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Technical Report 29

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The Effect of Mock Tower Height in Airborne Training

by

Charles D. Windle, Joseph S. Ward,
Kimball Nedved, and Jerome Nathan

Human Research Unit Nr 3, CONARC
Fort Benning, Georgia

Under the Technical Supervision of

The George Washington University
HUMAN RESOURCES RESEARCH OFFICE
operating under contract with
THE DEPARTMENT OF THE ARMY

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**THE EFFECT OF MOCK TOWER HEIGHT
IN AIRBORNE TRAINING**

SUMMARY AND RECOMMENDATIONS

1. The Problem

a. A series of research studies into causes of attrition in the basic Airborne training program at Fort Benning, Ga., has been conducted by the Human Resources Research Office, implementing a Department of the Army research requirement. The present study is the last in the series.¹

b. The objective of this study was to determine whether the mock tower phase of the Airborne training program could be accomplished more efficiently using these experimental procedures:

(1) Having trainees make all mock tower jumps from heights lower than the standard 34-foot level;

(2) Having trainees progress in gradual increments from lower heights to the standard level.

c. The study was also intended to show whether mock tower training under these experimental conditions would adversely affect performance during later stages of Airborne training.

2. The Method

a. An experimental mock tower equipped for jumps from various levels was constructed at Fort Benning, Ga. Ten classes—976 trainees in all—were included in the experiment. Each class was divided into four groups; the groups took the standard Airborne course, except for these differences during the mock tower phase (first week) of training:

(1) Group A made all jumps from 18 feet.

(2) Group B made all jumps from 26 feet.

(3) Group C made all jumps from 34 feet.

(4) Group D jumped first from 18 feet, next from 26 feet, and finally from 34 feet.

b. The performance of the four groups was compared on the basis of (1) ratings of jump form during mock tower training and (2) attrition data for the complete course.

3. Findings

a. The results were:

(1) The 18-foot and 26-foot groups learned jump form more readily than the standard 34-foot group.

¹See references 12-16 for previous reports in this series.

(2) The group which progressed from 18 to 26 to 34 feet did not appear to be superior to the standard group in the learning of jump form.

(3) At the end of mock tower training, attrition in the experimental groups was less than in the standard group.

(4) By the end of the three-week training program, the four groups did not differ significantly in over-all attrition. Attrition in the standard group decreased after the mock tower phase, as compared with that of the other groups which remained at a fairly constant rate.

b. Despite the slight advantage during the mock tower phase, neither training at lower levels nor gradual introduction to the standard level appreciably reduced the over-all number of failures. Apparently under the experimental conditions potential failures remain in the training program longer before "washing out," thus making these procedures less economical of instructors' time than the conventional program.

4. Conclusions and Recommendations

a. Under the conditions of this experiment, training at mock tower heights lower than the standard 34-foot level and gradual introduction to the standard height were not found to be superior to training at the conventional height.

b. Since over-all attrition was not reduced by modifying height aspects of the training, the most desirable method, for reasons of economy, would eliminate failures as early as possible. A feasible approach might be to require that volunteers make a preliminary jump from the mock tower prior to their acceptance as Airborne trainees. (In support of this view, attention is called to a study¹ reported by the Department of the Army in 1945 which showed such a preliminary jump to be an effective screening device.)

¹See reference 11.

INTRODUCTION

General Background

Lack of practical ways to control fear constitutes one of the most serious problems in the efficient military use of manpower. Men called on to perform in dangerous military situations have been found generally to experience emotions which interfere with or prevent efficient functioning. The types of disruption vary widely. The psychiatric casualty rate increases as the objective danger increases.¹ Men fail to perform acts necessary for their mission, such as firing at the enemy, for fear of increasing their own danger.²

Scientists do not yet have sufficient information about the causes and effects of fear to permit a theory of fear—a scientific framework which would have great applicability to military problems of fear control. Such information is lacking chiefly because it is difficult to obtain valid criteria of fear in experimentally controlled situations where contributing factors may be accurately measured. In experimental laboratories where exact measurements may be made, genuinely fearful situations are difficult to employ; in fearful situations in real life, such as combat or natural disasters, accurate measurements can be obtained only rarely.

In the Airborne training program, large numbers of individuals do face a genuinely fearful situation under relatively standardized conditions. The present study was specifically designed to test several hypotheses concerning the relative efficacy of different training methods in situations where the task to be learned is inherently fearful.

It is believed that the data should shed light on such general questions as these:

(1) Is a relatively simple task learned more quickly under less than under greater fear-provoking conditions? Is there a difference in later performance involving this task, depending upon the initial learning conditions?

