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DESERT ROCK ROCK

A Psychological Study of Troop Reactions of Troop Reaction
to an Atomic Explosion

Peter A. Bordes
John L. Finan
Joseph R. Hochstim
Howard H. McFann
Shepard G. Schwartz

Bordes
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CALENDAR OF IMPORTANT EVENTS, DESERT EVENTS

D-day minus 45 (17 Sep 51)	Defense Department announce Department
D-day minus 30 (2-5 Oct 51)	Questionnaire A (baseline) Questionnaire A (baseline) Fort Campbell Fort Campbell
D-day minus 26 (4-5 Oct 51)	Phase 2 indoctrinations given indoctrinations participant troops participant troops
D-day minus 17 (15 Oct 51)	Troops arrive at Camp Desert arrive at Camp
D-day minus 9 (23 Oct 51)	Questionnaire B (post-indoctrination) Questionnaire B (post-indoctrination) administered to non-participants administered to non-participants
D-day minus 4 (28 Oct 51)	Special Camp Desert Rock Camp Desert
D-day minus 3 (29 Oct 51)	Questionnaire B (post-indoctrination) Questionnaire B (post-indoctrination) administered to participants, C to participants
D-day minus 2 to 1 (30-31 Oct 51)	First polygraph test administered polygraph test Rock
D-day (1 Nov 51)	A-bomb explodes. Questionnaire Q explodes. Q (test) administered in the (test) administered in the after return to Camp Desert after return to Camp
D-day plus 13 to 36 (14 Nov-1 Dec 51)	Second polygraph tests administered polygraph tests participants, Fort Campbell participants, Fort Campbell
D-day plus 14 to 33 (15 Nov-4 Dec 51)	Control polygraph tests administered polygraph tests participants, Fort Campbell participants, Fort Campbell
D-day plus 16 (19 Nov 51)	Questionnaire D (delayed) Questionnaire D (delayed) participants and non-participants participants and non-participants
D-day plus 25 (28 Nov 51)	Questionnaire D (delayed) Questionnaire D (delayed) participants and non-participants participants and non-participants

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INFORMATION

DESERT ROCK I

A Psychological Study of Troop Reaction
to an Atomic Explosion

K I

Troop Reaction
to an Atomic Explosion

Peter A. Bender
John L. Finck
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Motivation, Morale, and Leadership Division

Leadership Division

The George Washington University
HUMAN RESOURCES RESEARCH OFFICE
operating in cooperation with
THE DEPARTMENT OF THE ARMY

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Preface

In October of 1951 the Army staged DESERT ROCK, the first of a series in which an atomic weapon was detonated as part of a tactical exercise in the participant troops. A major objective of Exercise DESERT ROCK was a psychological evaluation of troop behavior. By means of attitude measurement methods as well as measuring physiological effects of stress, both applied at critical points of maneuver, an attempt was made:

1. To evaluate effects of atomic indoctrination on the troop participants
2. To estimate effects of the detonation together with its accompanying effects, on performance.

This report is a consolidated account of psychological research done in connection with Exercise DESERT ROCK I. Many of the problems concerning the psychological responses of troops in such an exercise were considered to be without precedent in Army experience.

The Human Resources Research Office was asked by the Research and Development Division, Office, Assistant Chief of Staff, G-4, Logistics, to plan an evaluation of troop behavior. Also requested to participate in this study, under HUMRRO's direction, were the Attitude Assessment Branch, Troop Information and Education Division, the Chief of Information, Department of the Army, together with the Attitude Research and Force Information and Education Division, Office of the Secretary of Defense, the Operations Research Office, under contract to the Department of the Army.

Specifically, the chief responsibility for quantitative assessments of troop attitudes prior to and following the explosion rested with the Information and Education Division. The Operations Research Office was assigned the task of conducting interviews, and in addition, of making observations of certain aspects of the maneuver. Both these agencies have issued independent reports of their research. These reports are operational in nature. The on-base of the present report is not. Although findings of operational interest are reported, the main objective is to provide materials for further research of a similar nature. Techniques developed in this DESERT ROCK study can be applied in future evaluative studies, in such manner that the war in atomic warfare may become increasingly understood.

Wm. L. P. Lundy
Director, HUMRRO

This report is the 1951 from Col. L. W. Gilling, G-4, Chief, RD Div, RD Div, for the to the Director, HUMRRO, 100 - 2nd St, N.W., Washington 25, D. C., S.D.; and to the Chief of Staff, Department of the Army, 100 - 2nd St, N.W., Washington 25, D. C., S.D.

(1) Joint Report: Attitude Research Div, AFM & E Div, RD, and Attitude Assessment Div, DA, A Study of Soldier Attitudes and Knowledge: Lewis Atomic Effects-Research Division, 20 Feb 1952 (RESTRICTED Security Information)

(2) Operations Research Office Technical Memorandum ORO T-174, Troop Performance Training Exercises Involving the Use of Atomic Weapons, 15 Mar 1952 (RESTRICTED Security Information)

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SECURITY RESTRICTED INFORMATION

Preface

In October of 1951 the Army staged DESERT ROCK, the first of a series of maneuvers in which an atomic weapon was detonated as part of a tactical exercise in the presence of participant troops. A major objective of Exercise DESERT ROCK was a psychological evaluation of troop behavior. By means of attitude measurement methods as well as devices for measuring physiological effects of stress, both applied at critical points during the maneuver, an attempt was made:

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2. To estimate effects of the detonation together with its accompanying effects, on performance.

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The Human Resources Research Office was asked by the Research and Development Division, Office, Assistant Chief of Staff, G-4, Logistics, to plan an evaluative study of troop behavior.¹ Also requested to participate in this study, under HRRRO's coordination, were the Attitude Assessment Branch, Troop Information and Education Division, Office of the Chief of Information, Department of the Army, together with the Attitude Research Branch, Armed Forces Information and Education Division, Office of the Secretary of Defense, and the Operations Research Office, under contract to the Department of the Army.

Specifically, the chief responsibility for quantitative assessments of knowledge and attitudes prior to and following the experience rested with the Information and Education Division. The Operations Research Office was assigned the task of conducting face-to-face interviews, and in addition, of making observations of certain aspects of the men's performance. Both these agencies have issued independent reports² of their research activities. These reports are operational in nature. The emphasis of the present report is methodological. Although findings of operational interest are reported, the main objective is to provide materials for further research of a similar nature. Techniques developed in this first Desert Rock study can be applied in future evaluative studies, in such manner that the human factor in atomic warfare may become increasingly understood.

Meredith P. Brundage
Director, HRRRO

¹ Ltr 044 12 Sep 1951 from Col L. S. Gilling, GSC, CM-4, RD Br, RD Div, for the A. GPR, G-4 to Wt, HRRRO, 704 - 22d St, S. E., Washington 7, D. C., Subj: Psychological Evaluation of Troop Behavior in Connection with Project GUSTAR. File No. 04/73 86161.

² (a) Joint Report: Attitude Research Br, AFI & E Div, DD, and Attitude Assessment Br, TI & E Div, DA, A Study of Soldier Attitudes and Knowledge About Atomic Warfare--Exercise DESERT ROCK, 20 Feb 1952 (RESTRICTED Security Information).

(b) Operations Research Office Technical Memorandum, OPO-T-170, Troop Performance in a Training Maneuver Involving the Use of Atomic Weapons, 15 Mar 1952, (SECRET Security Information).

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ACKNOWLEDGMENTS

The authors wish to express their gratitude to all who participated in and aided in the collection, production, analysis, and interpretation of the data in this research. Research teams from four agencies gathered the basic material in the field at Fort Campbell, Kentucky; Fort Lewis, Washington; and Camp Desert Rock, Nevada. These agencies were: the Operations Research Office, Johns Hopkins University; the Attitude Research Branch, Department of Defense; the Attitude Assessment Branch, Department of the Army; and the Human Resources Research Office.

Valuable cooperation was tendered by Major General William B. Kean, Maneuver Director for the Exercise at Camp Desert Rock, Lt. Col. James R. Tully, Commanding Officer, 188th Airborne Battalion, 11th Airborne Division, and indeed, all of the staff and personnel conducting and participating in the Exercise.

