range costs such as target replacement.

The prototype model was designed as a research tool. The functional requirements for a rugged, reliable, and easy to maintain field model will not be finalized until the completion of the evaluation by Wiley and Coker [2]. At the time of this writing, an experiment designed to test the effectiveness of target designation by buzzer is in progress. As indicated previously, the key elements of the method, contained within the dashed section of figure 1, allows wide variations in design. The simplest version might be a spotlight equipped rifle with inexpensive targets made of folded corrugated board. Training would proceed in buddy fashion with one trainee calling targets, and the other firing, and then reversing roles. At the other extreme, would be a multi-target setup with target designation, timing and hit recording automated. A forcing function might be added so that the time limit for scoring a hit would decrease with improvement in performance. In this case, the instructor would be relieved of all operator functions freeing him for monitoring and coaching trainee performance. As noted before the method is also applicable to pistol and submachine gun training.

CONCLUSION

It is frequently true that the design of an operational system is in conflict with the features that make for an effective training environment. This is the challenge the training device designer faces to develop a device supported training environment based upon the principles of learning which enable the trainee to acquire the necessary skills. The Instinctive Firing method exploits the principle of immediate feedback (also termed knowledge of results) which has long been recognized as a powerful means of improving learning. When necessary skills have been sufficiently developed, the operational system serves as a means of integrating skills in the new context and as a vehicle for measuring proficiency in a meaningful way.

REFERENCES

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