(2) Under what conditions should troops be introduced to fearful situations—gradually, in order to become habituated to making appropriate responses to relatively familiar danger cues, or rapidly, in order to prevent anxieties from mounting during a period of increasing danger (or apparent danger)?

Specific Background

The basic Airborne program consists of a three-week course in which the specific skills required in parachuting are taught. Training students to

¹See references 1, 2.

²See reference 3.

perform effectively is done in three week-long stages: 34-foot mock tower jumping, 250-foot free-fall tower releases, and plane jumping.

The main training device employed to teach trainees the proper method of exit from the plane door and the correct body position during "free" fall is the 34-foot mock tower, a structure designed to simulate the conditions of free fall and the shock of the opening parachute. Prior to actual mock tower jumping, the student is given training in proper exit form, using a platform two feet above the ground. In mock tower training, he must demonstrate this learned form in conjunction with jumping from a considerably greater height and must learn to maintain proper position during a fall of eight feet from the mock tower.

During mock tower training, the trainee wears a harness attached by risers¹ to a trolley device which slides along a cable leading away from the tower. After taking the proper position in the door of the mock tower and receiving a vigorous tap on the buttocks from the jumpmaster, the trainee jumps and falls "free" for about eight feet. The risers then arrest his fall, and he rides the cable for about 50 yards to a dirt mound where he is unhooked from his harness by fellow students. He then reports to a rater for a critique of his jump.

The rater may record any of 30 errors in form which the trainee may commit. (These 30 error categories are listed in the appendix.) The reliability and validity of this scoring technique was studied in a previous experiment and found to be adequate.² The standard scoring procedure involves recording specific errors when fewer than five are made; five or more errors are indicated by a symbol.

During the first week of Airborne training, the student usually makes from 8 to 20 jumps from the 34-foot mock tower. If he performs satisfactorily, he progresses to the second week of training. If he fails, he may be permanently disqualified or he may repeat the first week of training, depending upon the types of errors made and his attitude toward training.

The "free-fall" phase of instruction, given during the second week of training, is devoted to teaching manipulation of risers and correct landing form. The free-fall tower is 250 feet high. The student, attached by risers to an open canopy, is mechanically hoisted to the top of this structure and released. He must make three or more jumps from this tower; to progress to the next week of training, at least half of these jumps must be satisfactory. About three per cent of the failures in 1953 were disqualified for refusal to jump from the free tower.

The third week of training is devoted to five novice jumps from an aircraft in flight. These novice jumps are primarily tests of how well the student can apply what he has learned during the first two weeks of training. Approximately 0.4 per cent of the men failed to pass this phase of training in 1953.

The basic Airborne training program has been subject to an over-all attrition rate of approximately 30 per cent, half of which is permanent and half of which is temporary.³ In 1953, a representative year, almost a quarter

¹The main lift webbing of the parachute harness to which the parachute canopy is attached.

²See reference 13.

³See reference 12.

of all failures were classified as "refusals to jump from the 34-foot mock tower." In addition, a number of trainees who failed to progress in training according to schedule were turned back in the training cycle or even permanently disqualified because of unsatisfactory mock tower performance.

The 34-foot mock tower is the first occasion in training in which the student is required to jump from considerable height. The high attrition rate during mock tower training suggests that this introduction to fear is a costly process; the mock tower may be performing more of a screening than an habituating function with regard to students most affected by height.¹ A possible reason for this condition is that the mock tower height of 34 feet may be too high for an initial jumping tower.² If, through habituation, men could be saved from failure in the Airborne course, the mock tower phase of training would be serving a more desirable function.

Related Studies

Fear of Height

It is generally considered that at relatively low levels of fear performance is facilitated, while at extremely high levels fear may be detrimental.³

There have been at least four studies of the effect of fear of height upon skilled performance. Johnson⁴ found that subjects could learn to walk the tight wire more quickly by practicing on a wire three feet above the ground than on one six feet above the ground. The difference in learning rate was attributed to greater emotional disturbance at the greater height. Jackson,⁵ using motion pictures of experienced and inexperienced flymen during aerial gymnastics, found that inexperienced gymnasts made broken and abrupt movements in contrast to the smooth and well-coordinated movements of the experienced. This was thought to be due in part to greater fear in the inexperienced gymnasts. Warren and Jones⁶ found that acrophobic subjects differed from those known not to be afraid of high places in showing decreased reading comprehension when in a high, precarious location while reading about high places. Miller,⁷ on the other hand, has presented evidence that fear of an impending mock tower jump facilitates performance.