The writers drew heavily on a report prepared by Mr. Ivor Wayne under a contract between the Human Resources Research Office and the Bureau of Social Science Research, American University. Grateful acknowledgment is also made to Dr. Meredith P. Crawford, Director of HumRRO, and Dr. S. James Goffard, who were members of HumRRO's field team, and to the following HumRRO consultants, who gave much valuable assistance in the interpretation of the data: Dr. Herbert Hyman; Mr. Dean Manheimer; Dr. Neal F. Miller; Dr. Arnold M. Rose; Dr. Richard L. Solomon; and Dr. Edward L. Walker. Critical evaluation of the manuscript and suggestions regarding the analysis by Dr. Meredith P. Crawford, Mr. Ira Cisin, Mr. Don Cahalan and Dr. Eugene Cogan represent major contributions to the study. Gratitude is also expressed to Mrs. Muriel S. Norden, editor; Miss Janice Chreitzburg, Mrs. Alice Jwaideh, Mr. Edward McNulty, and Mr. Berton Winograd, assistant analysts; Miss Martha Setzer, production supervisor; and Miss Dorothy Allinger and Mrs. Jean Loebelson, typists, for their assistance.

Peter A. Bordes
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Joseph E. Hochstim
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Shepard G. Schwartz

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SUMMARY OF FINDINGS¹

ABOUT INFORMATION

The participant paratroopers' factual information about atomic warfare—especially that concerning self-protection—increased sharply as a result of the indoctrination program. This information gain was retained, but not improved, during the remainder of the experiment (i.e., following the maneuver, detonation of the atomic bomb, and return to home base).

Although there was no observed increase in atomic information after D-day, two factors associated with the maneuver may have operated as powerful stimuli to learning and to retention of information: (1) the anticipation of the A-bomb maneuver experience at the time of indoctrination; (2) the reinforcement of theoretical information by the practical experience of the D-day events.

The information level of a control group of paratroopers who neither received indoctrination nor participated in the maneuver remained unchanged throughout the period of the research.

ABOUT CONFIDENCE

Over the course of the experiment, participant troops' self-confidence in their ability to sustain both conventional and atomic combat showed a marked increase. Of special interest is an increase in self-confidence which appeared immediately after the maneuver.

Troops' confidence in the ability of the experts to control the A-bomb increased markedly as a result of the indoctrination, and remained at this higher level thereafter.

The participants' estimates of their outfit's combat readiness showed a noteworthy decrease 18 days after the maneuver. This decline of confidence in the outfit may have reflected fears which the men were more willing to attribute to "the other fellows" than to themselves. Equally possible is the interpretation that the observed decrease resulted from factors extraneous to the experiment.

¹By John L. Finsen and Arnold M. Rose.

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The non-participants also showed some increase in self-confidence. It is possible that this increase was influenced by the non-participants' knowledge that there had been no serious mishap at DESERT ROCK.

ABOUT ANXIETY OF PARTICIPANTS

The anxiety expressed about the effects of the A-bomb, and about participation in the maneuver, was reduced by the indoctrination. Anxiety concerning some of the bomb's effects, however, persisted at a high absolute level throughout the entire experiment.

During the course of the maneuver, a rise in tension was suggested by increase in pulse and heart rate measured on a polygraph device.

After the explosion, underestimates—potentially serious—of the effective range of the bomb's flash and blast increased markedly.

Eighteen days after the explosion, reports of worry about participation in the maneuver were much more frequent than they had been some six hours after the detonation. During this 18-day period, an increase also occurred in the proportion of participants who described the A-bomb they had witnessed as being dangerous to the troops.

CHARACTERISTICS OF INFORMED AND SELF-CONFIDENT TROOPS

The troops who were better informed about atomic warfare were also the better-educated men; these men expressed more self-confidence and less anxiety.

Self-confidence was also positively related to higher rank, longer Army service, and favorable attitudes toward the Army and the outfit. In addition, self-confident men showed fewer signs of anxiety.

CHARACTERISTICS OF TROOPS REPORTING PHYSIOLOGICAL REACTIONS

A disproportionate number of men who experienced certain physiological disturbances on the day of the maneuver were found among the lower-educated troops.

These troops compared with other, lower-educated troops, not reporting physiological reactions, as follows: The reactors indicated experiencing more anxiety, were less self-confident, and had difficulty in absorbing the kind of information that might have been helpful in alleviating anxiety.

Such higher-educated men as reported physiological reactions did not differ from the remaining group of higher-educated men, except in greater difficulty in adjusting to their role in the Army.

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CHAPTER 1

BACKGROUND FOR THE RESEARCH

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Chapter 1

BACKGROUND FOR THE RESEARCH¹

PURPOSE OF THE EXERCISE

The primary objective of Exercise DESERT ROCK I was training--"the training of troops, staffs, and commanders to prepare them for combat operations"--in this instance, for combat operations involving the use of an atomic bomb. Accordingly, objectives were established for the exercise as follows:

1. To indoctrinate troops in the tactical employment of atomic weapons and in essential physical protection measures.
2. To test the effect of the explosion on many types of ground forces equipment and on various tactical formations, at varying distances from ground zero, and with varying protection.

Included under the first of these objectives was the problem of determining the psychological reactions of the troops experiencing the explosion.

DESCRIPTION OF THE EXERCISE

The standard methods of staging an Army maneuver had to be adapted to the circumstances of this first atomic exercise. Both Atomic Energy Commission regulations and Army policy concerning the new weapon required that the secrecy and security regulations be unusually stringent. Moreover, because the Army was concerned about the possibility of undue fear responses on the part of the troops, special precautions were taken. Finally, the training of general and staff officers was considered so important that large numbers of high-ranking officers from all the services witnessed the atomic detonation. Of some 5,000 men present, approximately 4,000 functioned as observers, rather than as participants in the maneuver, and an overwhelming majority of these observers were officers.

¹This chapter was written by Muriel S. Norden with the collaboration of Peter A. Norden.
²U. S. Army Field Manual, 105-5, *Maneuver Control* (RESTRICTED), 1949, p. 4.

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Events Prior to the Exercise

The Office of Public Information, Department of Defense, announced on 17 September 1951 that a training exercise in the military aspects of nuclear detonations would be staged, that it would be called "Exercise DESERT ROCK," and that some 5,000 service personnel would be employed in it. The statement aroused a great deal of public interest and comment.

The Army directed that the troops who were to comprise the participant Battalion Combat Team remain uninformed about their mission until their arrival at Camp Desert Rock in late October. For purposes of the research, moreover, it would have been preferable to have maintained secrecy at least until after the baseline Attitude Assessment Study had been made. On 19 September, however, it was announced by the press that units for the impending exercise would be drawn from the 11th Airborne Division, stationed at Fort Campbell, Kentucky, together with supplementary units from other battle-ready outfits. A successful effort was made to keep this news story from the Camp newspaper.

On 2 October, the first of the series of four Attitude Assessment Questionnaires was administered at Fort Campbell. In this first questionnaire, a free-response question was included, asking the men about the most interesting rumor they had recently heard. Forty per cent of the future participants responded by indicating that they had heard they were going to Nevada; about one-third of these specifically mentioned the A-bomb.

Indoctrinations for the Maneuver

Careful indoctrination, preceding the maneuver, was considered by the Army to be one of the vital components of the exercise.¹ The training program was planned on the premise that "unreasonable fear, due to the lack of information or improper training, might easily cause personnel to fail to achieve maximum success in exploiting an atomic explosion."² The basic text used for the standard atomic energy indoctrination also stresses the idea that factual information does much to dispel such unreasonable fear, which arises from contact with "force that cannot be seen, felt, or otherwise sensed." Healthy respect for radioactivity, on the other hand, is mentioned as being equally necessary: "If proper respect is not instilled, the toll of lives will be increased."³

In this training program, indoctrination was carried out in two stages: (1) a general lecture program at the troops' home bases;⁴ (2) a site-oriented briefing at Camp Desert Rock.

¹In this report, "maneuver" refers to the events of D-day, whereas "exercise" refers to the period beginning with the arrival of participant troops at Camp Desert Rock. The training program began on 4 October. The first indoctrinations at the home bases.

²U.S. Army, Fort Benning, Georgia, *Combined Arms Units in Atomic Warfare* (RESTRICTED Security Information), 21 December 1951, p. 4.

³Department of the Army Pamphlet No. 20-110, *Atomic Energy Indoctrination* (RESTRICTED), September 1951, p. 72.

⁴Fort Campbell, Kentucky, and Fort Lewis, Washington.

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Home Base Indoctrination

Following the administration of the Attitude Assessment Survey's baseline questionnaire, all troops who were to participate in the exercise were given a series of three 2-hour lectures, supplemented by films, during which the components of the standard Army Phase 3 indoctrination were reviewed. These were formal talks which included "the basic non-technical instruction in radiological defense measures and techniques which must be imparted to all commissioned and enlisted personnel of the Army to enable them to perform their assigned duties efficiently in the presence of radiological hazards." Among the points covered were: (1) the nature of the atom; (2) the effects of blast, heat, and radiation on personnel and installations; (3) the results of the bursts at Nagasaki and Hiroshima; (4) safe distances from the center of the blast under varying conditions; and (5) the medical aspects of atomic detonations. Greatest stress was placed on the phenomenon of radiation.