Effect of Gradual or Sudden Introduction to Fear-Inducing Situations

Learning theory would suggest that adaptive responses to danger cues could be learned by combining weak danger cues with strong positive

¹In 1945, the mock tower was regarded by training officers as the most effective eliminating device in the Airborne School. (See reference 11.)

²It might be noted that at the time mock towers were first built, the high injury rate from airplane jumps seemed to require as severe training as possible. Evidence of the rigorous training requirements of 1941-1943 are the various elaborate P'T exercises and the nerve-testing "shock" harness tower device, since dropped from the program.

³See reference 10.

⁴See reference 7.

⁵See reference 6.

⁶See reference 8.

⁷See reference 10.

cues. This was the method used by Watson¹ in his classic study of teaching a child, who had been conditioned to fear rabbits, to overcome his conditioned fear; the rabbit was gradually brought closer on successive days while the child was eating. This same principle has been suggested as a basic procedure for use in psychotherapy, where the patient learns adjustive responses to his verbalizations of traumatic situations.

Janis² described the conditions under which civilian populations become emotionally adapted to air attacks as a regular succession of raids not directly involving danger, during which the person has some purposeful action to perform. The technique of gradual introduction has been advised for use in combat to decrease psychiatric casualties³ and has been employed by the War Shipping Administration to induce reluctant trainees to jump from a height into water.⁴

In an Army study made in the spring of 1945,⁵ several parachute training classes receiving instruction at Fort Benning were divided so that half the students of each class were given a preliminary jump from the mock tower prior to training. Men who failed on the preliminary jump were followed through the course of training in order to compare their subsequent performance with that of men who succeeded on the early jump. The results of this phase of the study supported the view that a preliminary mock tower jump could be used to screen potential failures before extensive training time was invested in them.

This same study provided for a comparison between the men who made the preliminary jump and the "controls" who did not receive this jump experience prior to training. The rationale which dictated this phase of the study was presented in the report as follows:

... introducing a new student to a frightening situation in advance of a period during which he would normally be preparing himself mentally, as well as gaining confidence through mastery of the technical training, may raise his anxiety to a higher level than would otherwise be the case. Under this assumption, even those men who make the initial jump successfully might drop out of training at some later point, in disproportion to men who were not given an early jump. Again, under the same assumption, men who are 'forced' from the tower without the usual week's training in general jumping technique, may tend on their first attempt to make more and worse errors which may be more persistent and more difficult to correct than if the initial jump were given later.

It was concluded that the preliminary jump had no deleterious effects on performance in the subsequent course of instruction.

The preliminary jump group may be described as one which had been suddenly introduced to a fearful situation and the control group as one which had been gradually introduced to the same situation. Under the conditions of this study, then, sudden or gradual introductions to the mock tower situation produced no differential effects as measured by subsequent performance.

¹See reference 5.

²See reference 2.

³See reference 9.

⁴J. Zubin, personal communication.

⁵This study was conducted by the Research Branch, Information and Education Division, War Department, under the direction of John L. Finan. See reference 11.

Assumptions

The following assumptions were made in designing the present experiment:

(1) Within the range of height to be studied, fear is directly related to height.

(2) Under the conditions of this study, fear is inversely related to certain aspects of performance.

Hypotheses to Be Tested

The hypotheses to be tested were:

(1) That men trained at mock tower heights lower (and presumably less fearful) than the standard 34-foot tower would (a) learn mock tower form faster, (b) be more successful at passing mock tower training than standard trainees, and (c) incur no more attrition than the standard group in the latter two weeks of training.

(2) That men who are trained at successively higher heights until they reach the standard mock tower height would perform better according to the preceding criteria than those required to do all their mock tower jumping from 34 feet.

PROCEDURE

Experimental Design

The following four groups were employed in this experiment:

- Group A Mock tower training at 18 feet
- Group B Mock tower training at 26 feet
- Group C Mock tower training at 34 feet (the conventional height group)
- Group D Mock tower training at an 18-foot level on jumps 1-4, a 26-foot level on jumps 5-7, a 34-foot level on all succeeding jumps (the habituation group)

All trainees received mock tower instruction under standard Airborne procedures but at heights which varied according to the group to which they were assigned. Following the mock tower phase of training, the four groups received no differential treatment.

The four groups were compared on two measures of performance:

(1) rating of jump form at the mock tower and (2) attrition rate at the end of the mock tower phase and at the completion of the three-week course.