Camp Desert Rock Indoctrination

Four days before the maneuver took place, the men were given a special non-technical briefing. Three officers gave informal talks of about 30 minutes each on the following subjects: (1) the appearance of the bomb and its effects on emplacements; (2) radiological safety instruments; (3) effects on personnel. The troops were reminded that no danger of immediate radiation remains 90 seconds after an air burst; that they would be sufficiently far from ground zero to be perfectly safe without shelter; and that with simple protection they could even be placed quite close to the center of the detonation, with no harm to them. This phase of the orientation was concerned with practical aspects of the forthcoming burst.

Living Conditions at Camp Desert Rock

Living conditions at a desert installation are necessarily less comfortable than those of a garrison. All personnel arriving at Camp Desert Rock were warned not to leave the vicinity without water; to keep their eyes open for sidewinders, tarantulas, and scorpions; to keep to the main roads. The weather was not during the day; cold at night. Sand and dust were everywhere. Such facilities as electricity, tent floors, stoves, running water, and permanent-type latrines had not yet been installed at Camp Desert Rock.

For the official observers, who arrived two or three days before the burst and left almost immediately thereafter, excitement and a sense of history may have compensated for the deprivations they experienced. For the participant troops, on the other hand, some three weeks of monotony stretched before D-day, punctuated only by rehearsals for the

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maneuver; preparation of emplacements, which required about five days, and by such experiences as returning to camp after a day's work to find the tents blown over by a high wind. Passes were limited to not more than one per man throughout the exercise. Access to media of information was more difficult than under normal garrison conditions. Except for camp movies, recreation was virtually limited to such activities as are available to troops in the field. A postponement of the detonation, made necessary because of adverse weather conditions, probably contributed to the general boredom.

During this period, teams of researchers were among the participants intermingled with the men. At various stages of the exercise, groups of participants were given Attitude Assessment Survey questionnaires; others were intensively interviewed; and with a few, physiological measurements were taken.

The day-to-day duties required of the men consisted of preparing the emplacements (e.g., barbed wire, reinforced trenches, foxholes) and other defensive positions, and repeated directed discussions of the maneuver. There were two rehearsals in preparation for D-day. In order to provide the feeling of a realistic maneuver, a tactical situation was established.

Tactical Situation

The tactical aspects of the maneuver, as presented to participants and observers, may be abstracted as follows:

An aggressor force, consisting of two armies, has landed on the northwest coast of the United States and has proceeded to drive to the southeast. This aggressor force is being delayed by friendly forces at a line which is described as being drawn up in the Eastern California-Western Nevada area. The decision has been made to employ an atomic weapon to effect maximum destruction of the enemy and to launch an offensive to drive the enemy to the north from his present position. The atomic weapon will be dropped over the ground zero on D-day, H-hour. The Battalion Combat Team will initially organize and occupy one battalion defensive position, and, on order, following the employment of the weapon on D-day, H-hour, attack into the bombed area.*

Organization of the Battalion Defensive Position

Emplacements were prepared at given distances from ground zero, and material was distributed at prescribed points. Prior to the detonation, animals were placed in many of the forward positions, both in foxholes and on the ground. On the afternoon prior to the shot, each man left his rifle and a radiation film badge in a foxhole.

*See *DESERT ROCK Information and Guide* (RESTRICTED), pp. 10-11.

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Occupation of the Battalion Defensive Position

Very early in the morning of D-day, the men were brought by truck to the point, approximately seven miles from ground zero, from which they were to observe the detonation. In the final 60-minute period before H-hour, the absolute safety of their position was stressed by the briefing officer on the public address system. Many of the points about atomic effects which had been made in previous talks were repeated. What they were about to see was described to the observers, and the various test positions were indicated to them.

D-day; H-hour

At approximately H-hour minus 5 minutes, the men were told: "...Turn and sit down. Face South.... Leave room so you can turn after the nuclear explosion in sitting position and face North. You will remain in the sitting position until the blast wave passes, which will be approximately 30 seconds after the explosion. You will turn approximately 2 to 3 seconds after the burst on my command. The noise will be a crack or rumble as we told you in the orientation...." At H plus two seconds, they were ordered: "Turn in position, stay seated. The blast will be here in 15 seconds." About 40 seconds later, they were ordered to stand up and look at "the cloud."

H-hour plus 1 to H-hour plus 2

During the hour following the burst, the participant troops waited while radiation levels were measured; only then were they brought by truck to the dug-in position farthest from ground zero, where they retrieved the rifles which had been left in the foxholes on the previous afternoon. Then they marched to the point closest to the shot, one-half mile from ground zero. In the meantime, the official observers had moved in by bus to this test position, preceding the troops to the most forward position. When the participant troops had inspected the area, they entrucked and were carried back to each of the other test positions. At each point they left the trucks, walked in single file around the area, observed damage, and were informed of the security classification of each observation. The men were warned not to handle any of the material at the emplacements. Each time that the troops re-formed their files, they were carefully counted and checked. When they had seen all of the emplacements, they were returned by truck to the camp site.

Estimate of the Maneuver

Under the restrictions set by the Atomic Energy Commission, it was difficult to make the maneuver realistic. The usual performance

*Position No. 6 Speeches, notes by Maj. T. M. Rienzi, U. S. A., Armed Forces Special Weapons Project.

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requirements, such as the use of weapons, the opposition to a simulated "enemy," and mock combat, were absent. The troops moved across the terrain at each emplacement in single files, a formation likely to render them highly vulnerable to enemy fire, if there had been any. Thus, the men's estimate of the vulnerability of the "enemy" depended chiefly on their observation of damage to equipment.

By all accounts, this phase of the operation appears to have been disappointing to the troops. There were no buildings near ground zero, and the sparse vegetation of the desert provides a less spectacular target to the A-bomb than structures do. Moreover, damage at the emplacements was not comparable to the damage rendered to a target more likely to be bombed under actual conditions of combat. Indeed, in General John E. Hull's later estimation, the troops of Exercise DESERT ROCK I "were there purely as observers and there was no tactical problem involved."¹

Secrecy and Security Measures

From the first, the attempt to maintain secrecy concerning the units assigned to participate in the maneuver was unsuccessful. As mentioned earlier, information from various sources reached the troops at Fort Campbell at a time when a strong effort was being made to keep the men from knowing that they had been selected for the maneuver. Later, California, Utah, and Nevada newspapers, particularly those in Las Vegas, were filled with reports, discussion, and speculation concerning the blast, both before and after the detonation. These papers were available to those men at Camp Desert Rock who wished to read them.

It is possible that the frankness of public discussion, juxtaposed against the background of strong instructions that the maneuver was not to be freely discussed, seemed like a contradiction to the troops. The Atomic Energy Commission issued a nine-point guide, specifying those observations on atomic effects which would be classified, and reminding the observers that the phenomena not specifically mentioned in the guide were also to be considered classified information. The AEC summarized their viewpoint, "The simplest guide is not to talk about tests, and to refer all questioners to the AEC Information Office."² While this directive was probably not seen by the troops, it was read by the officers, who, in some cases, may have disseminated its provisions to their men. The Army issued somewhat more liberal instructions concerning security to the observers: "Everyone will want to know what you have seen -

¹Department of Defense, Recording of Minutes of Press Conference Held by General John E. Hull, Vice Chief of Staff, U. S. Army, 23 April 1952, p. 1.

²Atomic Energy Commission, Security Instructions, 20 October 1951

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officials, friends, and the enemy. Let your dissemination of information be guided by the following:

- "1. That you have observed an atomic test.
- "2. What the explosion and the results thereof looked like to you."

These instructions, however, are still not quite in accord with the Army's statement that, while security regulations surrounding many of the tactical aspects of the test would not be relaxed, "the troops were urged to disseminate as widely as possible those things which they observed and learned at Desert Rock."

Published Comments About the Exercise

Las Vegas newspapers reflected, in their detailed coverage of the exercise, the intense curiosity of local residents concerning the events at the proving ground. Official observers, particularly the responsible officers, the Atomic Energy Commission spokesmen, and the Congressmen, were widely quoted as expressing confidence in America's future ability to use tactical atomic weapons in combat situations. Major General William B. Kean released a statement which was extensively quoted or paraphrased in most newspapers. He announced that participation in the maneuver "involved observation of the detonation, observation of the effect on test items and equipment, and observation of psychological and physiological reactions.... The results, when analyzed and tabulated, should have considerable effect upon Army doctrine, training, and military education." (Italics ours)⁴

The press was concerned with the observations of the troops as well. An Army-monitored press conference with eleven participants, mostly from the 11th Airborne, was permitted on the afternoon of D-day. All of the soldiers were reported as agreeing that "the bomb detonation was a spectacle that they didn't want to miss, and most of them said it scared them a little." A first lieutenant said that the "men in his platoon showed no signs of panic, although some showed that they were a little nervous, as they crouched" waiting for the detonation. As to whether he would be willing to jump into an A-bombed area, a private replied, "I probably would be so scared from combat jumping, anyway, that I wouldn't care whether there was an atomic explosion."