Experimental Apparatus

The experimental mock tower (see Figure 1) was constructed along the lines of the standard tower but with additional platforms at 18 and 26 feet, in order to allow jumps from these heights as well as from the standard height of 34 feet. The customary risers were extended so that men jumping from the 18- and 26-foot heights fell "free" for the same distance as those jumping from 34 feet.

EXPERIMENTAL MOCK TOWER

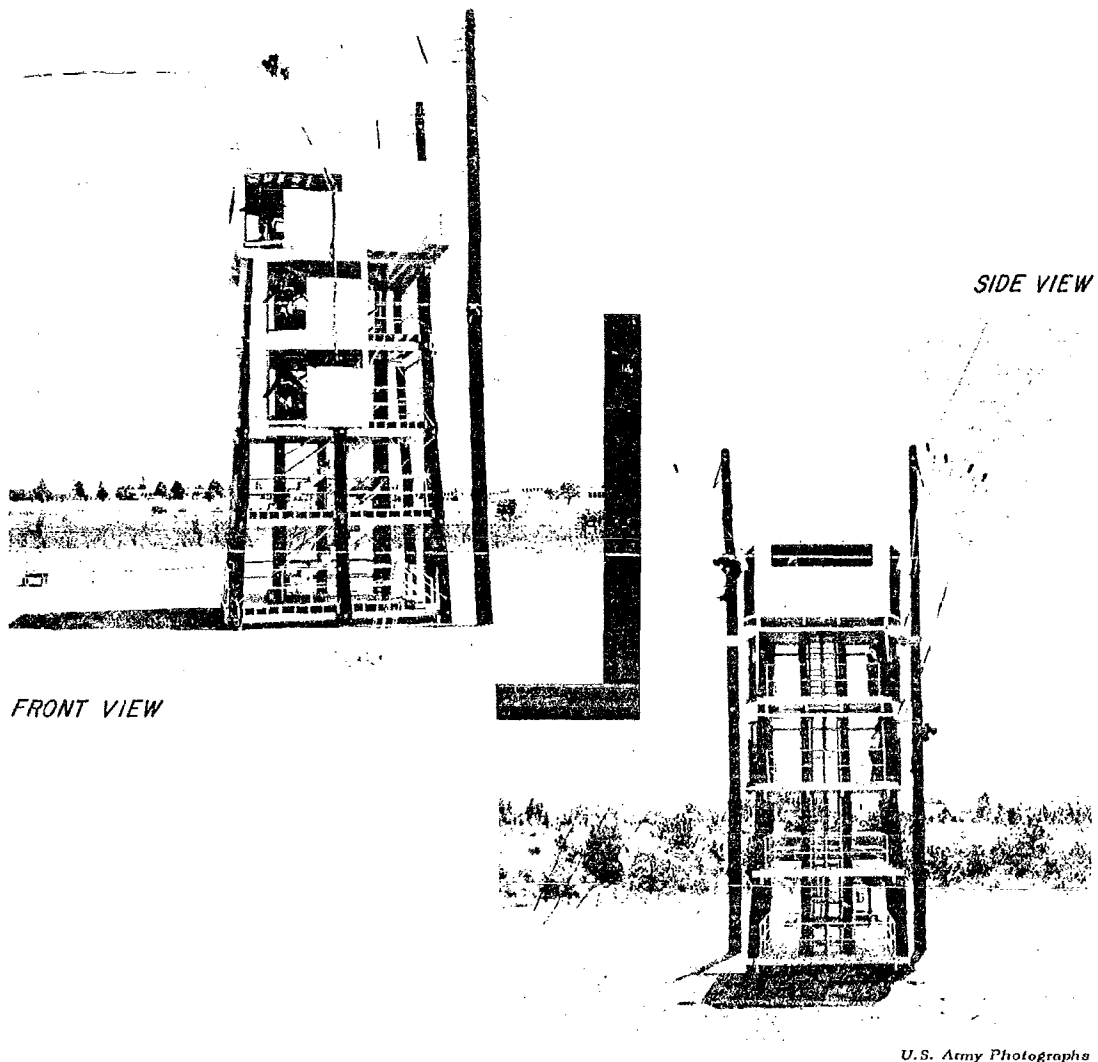


Figure 1

Experimental Program

Selection of Subjects

Subjects were personnel who volunteered for basic Airborne training and came to Fort Benning to take the course during the summer of 1954. They came from many different posts, and ranged in rank from enlisted men who had just finished basic training to officers and noncommissioned officers taking the course for career advancement. The total sample consisted of 976 trainees, who comprised 10 classes.

Assignment of Subjects to Experimental Groups

Each class in turn was divided into four experimental groups,¹ selected so that each had the same distribution of military rank. There were 251 subjects in Group A, 223 in Group B, 250 in Group C, and 252 in Group D.

Trainees who had failed to progress in training and had therefore been set back from non-experimental classes were assigned equally to the four groups and included in the experiment. Set-backs from experimental classes were directly assigned to the same experimental group they had been in previously, although only data on their performance prior to the set-back were used in subsequent analyses.

Cadre

The cadre who served as instructors, jumpmasters, and scorers were assigned to the Airborne Department as instructors at the time of the study and functioned in the same manner during the experiment as they did in the normal administration of the Airborne course. No special control was enforced over the order in which they were assigned to the various tasks or experimental groups.

Training

Group A made all mock tower jumps from the 18-foot platform, Group B from the 26-foot platform, and Group C from the 34-foot platform. Group D made the first four jumps at 18 feet, the next three from 26 feet, and all remaining jumps from 34 feet. To ensure that these trainees received common treatment in other phases of training, they were separated into the A, B, C, D grouping only for mock tower training. In all other phases, they were organized according to the regular Airborne roster.

Type of Data Collected²

Error Ratings. The standard data on errors made on each jump, as recorded by an Airborne rater, were collected for subjects in all groups.

Attrition Data. Data on attrition at all phases of Airborne training were obtained from the Airborne Department for the trainees studied.

RESULTS

The outcome of training at different mock tower heights is presented first in terms of the efficiency of learning correct jump form and second with regard to attrition.

¹In one class only three experimental groups were studied because of administrative requirements of the Airborne Department.

²In addition to the data reported here, an attitude questionnaire was administered to about 95 per cent of the graduates. It included six (or seven) questions about the trainee's feelings at various stages of training, and two questions about mock tower height preference. Conclusions based on administration of the original form of the questionnaire to about two thirds of the sample were reported in an IRU Nr 3 Staff Memorandum (see reference 14). Results for the total sample and both forms of the questionnaire were so similar to those already reported that they are not included here.

In line with the prediction that training at lower heights would result in superior performance, the basic comparisons made were (1) each of the lower height groups versus higher levels (A versus C, B versus C, A versus B) and (2) the habituated group versus the conventional group (D versus C). Results of statistical analyses are summarized at the end of each table.

Jump Form

The occurrence of first satisfactory jumps is expressed in Figure 2 in cumulative percentages for each group. These curves reveal the same general trend, regardless of height at which training occurred. Also, it is