The newspapers stressed that the maneuver was successful, the detonation was awe-inspiring, atomic weapons are formidable, and the men present were impressed by the spectacle. The well-publicized information that psychological observation and measurement were among the exercise objectives probably came as no surprise to the troops.

⁴Ex. 111. *DESERT ROCK Information and Guide*, p. 2.

⁵Department of the Army News Feature Release, 16 Nov 1951.

⁶*Los Angeles Times*, 2 Nov 1951, p. 1, by-line Gene Sherman, dated 1 Nov 1951.

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The possible influences of such published accounts that may have come to the attention of the non-participants remaining at the home base, while they doubtless existed, cannot be evaluated.

Events After D-day

Following the maneuver, the participant troops were permitted three-day passes. Camp was broken, and the men returned to their home bases. There, in accordance with the research plan, psychological testing continued for about one month after the maneuver, among both participant and non-participant troops.

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CHAPTER 2

DESIGN AND METHOD
OF THE INFORMATION AND ATTITUDE ASSESSMENT STUDY

SECURITY **RESTRICTED** INFORMATION

Chapter 2
**DESIGN AND METHOD
OF THE INFORMATION AND ATTITUDE ASSESSMENT STUDY¹**

PURPOSE

The purpose of the Information and Attitude Study was to investigate the effectiveness of the indoctrination program and the A-bomb maneuver in increasing the troops' knowledge about atomic warfare and in building the men's confidence in their ability to do well in ground operations in an area where A-bombs had very recently exploded.

The research design was planned to measure:

1. Effectiveness of indoctrination procedures in imparting knowledge about the atomic weapon and confidence in its use to the troops participating in the experiment.
2. Effects of witnessing the A-bomb detonation and damage on troops' knowledge and confidence.
3. Changes in knowledge and attitudes over a period of time following the maneuver.
4. Dissemination of information and opinions by troops participating in the maneuver to non-participating troops.

These effects were measured by means of closely comparable questionnaires administered to the troops at four stages in the research.

DESIGN

A schematic diagram of the fundamental research design is presented in Table 1.

Precautions Against Contamination of the Experiment

Controls for two factors were included in the design, making possible (1) estimation of test-retest effect and (2) estimation of possible contamination of the experimental variables by extraneous factors.

¹The chapter was written by Joseph K. MacArthur and John L. Zimm. The section on "The Questionnaire" was written by Shepard G. Schwartz.

TABLE 1
THE RESEARCH DESIGN^a

Stage of Research	Participant Groups			Non-participant Groups		
	1	2	3	5	6	7
Baseline	(A)			(A)		
Post-industrination ^b	B	(B)		B	(B)	(B)
D-day, Post-bomb		C	(C)			
Delayed Effects			(L)		(D)	(D)

The main line of analysis is indicated by the arrows. The capital letters refer to the names of the questionnaires administered to the groups indicated at each stage of the research. For example, at the baseline stage, Questionnaire A was administered to participant Group 1 and to non-participant Group 5.

^aSupplementary, but not essential, to the basic research design were four samples, Groups 9 and 10 (participants) and Groups 11 and 12 (non-participants). Group 9 was given the same questionnaire as Group 2; Group 10 was given the same questionnaire as Group 1. Groups 11 and 12 received only Questionnaire D. ^b"Post-industrination" is used in this table and elsewhere in the report to refer only to a research stage. It does not imply that non-participants received industrination, but only that they were tested after the participants had been industrinated.

Estimation of Test-Retest Effect

Measurement of test-retest effect was made possible where necessary by retesting, at each stage of the research, the men who had been tested once before (at the immediately preceding stage). For example, a comparison was thus possible between the results of the group tested for the first time after the detonation and the results of the group tested for the second time after the detonation.

Where possible, elimination of test-retest effect was accomplished by the standard procedure of having one random sample^c of the participant troops tested at each stage of the experiment for the first time. For example, to eliminate test effect from the estimate of the effect of witnessing the A-bomb detonation, two separate random samples (Groups 2 and 1) were drawn from the same population of men; one sample (Group 2) was tested for the first time before the detonation, the other

^c The sampling method used in this study is described on pp. 19, 20.

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(Group 3) was tested for the first time after the detonation. This procedure permitted a comparison between two previously untested samples.

Estimation of Possible Contamination of the Experimental Variables by Extraneous Factors

In order to sift out, as far as was feasible, the effect of extraneous variables, another--separate but comparable--set of groups (5, 6, and 7) was used. These groups consisted of random samples of men presumed to be comparable to the participant groups except that they remained at the home base and were subjected neither to indoctrination nor to the combined indoctrination and exercise. (This type of analysis is applicable only to the indoctrination phase of the study and not to the maneuver phase, inasmuch as unindoctrinated troops could not be transported to Desert Rock for participation in the maneuver.)

Changes in the control groups from one test period to another would permit estimation of changes in attitude or information not attributable to indoctrination or exercise. Comparison of changes in the control groups with changes in the participant groups would provide a purified estimate of the effects of indoctrination and exercise.

Measurement of the Effects of the Training Program

Effect of Indoctrination Procedures

Questionnaire A (Baseline Test): Given at home base (Fort Campbell, Kentucky) to a sample of troops (Group 1) who were to participate in the experiment and also given to a non-participant group (Group 5). The questionnaires were given to both groups one month before D-day. This was before the participants received their formal indoctrination and before troops were officially notified which units were going to Desert Rock.

Questionnaire B (Post-Indoctrination Test): Administered to samples of participants (three days before D-day at Camp Desert Rock) and non-participants (nine days before D-day at Fort Campbell). Participants included a group of men (Group 2) who had not been tested before, as well as the group (Group 1) that had already taken the baseline test. Non-participants included two groups (Groups 6 and 7) which had not been previously tested, as well as the group (Group 5) that had taken the baseline test.

Between the administration of the baseline test and the post-indoctrination test, all participants had received Phase 3 indoctrination at their home base, had been transported to the maneuver area, had lived at the maneuver site for 14 days and had received additional indoctrination there. Non-participants had stayed at their home base, had received no indoctrination, and had been responsible only for execution of their normal duties.

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Immediate Effect of the Maneuver

Questionnaire C (D-day, Post-bomb Test): Administered at Camp Desert Rock to a sample of participants (Group 3) that had not been previously tested, and also to Group 2 that had taken the post-indoctrination test. The questionnaire was given on D-day following the troops' return to camp, some 6 or 7 hours after they had witnessed the detonation and its consequences.

Changes Related to a Lapse of Time After the Exercise

Questionnaire D (Delayed Effects Test): Given at Fort Campbell 18 days after D-day to participant Group 3 and to non-participant Groups 6 and 7. Ideally, there should have been a fourth group of participant troops that could have been given the test for the first time at this point, as well as previously untested groups of non-participants. However, since the number of men involved in the maneuver was small, it was decided to use three samples of participants rather than divide the men into four even smaller samples. It is apparent that this procedure results in confounding test-retest effect with experimental effect at this stage.

Estimation of Dissemination of Information and Opinion and of the

Retention of Knowledge

Questionnaire B (Post-indoctrination) and Questionnaire D (Delayed Effects): In order to estimate dissemination of information about the maneuver from participant to non-participant troops, two groups of non-participant troops were set up: Group 6, which was expected to have very little contact with the participants after their return to camp and Group 7, which was expected to have close contact with the participants after their return to camp. Although originally intended to measure dissemination, Groups 6 and 7 were primarily used as a control group for the effect of time lapse when the data on dissemination turned out to be too slender for analysis. Both groups were given Questionnaire B nine days before the maneuver and Questionnaire D 18 days after the maneuver, at Fort Campbell.

Unfortunately, the non-participant troops were off the maneuver during most of the 15 days after D-day and their contact with other troops was severely limited. There appeared to be little if any dissemination, but it is not clear that this would have been the case had there been more opportunity for interaction between participant and non-participant troops. Also, the amount of dissemination was probably affected by the troops' concept of what could be legitimately discussed in public. For these reasons, there is no detailed discussion of dissemination in this report.

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THE QUESTIONNAIRES

Content of the Questionnaires

The basic questionnaire contained on the average somewhat more than 100 items and covered nine major areas in addition to a number of subareas. These areas are enumerated below.

1. Background characteristics of the troops.
2. Troops' knowledge of atomic warfare and weapons.
3. Troops' confidence in
 - themselves, as indicated by the men's self-estimates of how well they thought they would do in conventional combat and in A-bomb combat.
 - their outfits, as indicated by estimates of the outfit's combat readiness.
 - controllability of the A-bomb, as indicated by men's estimates of how safely the experts could use the A-bomb in maneuvers.
4. Attitudes of the troops toward military life, with emphasis on
 - their identification with the Army, and with their branch of service within the Army (e.g., the Airborne Infantry).
 - their personal satisfaction with their outfits and their jobs.
5. War pessimism of the troops, as implied by their estimates of the imminence and duration of a future war with Russia, and their estimates of Russia's supply of A-bombs.
6. Anxiety expressed by the troops concerning
 - their participation in an A-bomb maneuver.
 - the A-bomb itself, as well as its individual major effects.
 - the dangerousness of the A-bomb effects.
7. Prevalence of tension among the troops as indicated by self-reports of various physiological manifestations. Two temporal reference points were utilized in exploring this area: (a) one referring to reactions that had "never" been experienced; (b) one referring to reactions experienced on the day of the maneuver.
8. Verbal volunteering behavior of the troops as indicated by their willingness to undertake
 - another A-bomb maneuver.
 - an unspecified secret, dangerous mission.
9. Troops' opinions of the efficacy of the indoctrination, as indicated by estimates of how much they had learned, and how much more they needed to know.

Methodological Considerations

Comparability of Questionnaires

In order to measure changes in information and attitudes of the men from one stage of the experiment to another questionnaire items

*A complete list of the questions analyzed in this report by the areas in which they are assessed is given in Appendix A.

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were kept as nearly constant as possible. Some additions and deletions were required to meet the varying situations. Obviously, for example, the men could not be asked if they had experienced any physiological reactions during the maneuver until after they had gone through the maneuver, nor could some of the questions concerning the maneuver be asked of the non-participants.

Sensitivity of Items to Extraneous Factors

The questionnaire was designed to supply data which could be utilized either as dependent variables reflecting the effects of exposing troops to the training program, or as independent variables permitting some characterization of those segments of the troops which might react in different ways to the training.

Although in general, most items included in the questionnaire permitted estimations of troop reactions to the training program, some proved to be oversensitive to extraneous factors. Ideally, a dependent variable should be sensitive to the independent variables against which it is analyzed, but should display no sensitivity to extraneous factors. Since the main analysis took the form of a series of measurements through time, extraneous factors had considerable opportunity to operate. For example, a number of opinions concerning the men's attitudes toward their outfits (i.e., companies or batteries) were solicited on the assumption that these attitudes as components of morale would reflect the effects of the exercise. Nevertheless, a strong possibility exists that the changes in the men's attitudes toward their outfits which were observed from one stage to another could have occurred as the result of change in command, levies of troops, reorganization of administrative units, or any of a large number of other events unrelated to the experiment. A curious illustration of this occurs in the measurement made at Stage D where, among the participant troops, attitudes toward officers tended to become less favorable than they had been at Stage C, while attitudes toward non-coms tended to become more favorable.

Limitation of Response Categories

The indoctrination program stressed, among other things, the precautions taken by the Army to ensure the men's safety, and also attempted to offset some of the exaggerations and superstitions surrounding the A-bomb in order to build up the men's confidence. It was surmised that the explosion might cause great fear and possibly even panic among the men; few observers came near guessing that the indoctrination program could possibly induce overconfidence in the men. Against this background, scarcely any provision was made in the response categories of appropriate questions for overconfident and overenthusiastic answers. Careless behavior of some men while exploring the area close to ground zero suggests that such answers might have been given if the appropriate questions had been asked. Since the instrument did not run

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the full scale, it was possible only to measure changes within the range from overestimation to correct estimation of the effects of the A-bomb, but the questionnaire did not permit adequate measurement of changes in the direction of underestimation.

Questionnaire Administration

All questionnaires were self-administered to the men, who were assembled in groups for this purpose. Trained test administrators explained some of the purposes of the study, told the men how to fill out the questionnaires, assured them of anonymity, and asked their cooperation in giving full and complete answers. In general, questionnaire procedures, standardized by the I & E Research Branch, Armed Forces I & E Division, were followed.

THE POPULATION

The Sample Design

Sampling was done in two stages: selection of battalions, and selection of men within the battalions.

Selection of Battalions

The participant battalion was selected by the Commander of the 11th Airborne Division, the division designated by Office, Chief of Army Field Forces. Enlisted men from the 1st Battalion, 188th Regiment, Fort Campbell, Kentucky augmented by a group of men from the 2d Battalion, were earmarked for the maneuver. Thus, as a result of administrative considerations, these men became the universe from which the samples of participants (Groups 1, 2, and 3) for the research were drawn.

The nature of the participant battalion dictated the choice of non-participant groups, since it was desirable that the two be as closely comparable as possible. The following selections were made:

1. A second regiment (the 503d, from the same division) was chosen as the one most nearly comparable to the 188th (participant) Regiment with respect to length of service in the Army and time in the Airborne Division. From within 503d Regiment, the 3d Battalion was chosen because it was most similar to the participant battalion with respect to age, education, marital status, and other background characteristics. From the 3d Battalion, non-participant Groups 5 and 6 were drawn.

2. Non-participant Group 7 came from the same regiment as the participant groups, but from non-participant personnel of the 2d Battalion who remained at Fort Campbell.^a

^aThe Heavy Weapons Company of the 1st Battalion, augmented by an artillery group from Fort Lewis, Washington (C Battery 546th Field Artillery Battalion), was used for supplementary study (Groups 8 and 10). Auxiliary Group 11 was drawn from the remainder of the 546th Field Artillery Battalion and Group 12 from the 194th Field Artillery Battalion, both from Fort Lewis, Washington.

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Selection of Men Within the Battalions

A roster was set up for the augmented 1st Battalion of the 188th Regiment (the participant group). Each of its three rifle companies was arranged alphabetically by rank in descending order, one company following another on the roster. From a randomly selected starting point, the men were consecutively assigned to three participant groups (1, 2, and 3).

A similar procedure was followed for the non-participant groups.^a Thus, the first stage of sampling was, from a statistical point of view, a purposive selection of battalions. The second stage of sampling was a stratified random selection of subjects. Criteria used for stratification were company and rank.

The Universe

The primary purpose of the maneuver was that of military training; the research was necessarily of secondary importance. It was reasonable that the Army would choose its participants from troops of relatively high caliber. Since the two battalions were selected purposively, they cannot be considered a sample of the Airborne Division. They are the universe of the study and, in the strictest sense, they represent only themselves.

Consequently, in a formal scientific sense, the findings of this report cannot be generalized beyond the two battalions included in the experiment. The men studied were all volunteers for the Airborne, they were at an advanced stage of training, they were better educated than the average unit, and differed in other ways which are presented on page 20. In these respects, at least, these men may not be considered as representative of an average infantry organization and their attitudes and reactions might turn out to be quite different even from those of other Airborne battalions.

From a practical point of view, however, one might reason that certain kinds of findings are considerably more generalizable than others. For example, findings about the effect of indoctrination on knowledge might prove to be more extensible than findings concerning men's volunteering for a dangerous mission. In the event that the interactions between the variables that make the selected battalion unrepresentative and the effect of indoctrination on knowledge prove to be small, it might be justifiable to generalize on this item from the battalions studied to other Airborne units at a similarly advanced stage of training. But even

^aGroups 1 and 2 represented randomly split halves of C Battery, 54th Field Artillery Battalion.

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this would have to be done with caution. Certainly, where the interactions can be assumed to be large, such as in the case of volunteering, no generalization of the findings is legitimate.

In most studies conducted within the Army, the primary purpose is necessarily a military one. Selection of the samples for research will be governed by the military purpose at hand. Consequently, such limitations as apply to this study are likely to occur in some degree in most Army research.

The Sample Size

In Table 2 the following data are reported: (a) Number of men originally selected for study; (b), (c), (d), (e) Number of men who filled in the questionnaire form at each stage of the experiment; (f) Number of cases used in the analysis (that is, the number of men within any one group who could be studied at two successive stages—described in the table as "matched respondents"); (g) Percentage of attrition between the number originally selected for study and the number used in the analysis.

Note: The total universe (N) for the participant Groups 1, 2, and 3 consists of 451 men. The matched respondents (n) used in the analysis of Group 1 are 112 men, a fairly substantial part of this universe. For all practical purposes, the universe can be considered finite and the standard error around the percentages reported can be reduced by application of a correction factor:

$$\sqrt{\frac{N-n}{N-1}}$$

In the above example, the standard error of a percentage in this finite universe is only 87 per cent of what the error would be if the universe were considered infinite (e.g., a standard error of 8 per cent in an infinite universe would be reduced to 7 per cent in the finite universe described here).