**CUMULATIVE PERCENTAGE OF STUDENTS IN EACH GROUP
ACHIEVING AT LEAST ONE SATISFACTORY JUMP IN NINE MOCK TOWER JUMPS**

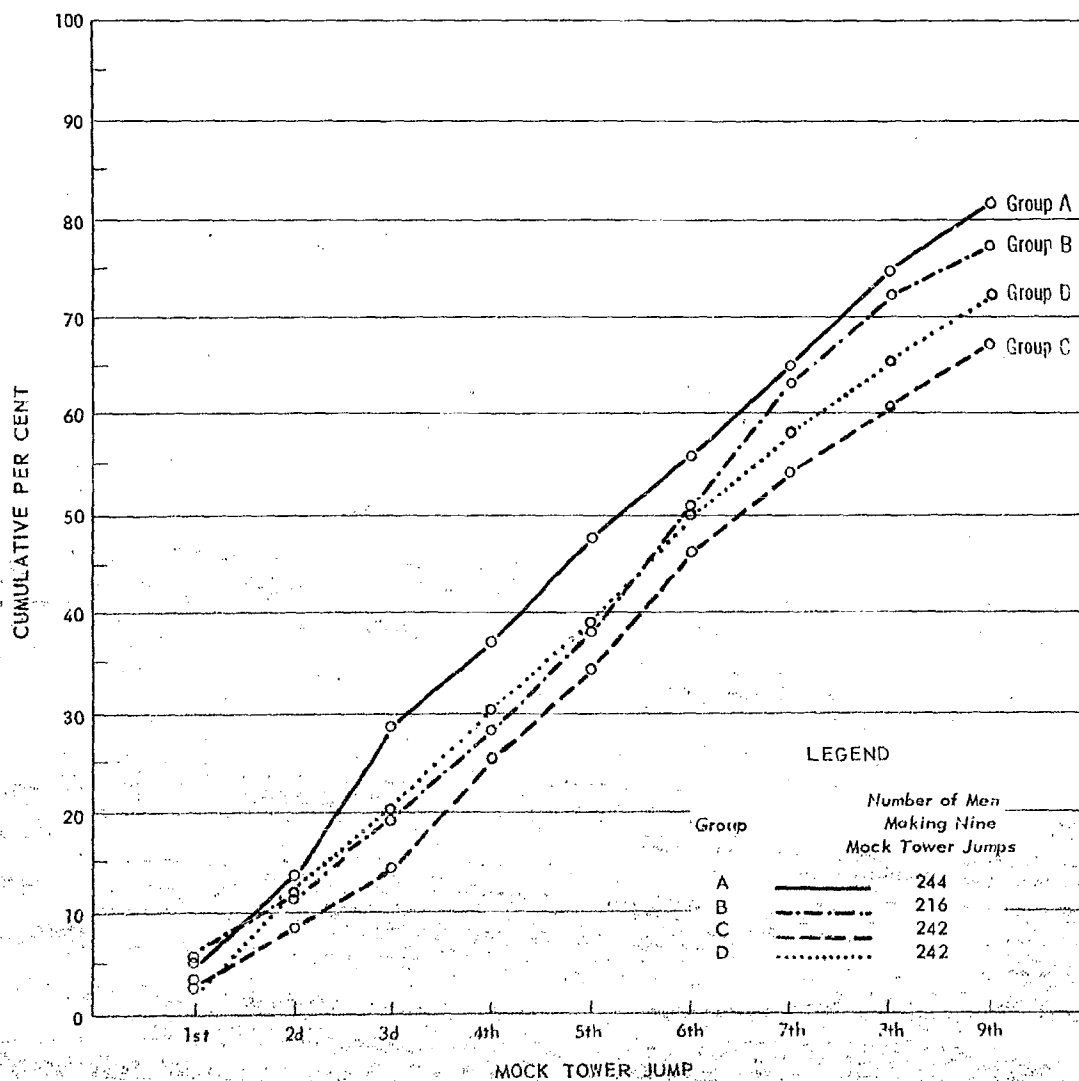


Figure 2

apparent that after the initial mock tower jump, Groups A and C maintained consistent positions, being highest and lowest, respectively, with regard to the percentage of trainees who had achieved at least one satisfactory jump.

Tests for differences between groups were carried out at three points: after four jumps, after nine jumps, and for the eighth and ninth jumps only. Jump 4 was selected as a point for comparison because it represents the completion of the first phase of mock tower training for Group D. Over these first four jumps, Groups D and A differed only in that Group D trainees knew their next mock tower jumps would be at higher levels.

During the first four jumps, 38, 29, 26, and 30 per cent of the men in Groups A, B, C, and D, respectively, made at least one satisfactory jump. The distributions, percentages, and results of statistical tests are presented in Table 1. The students in Group A were superior to those of Group C in the learning of jump form during these first four jumps. Group A also tended to differ from Groups B and D over the same training period, but these differences are not as reliable.

Table 1
RATING OF FORM DURING THE FIRST FOUR MOCK TOWER JUMPS

Group	Number of Men Making at Least One Satisfactory Jump	Number of Men Who Failed to Make a Satisfactory Jump	Per Cent of Group Making at Least One Satisfactory Jump
A	92	152	38
B	62	154	29
C	62	180	26
D	73	169	30

	Comparisons ^a	χ^2	p^b
Chi square tests of the hypothesis that the proportion of men making at least one satisfactory jump did not vary from group to group	A vs. C	7.65	.01
	B vs. C	.40	.53
	D vs. C	1.03	.31
	A vs. B	3.77	.05
	A vs. D	2.75	.10

^aDegrees of freedom equal 1 in each case.

^bThe p value represents the probability that the difference between the groups under comparison could have occurred by chance. A p value of .01 indicates that only one time in one hundred cases would a difference at least as large as the one obtained occur by chance; a p value of .001, that only one time in one thousand would so large a difference occur by chance.

The same sort of analysis was made for data from all nine jumps; the results appear in Table 2. During these nine jumps, 82, 77, 67, and 72 per cent of the men of Groups A, B, C, and D, respectively, made at least one satisfactory jump. Groups A and B were superior to Group C over these nine jumps, and Group A also outperformed Group D. Differences between A and B and between D and C may be attributed to chance.