The use of correction terms for a finite universe would have been universally applicable throughout the Attitude Assessment Study. It was sacrificed, however, because of a conceptual difference in the definition of the universe. If the two battalions are considered a sample of all Airborne troops—as they were at the time the material in this study was originally analyzed—the universe from which each sample comes is, for practical purposes, infinite, and no correction term can be applied. Under the present,

⁷Although strict anonymity was preserved throughout the study, it was possible to utilize such background characteristics as birthdate, state of birth, rank, and length of service to match questionnaires.

statistically more tenable, definition of the universe, correction terms can be applied but the findings should not, at least theoretically, be extrapolated beyond the two battalions under study.

In practice, the results of the Attitude Assessment Study are hardly affected by the use of the correction term. In only a very few cases would application of the correction term tend to report a difference as significant, which otherwise would be considered not significant.

Attrition in the Samples

Sources of Attrition

Some men who were scheduled to appear when the questionnaires were administered did not come. This group includes men who were on furlough or pass, as well as men who were transferred, hospitalized, AWOL, or could not be spared for administrative reasons.

Two kinds of attrition occurred in this study. Since all subjects were scheduled to appear at two successive questionnaire administrations, attrition could occur from the failure of a man to appear at one or both questionnaire administrations for which he was scheduled. The analysis utilized only those men who filled in questionnaires at two

TABLE 2
NUMBER OF MEN TESTED AT EACH STAGE OF THE RESEARCH

Group Designation	Basic Groups						Auxiliary Groups			
	Participant Groups			Non-participant Groups			Participant Groups		Non-participant Groups	
	1	2	3	5	6	7	9	10	11	12
(a) Selected for Study	149	151	151	250	250 ^a	123 ^a	86	90	101	112
(b) Baseline (Study A)	135			194						
(c) Post-indoctrination (Study B)	115	135		165	161	115	83			
(d) D-day, Post-bomb (Study C)		130	133				75	64		
(e) Delayed Effects (Study D)			107		135	33		62	95	116
(f) Matched Respondents	112	122	91	150	114	76	74	45		
(g) Percent of Attrition	25	19	40	40	54	38	14	50		

^a Approximate. Exact figure unavailable.

successive stages (matched respondents) and treated those men who filled in only the first of their two successive questionnaires (unmatched first-test respondents) as if they had not appeared at all.¹

Effects of Attrition on Level of Response

From Table 2, row (g), it can be seen that sizeable proportions of men (from 19 per cent to 54 per cent in the basic groups) were lost to the analysis through attrition. If these men were different with respect to information, attitudes, self-confidence, and other factors, from those who were actually included in the analysis, a bias was introduced into the findings. It thus becomes important to analyze whatever evidence is available for clues about the nature of this possible bias.

No statement can be made about the bias introduced into the survey findings by failure to question the men who did not appear at all, since nothing is known about them except that they were scheduled to appear and did not do so. These men account for roughly one-half of the attrition in the basic groups.

Something is known, however, about the other men not included in the analysis, since they filled in one of the two questionnaires. Therefore, at any stage of the research it is possible to compare the answers given by the matched groups with the answers given by the men who appeared at only one of the two sessions. Results of these comparisons for all questions reported in the Attitude Assessment Study are shown in Table 3, in which is indicated on how many questions the proportion of men responding favorably² among the unmatched first-test respondents was larger than, smaller than, or equal to the proportion responding favorably among the matched first-test respondents.

The evidence in Table 3 suggests that the men who appeared only at their group's first test were somewhat less favorable than those who appeared at two successive questionnaire sessions. Thus, in each group an upward bias was introduced by the matching procedure. On the average, this bias was small, although on some individual questions the bias in either direction was fairly substantial. In Group 1, for example, the men who appeared at only the first questionnaire administration deviated from the matched respondents by 10 or more percentage points on 7 questions in the favorable direction, and on 10 questions in the unfavorable direction. The range of the deviations in this group extended from plus 21 per cent to minus 22 per cent.

Analysis of the data by question area (self-confidence, anxiety, information, attitude toward military life, and others) shows a similar distribution in most question areas for almost every group of men.³

¹As shown in Table 1, page 14, no second-test results were used in the analysis, except Stage D. In this case, too, only matched respondents were included.

²"Favorable" responses in the case of information questions were those answers judged to be correct on the basis of the material contained in the indoctrination manuals. In the case of attitude questions, those responses which were judged to indicate desirable military characteristics were defined as favorable.

³1 button on by questionnaire area are available, on request, from HUMPRO.

TABLE 3^a
COMPARISON OF MATCHED AND UNMATCHED RESPONDENTS'
FAVORABLE RESPONSES TO FIRST-TEST QUESTIONS

Groups	No. Questions on Which Proportion of Unmatched Respondents Answering Favorably is—			Total Questions	Percentage Differences, Matched & Unmatched Respondents	
	Larger	Equal	Smaller		Mean Difference ^b (per cent)	S.D. of Differences
Participant						
1	28	2	31	61	-1.1	9.0
2	30	1	37	68	-2.6	12.3
3	20	2	61	83	-3.9	7.1
Non-participant						
5	26	2	33	61	-1.5	7.9
6	27	5	39	71	-0.9	7.9
7	21	1	33	55	-1.5	7.9

^aThis table represents a summary of a more detailed analysis, the data for which are on file at HUMRAC. Additional data on attrition are also available.

^bThe mean of the differences in the percentages responding favorably between matched and unmatched first-test respondents.

Effects of Attrition on Changes in Response

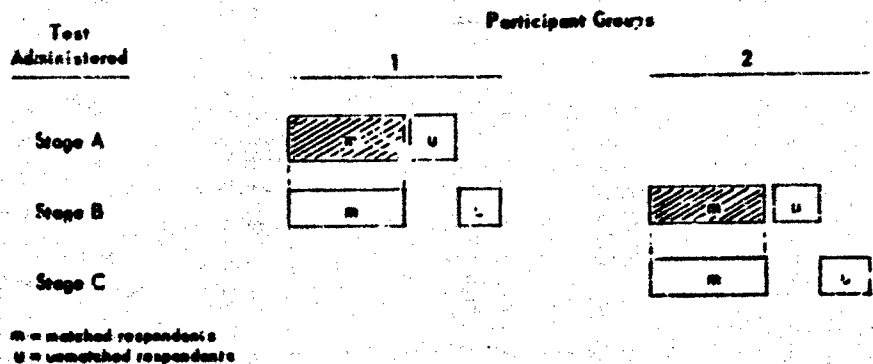
The basic question, however, is not so much how the level of attitude and information may be affected by bias, but rather what effect this bias may have on changes in attitude and knowledge. It can be reasoned that even if a bias does exist with respect to level, the results on changes in attitude and information may not be affected, provided the bias proves constant from group to group and from stage to stage.

Because the crucial comparisons were intended to be between men who were tested for the first time in each sample, whether or not a person appeared at two successive tests was not really essential for the main analysis. There is no real reason, therefore, to discard the unmatched first-test respondents. On the contrary, it is advantageous to keep them in the sample for two reasons:

1. Possible bias introduced by elimination of the unmatched first-test respondents is avoided.
2. The sampling error is slightly reduced by the increase in the number of men used in the analysis.

A measure of the bias introduced to the findings on change by excluding unmatched first-test respondents was obtained by comparing the amount of change observed when using all first-test respondents with the amount of change observed when using only matched first-test respondents. For example, comparison of the two ways of measuring

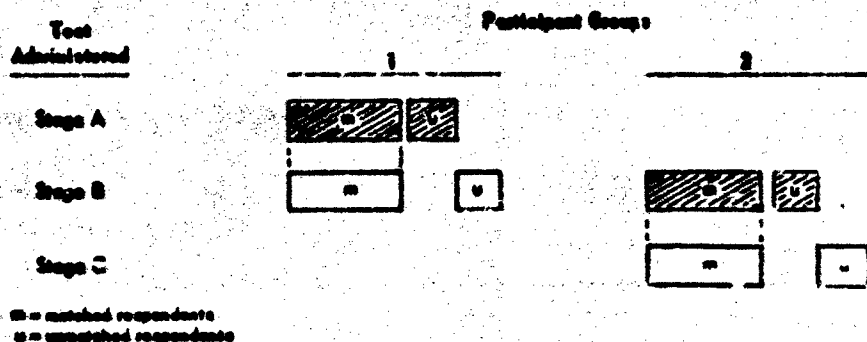
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When using matched first-test respondents to measure change from Stage A to B, the change is given by the difference in attitudes between the two doubly shaded groups (unmatched first-test respondents excluded).

Figure 1—Change measured on the basis of matched first-test respondents only.

change from stage A to B was done as diagrammed in Figures 1 and 2. A somewhat mixed pattern emerges." On the average, the differences introduced by exclusion of the one-timers are relatively small from questionnaire A to questionnaire B. It appears, however, that a bias was introduced which exaggerated the magnitude of the change from



When using all first-test respondents to measure change from Stage A to B, the change is given by the difference in attitudes between the two doubly shaded combined groups (unmatched first-test respondents included).

Figure 2—Change measured on the basis of all first-test respondents.

"5) In this analysis, based on a comparison of a total group with the major part of that group, the differences are attenuated.

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questionnaire B to C by excluding the men who took only the first test. If the men who appeared only at their group's first questionnaire administration had been included in the analysis of changes between Stage B and Stage C, 9 of the 68 questions studied would have presented differences which ranged from 5 to 10 percentage points smaller than the differences actually shown; only 4 of the 68 questions would have shown differences which were from 5 to 7 percentage points larger than those which were reported. In this instance, too, analysis by question area bears out the same pattern.¹⁴

TABLE 4
COMPARISON OF MATCHED WITH ALL FIRST-TEST RESPONDENTS'
FAVORABLE CHANGES FROM STAGE TO STAGE^a

Test Stages	No. Questions on Which Proportion of All First-test Respondents Answering Favorably is:			Total Questions	Percentage Changes: Favorable Responses: Matched & All First-test Respondents.	
	Larger	Equal	Smaller		Mean Difference (per cent)	S.D. of Differences
Participants						
A to B	25	13	23	61	+6.1	2.2
B to C	16	9	41	66	-1.4	1.3
Non-participants						
A to B	27	15	24	66	-0.3	2.7

^aFor example: On 75 of 66 questions, a larger proportion of all first-test respondents than of matched respondents changed in a favorable direction from test A to test B, on 13 questions there was no difference between the two groups, and on 26 questions the proportion of all first-test respondents of voting in a favorable direction was smaller.

Summary of Findings on Attrition

1. No statement can be made about the bias introduced into the survey findings by failure of men to appear at both questionnaire administrations. These men account for roughly one-half of the attrition.
2. An upward bias was introduced into the level of the survey findings because of exclusion from the analysis of men who had appeared only at the first questionnaire administration for their group. This

¹⁴Additional data on the foregoing are on file at MONRHO and are available on request.

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bias is small on the average, but on a number of individual questions it has been shown to be fairly substantial. Furthermore, it is consistent on all of the six groups studied.

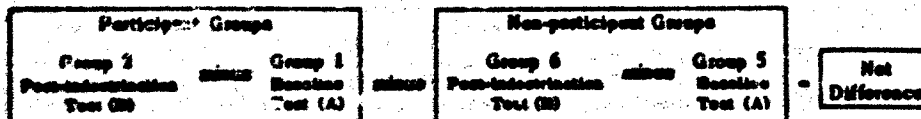
3. The pattern is mixed with respect to survey findings on change. Of three comparisons, two show practically no bias; the third shows an upward bias.

METHODS OF ANALYSIS

Three different types of analysis were used to estimate changes in information, attitude, and confidence between the four stages of the research.

Analysis of Changes from Baseline Test (Study A) to Post-indoctrination Stage, (Study B)

For comparison of the results of the baseline and post-indoctrination tests, the following type of analysis was used:



The rationale underlying this analysis is:

1. Separate random samples of men were tested, rather than the same samples, in order to eliminate test effect, i.e., those variations which are related to asking the men the same questions twice.

2. Changes in attitude and information observed in the non-participant groups were subtracted from the corresponding changes in the participant groups in an attempt to eliminate variations due to factors outside the indoctrination program.² Even if they had not been subjected to the indoctrination, the participant groups might have shown some change as a result of such sources as newspapers, radio, and letters from home. Changes in the non-participants would yield clues about the effect of influences outside of the formal indoctrination.

In many types of laboratory experiments and in some social experiments, control groups are an intrinsic part of experimental design. The underlying assumption is that the control groups will provide an estimate of the effect of time-correlated variables and will not be affected by the experiment itself. In the present study, however, there is evidence that changes occurred in the control groups which may have been due to the

²The effect of changing location (from home base to Camp Udon and back) was consciously controlled with the indoctrination effort.

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conduct of the experiment—perhaps to the very fact that the participant (experimental) groups were separated from the non-participant (control) groups, when the participants were sent to Camp Desert Rock on A-bomb maneuvers and the control groups were left behind at Fort Campbell.

If only time-related variables had operated on the control groups between the base period and pre-bomb tests, it would be reasonable to expect that information levels might have remained substantially unchanged, or on some questions shown an increment—due to discussions among the men, to radio, or newspaper influence. It would be difficult to postulate a reason for a decrease in information from baseline to post-indoctrination stages. Analysis of 30 information questions, however, shows that such a decrease in information occurred among the control groups.

From the baseline to the post-indoctrination stage, the proportion of non-participant men correctly informed

increased on 7 questions
decreased on 18 questions
did not change on 5 questions

and the proportion who said, "can't guess,"

increased on 24 questions
decreased on 5 questions
did not change on 1 question.

Thus, changes in these non-participant groups were in the unfavorable direction, i.e., fewer were correctly informed and more checked "can't guess." This finding could be rationalized under the hypothesis that factors other than time-related variables, such as the awareness of being left behind, affected the control (non-participant) groups.

Accordingly, the survey data are reanalyzed using changes in the participant groups only. The standard error of the difference¹⁴ between two percentages can then be computed in the usual manner by the formula:¹⁵

$$\sigma_{p_1 - p_2} = \sqrt{\frac{p_1 q_1}{N_1} + \frac{p_2 q_2}{N_2}}$$

¹⁴In addition to sampling variation, the findings reported are subject to biases due to errors of interpretation and of failure to report a finding. The probable effect of such biases is not known or measured by the sampling error.

¹⁵It is recognized that there is an increase in variance due to clustering and a decrease in variance due to stratification. These two factors do not necessarily cancel out. To avoid confounding of computations, however, on a large number of questions this approximation formula was used.

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By contrast, the analysis previously referred to which is based on changes in participant and non-participant groups [(B2 - A1) - (B6 - A5)] computes the standard error of the net difference as follows:

$$\sigma(p_1 - p_2) - (p_3 - p_4) = \sqrt{\frac{p_1 q_1}{N_1} + \frac{p_2 q_2}{N_2} + \frac{p_3 q_3}{N_3} + \frac{p_4 q_4}{N_4}}$$

As can be seen, the introduction of the non-participant group into the analysis approximately doubles the variance. The doubling of the variance, as well as changes in the net difference, results in a different interpretation of the findings for some questions.

Following are the comparative results obtained from the application of the two different types of analysis from baseline (study A) to post-indoctrination (study B):

Statistically significant* with and without non-participant control groups	27 questions
Statistically not significant with and without non-participant control groups	37 questions
Statistically significant with (but not without) control groups	2 questions**
Statistically significant without (but not with) control groups	4 questions**

Analysis of Changes from Post-indoctrination Stage (Study B) to Post-bomb Stage (Study C)

Non-participant control groups did not enter into the later stages of the experiment. It was not possible to arrange for a non-participant group to have stimulation comparable to that of Group 2, which had been given the post-indoctrination questionnaire. In addition, the short time interval between the two tests (three days) and the fairly complete isolation of the participants during this period seems to make the lack of a control group less important.

The effect of the maneuver was estimated by the following formula:



*To report, AFI & E Div, DD, and TI & E Div, DA. p. 25.

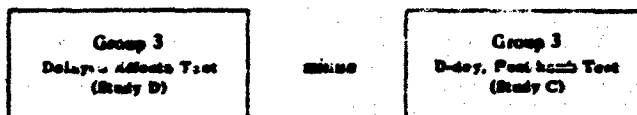
**Statistically significant as used here applies to the 5 percent level of confidence.

†For questions resulting in a different significance level, see Appendix A, p. 119.

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Analysis of Changes from Post-bomb Stage (Study C) to Delayed Effects Stage (Study D)

The analysis measuring the permanence of the maneuver effect used the same men rather than two independent samples. As indicated in the previous discussion of the research design, not enough men were available in the three participant companies to set up a fourth study group. Consequently, the analysis measuring the permanence of the maneuver effect was based on successive measurements of the same men.