In order to test for group differences in the late stage of mock tower training, the data for jumps 8 and 9 only were analyzed (see Table 3). On these two jumps, 74, 70, 57, and 59 per cent of the men of Groups A, B, C, and D, respectively, made at least one satisfactory jump. It is apparent that Groups A and B were superior to Group C in performance over the

Table 2

RATING OF FORM DURING THE FIRST NINE MOCK TOWER JUMPS

Group	Number of Men Making at Least One Satisfactory Jump	Number of Men Who Failed to Make a Satisfactory Jump	Per Cent of Group Making at Least One Satisfactory Jump
A	199	45	82
B	167	49	77
C	163	79	67
D	175	67	72
<i>Comparisons^a</i>			
Chi square tests of the hypothesis that the proportion of men achieving at least one satisfactory jump did not vary from group to group	A vs. C	12.16	<.001
	B vs. C	5.14	.02
	D vs. C	1.19	.28
	A vs. B	1.02	.31
	A vs. D	5.34	.02

^aDegrees of freedom equal 1 in each case.

Table 3

RATING OF FORM ON THE EIGHTH AND NINTH MOCK TOWER JUMPS

Group	Number of Men Making a Satisfactory Jump	Number of Men Who Failed to Make a Satisfactory Jump	Per Cent of Group Making a Satisfactory Jump
A	181	63	74
B	151	65	70
C	139	103	57
D	143	99	59
<i>Comparisons^a</i>			
Chi square tests of the hypothesis that the proportion of men making a satisfactory jump did not vary from group to group	A vs. C	14.41	<.001
	B vs. C	7.11	.01
	D vs. C	.08	.78
	A vs. B	.84	.36
	A vs. D	11.78	.001

^aDegrees of freedom equal 1 in each case.

eighth and ninth jumps, and that Group A was superior to Group D. Differences between A and B and between D and C were not reliable.

From the statistical analyses reported in Tables 1, 2, and 3, it may be stated that Group A was consistently superior to Group C in the learning of jump form. Group B, while not different from Group C in the early stage of mock tower training, shows a consistent superiority over Group C when all nine jumps are considered or when the eighth and ninth jumps together are analyzed. Group D does not appear to be different from Group C in any of the three comparisons. Group A tended to be superior to Group B in the early stages of training, but this difference disappeared as training progressed. Group A tended to be superior to Group D even in the first four jumps, when the two groups were jumping from the same height; on the basis of all nine

jumps, A was clearly superior. The poorer performance by Group D trainees when they were jumping from the same height as the Group A men may have been related to their knowledge that they soon would jump from higher levels of the mock tower.

Attrition¹

It had been hypothesized that the attrition rate would be lower for men trained at towers of lower height and for those who were gradually accustomed to height than for the group trained at the conventional 34-foot tower. By the end of the mock tower phase of training, failures amounted to 14 per cent for Group A and Group B, 22 per cent for Group C, and 16 per cent for Group D. The distributions of men passing and failing, the percentages failing, and results of statistical tests are presented in Table 4. It may be stated that Groups A and B showed less attrition than Group C during the mock tower phase of training, and the same tendency was evident in Group D.

Table 4

SUCCESSSES AND FAILURES BY THE END OF THE FIRST WEEK OF TRAINING

Group	Number of Men Who Were Failing	Number of Men Who Were Passing	Per Cent of Group Failing
A	34	217	14
B	32	191	14
C	54	196	22
D	40	212	16
<i>Comparisons^a</i>			
		χ^2	p
Chi square tests of the hypothesis that the propor- tion of failures did not vary from group to group	A vs. C	5.07	.02
	B vs. C	3.69	.05
	D vs. C	2.34	.13
	A vs. B	.01	.92
	A vs. D	.37	.54

^aDegrees of freedom equal 1 in each case.

Attrition during the second and third weeks of training was 17 per cent for Group A, 14 per cent for Group B, 13 per cent for Group C, and 16 per cent for Group D (see Table 5). The probabilities are all fairly high that differences among groups can be explained by chance.

The difference in attrition present during the mock tower phase of training thus disappears by the end of the training cycle. The percentage of failures for Group A increased from 14 to 17 per cent, for Groups B and D remained the same, and for Group C decreased from 22 to 13 per cent. While the difference between A and C in the percentage failing during the second two weeks is not as great as it was for the first week, there does appear to be a more marked tendency for men in Group A than in Group C to fail during the latter period of training.

¹Trainees temporarily disqualified for longer than a month are returned to their original units and are relatively unlikely to return to training. In the present study these failures are considered permanent, even though technically they are only temporary failures.

Table 5

SUCCESSES AND FAILURES DURING THE SECOND TWO WEEKS OF TRAINING ONLY

Group	Number of Men Who Failed	Number of Men Who Passed	Per Cent of Group Who Failed
A	36	181	17
B	27	164	14
C	25	171	13
D	33	179	16
<i>Comparisons^a</i>			
Chi square tests of the hypothesis that the distribution of failures did not vary from group to group	A vs. C	.92	.34
	B vs. C	.06	.81
	D vs. C	.45	.50
	A vs. B	.30	.58
	A vs. D	.02	.89

^aDegrees of freedom equal 1 in each case.

Table 6

SUCCESSES AND FAILURES DURING THE THREE-WEEK COURSE

Group	Number of Men Who Failed	Number of Men Who Passed	Per Cent of Group Who Failed
A	70	181	28
B	59	164	26
C	79	171	32
D	73	179	29
<i>Comparisons^a</i>			
Chi square tests of the hypothesis that the distribution of failures did not vary from group to group	A vs. C	.66	.42
	B vs. C	1.27	.26
	D vs. C	.30	.58
	A vs. B	.06	.81
	A vs. D	.03	.86

^aDegrees of freedom equal 1 in each case.

Attrition over the complete three-week training cycle was 28 per cent for Group A, 26 per cent for Group B, 32 per cent for Group C, and 29 per cent for Group D (see Table 6). Based on the probabilities presented in this table, it may be stated that attrition from group to group varies only on a chance basis.

DISCUSSION

Comparing the results of training at a mock tower height of 18 feet (Group A) and at the conventional 34-foot (Group C) level, data on the learning of jump form and attrition rate during the mock tower phase indicate that Group A is superior to Group C. However, attrition in the subsequent two weeks of Airborne instruction tends to be slightly higher for the 18-foot group.

than for the 34-foot group; the percentage of failures decreased for Group C during this period but increased for the 18-foot group. Apparently, students assigned to the 34-foot group failed earlier in the training cycle, while in the 18-foot group potential failures were carried further into the training program before "washing out." This difference strongly suggests that a mock tower training height of 18 feet is administratively unsatisfactory (on the assumption that it is costly to keep eventual failures any longer than necessary).

Group B (the 26-foot group) was also superior to Group C in the learning of jump form and the rate of failure during the mock tower phase. During the second two weeks of training, the two groups showed approximately the same percentage of attrition. The slight superiority shown by Group B in the three-week program (six more graduates per 100 men) would, even if reliable, have to be weighed against the expense which would be involved in altering the 34-foot mock tower and making other revisions in the existing program. In addition, although Group C did incur slightly more failure than Group B in the over-all program, a larger proportion of Group C failures (.68) than of Group B failures (.54) occurred during the first week.¹ It may be more economical in training time, therefore, to risk slightly more failure but permit a larger proportion of this failure to occur in the first week of training.

Group D, trained at all three mock tower levels, appeared to perform at about the same level as the conventional 34-foot group, aside from a tendency to incur less failure during the mock tower phase of training.

CONCLUSION AND IMPLICATIONS

Under the conditions of this experiment, training at lower mock tower levels and gradual introduction to the standard 34-foot level were not found to be superior (for the training objectives of the school) to the conventional method of training.

Attention is again drawn to the study reported by the Department of the Army on the efficacy of giving volunteers a mock tower jump early in training.² The preliminary jump was found to be an effective method of screening potential failures. In addition, the preliminary jump did not lower the performance (measured by attrition and jump form) of the experimental group when evaluated against a group which did not receive an early mock tower jump.

Since training at lower heights or gradually introducing trainees to greater height does not reduce the over-all number of failures appreciably, the available evidence points toward employing some method which would eliminate failures as early as possible. A feasible approach might be to require that volunteers make a preliminary jump prior to their acceptance as Airborne trainees.

¹Proportions were obtained by dividing the total number of failures during three weeks (Table 6) into the number of failures during the first week (Table 4).

²See reference 11.

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Appendix

CATEGORIES OF ERROR USED IN RATING MOCK TOWER JUMPS

Error Symbol	Meaning
SQ	Squat Out
FO	Fall Out
W	Weak Exit
HOT	Hands on Top of Reserve
HC	Hands Crossed
HCOT	Hands Crossed on Top of Reserve
AC	Arms Crossed
GRD	Grabbed Reserve in Door
KB	Knees Bent
FA	Feet Apart
HU	Head Up
EO	Elbows Out
DO	Dive Out
KO	Kick Out
SO	Step Out
RQ	Recover Too Quickly
BFD	Both Feet in Door
WFD	Wrong Foot in Door
T	Turn in Air
H	Hesitate
R	Reaction Poor
BW	Bent at Waist
BS	Body Straight
EC	Eyes Closed
LC	Late Count
WC	Wrong Count
FC	Fast Count
NC	No Count
CID	Count in Door
NT	No Tap
(X)	More Than Four Errors

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