ADDITIONAL CAUTIONS IN INTERPRETING THE ATTITUDE AND INFORMATION DATA

Effects of Indoctrination

Confounding of Two Indoctrinations

In the first place, the attitude study findings on the effectiveness of indoctrination do not permit a rigorous evaluation of the role of the home-base indoctrination. Administrative considerations limited the design to a comparison between baseline and pre-bomb (post-indoctrination) tests, a measure which resulted in confounding the effects of home-base and on-the-spot indoctrinations. Hence, even though considerable information gain and anxiety reduction were observed, it is not possible to isolate how much of this change is owing to the home-base indoctrination and how much to the indoctrination at Desert Rock.

Role of Expectation

In spite of the effort to keep the participant troops from knowing that they would soon be out on the desert while an A-bomb exploded, it seemed that even in the very early stages of the research some men were aware of this fact. The possible motivational effect of men's expectations on learning indoctrination materials could not be isolated, since it was not possible to compare responses of troops who were indoctrinated under the expectation of participating in the maneuver with those of troops who had no such expectation. The data do not deny the possibility that participants in the exercise were more highly motivated to learn than were troops whose indoctrination was not governed by similar expectations of taking part in an atomic maneuver.

SP. 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000

Lack of Unindoctrinated Participants

Finally, because of safety precautions, no unindoctrinated troops were allowed to participate in the maneuver. Because of this lack, it was not possible to set up control groups for the purpose of obtaining direct experimental evidence on how the indoctrinations were related to the attitudes, emotions, and behavior of the participant troops on D-day.

Effects of the ExerciseContaminating Factors (Desert Living, Maneuver Conditions)

The observed changes between pre- and post-bomb tests (i.e., study B and study C) must be attributed to the total configuration of events occurring between the two tests, rather than to the events of D-day alone. The detonation and maneuver, while undoubtedly most important, were not the only circumstances which influenced the men's responses.

Observers' reports, as well as troops' comments written in on questionnaires, suggest several possibly contaminating factors. As noted earlier,² there may have been dissatisfaction among participants concerning desert living conditions, lack of realism, and unavoidable delays in the staging of the maneuver. It is possible that these conditions may have had some influence on attitudes involving morale and identification with Army role.

Confounding of Detonation and Damage

For purposes of this preliminary study, the total impact of the detonation and maneuver was regarded as a single effect. Nevertheless, it is quite possible that each of the events (i.e., the detonation itself and the accompanying maneuver) may have had a different effect on the men. Indeed, a later study of another atomic exercise has been specifically designed to separate the effects of the two events.

Lack of Impression of Danger

To whatever degree the maneuver fell short of an actual A-bomb combat situation (in respects noted below), generalization of the findings from the one to the other would not be justified. There was an abundance of observers, including many general officers and important civilians who entered the forward area in advance of the troops. Further, extreme precautions were taken in checking for radioactivity. Approximately two hours elapsed between the detonation and the order to move forward toward ground zero. The advance was made in non-combat formation (single file). These precautions in all probability tended to reduce the troops' anxieties. The men's realization that it was extremely unlikely that they would get hurt might have influenced their subsequent response to some of the questionnaire items.

²Chapter 1, *supra*.

Men's Awareness of the Testing Objectives

It is also likely that the exposure of a relatively small body of troops to a rather extensive research program may have resulted in the men becoming unusually self-conscious about their psychological reactions. Practically every one of the participants was given an attitude questionnaire at one stage or another. Some of the troops were interviewed intensively; others had physiological measurements taken. In addition, many men were aware, as a result of official announcements, that psychological evaluation of troop behavior was one of the objectives of the exercise. The extent to which the troops' awareness of the interest in their psychological reactions may have influenced their responses could not be determined. The possibility exists, however, that their responses were affected by this realization.

BACKGROUND CHARACTERISTICS OF THE TROOPS

1. All of the subjects included in this survey were enlisted men, more than two out of three of whom had volunteered to enter the Army. Sixty-nine per cent of the participant group and 71 per cent of the non-participants were volunteers. This compares with 44 per cent volunteers among all enlisted men in the Army.²
2. Like all paratroopers, these men had volunteered for airborne service.
3. The men were slightly younger than men in the Army as a whole, the median age for both participants and non-participants being 21 years. While the range of the age distribution extended from 17 to 37 years, about 86 per cent of the men were included in the 18- to 23-year bracket. These figures compare with a median age of 22 years for enlisted men in the Army as a whole, two-thirds (66 per cent) of whom are in the age bracket, 18 to 23 years.
4. The men studied were somewhat better educated than enlisted men in general. Four-fifths of both participants and non-participants had gone beyond grade school. By contrast, only three out of five (62 per cent) of all enlisted men in the Army have received the same amount of education.
5. More than four out of five of both groups were single. In the Army at large, about three out of four (74 per cent) are single.
6. More men in the participant group (18 per cent) than in the non-participant group (17 per cent) had been with their present outfits for a relatively short time—less than 6 months.³ On the other hand, 2

²Source for all data about the Army as a whole: Sample Survey of Army Composition and Strength (including SCARWAP Personnel) as of 30 Sep 1951.

³They may have resulted from the impression held by some of the men who had been drawn from the 2d Division that they had been permanently transferred to the 1st Division. See p. 17, *supra*.

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larger proportion of the men in the participant group (42 per cent), as compared with non-participants (31 per cent), had been with the Army a relatively long time—more than 12 months.

7. There were more non-coms in the participant group (32 per cent corporals and sergeants) than in the non-participant group (23 per cent).

8. More of the participant men (33 per cent) than of the non-participants (20 per cent) came from the Middle West.

9. One out of seven (14 per cent) of the participant men were combat veterans, compared with one out of twelve (8 per cent) of the non-participants.

The above description is based on the 325 men in participant Groups 1, 2, and 3, and on the 340 men in non-participant Groups 5, 6, and 7. These totals include only those men who filled in the questionnaire at two consecutive administrations.

The three participant groups (1, 2, and 3) proved to be similar to one another in all background characteristics. Likewise, the non-participant groups (5, 6, and 7) were similar to each other. Participants and non-participants were alike in all characteristics except those factors enumerated above; i.e., length of service in the Army and in the outfit, rank attained, birthplace, and combat experience."

"Data tables on which this description is based are shown in Appendix B.

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CHAPTER 3

EFFECTS OF THE TRAINING PROGRAM ON TROOPS' INFORMATION AND ATTITUDES

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Chapter 3

EFFECTS OF THE TRAINING PROGRAM
ON TROOPS' INFORMATION AND ATTITUDES¹

The Attitude Assessment Survey findings were reorganized by HUMRRO analysts to show the over-all effect on the participant troops of the training program, which includes indoctrination and maneuver. For this purpose, all successive stages of the research were analyzed simultaneously. While this presentation lacks the advantage of specificity in describing the effect on the men of the individual stages of the training program (an approach emphasized in the Attitude Assessment Report),² it has the merit of pointing out the accretion of changes which, although small and not always statistically significant from one stage to the next, may accumulate significance over the entire course of the experiment.

FINDINGS RELATED TO INFORMATION³

At the start of the experiment (as shown in Table 5) participants and non-participants displayed approximately equal knowledge with respect to questionnaire items dealing with information included in the indoctrination program.⁴ On the baseline test (Study A), the mean score in a series of 30 questions related to atomic weapons and atomic warfare was 12.1 for participants and 11.8 for non-participants.⁵

¹This chapter was written by John L. Finsen and Joseph C. Hochstim with the collaboration of Shepard G. Schwartz.

²Joint Report, AFM & E Div, DD, and TM & E Div, D*, op. cit.

³In this discussion, as in all summary statements in this chapter, the groups of men used in the analysis were:

Baseline: Participant Group 1 and Non-participant Group 5.

Post-indoctrination: Participant Group 2 and Non-participant Groups 6 and 7 combined.

Post-bomb: Participant Group 3.

Delayed Effects: Participant Group 3 and Non-participant Groups 6 and 7 combined.

It is noted that since Participant Group 3 and Non-participant Groups 6 and 7 were each compared at two stages, the resulting comparison may be contaminated by test-retest effect, since the same men were used in two successive tests.

⁴The questions asked do not represent a balanced list of all information items that might be discussed in a training program for atomic warfare. Of the 30 questions asked, 18 deal with effects of radiation, 4 with effects of the flash, 1 with blast effects, and 9 with miscellaneous information.

⁵For detailed results, see Appendix Table C-1, pp. 130-1.

TABLE 5
MEAN INFORMATION SCORE^a AT EACH STAGE OF THE RESEARCH

Group Designation	Stage							
	Baseline		Post-indoctrination		Post-bomb		Delayed Effects	
	Mean Score	N	Mean Score	N	Mean Score	N	Mean Score	N
Participants	12.1	112	21.6	122	21.9	91	22.1	91
Non-participants	11.8	150	11.0	190	N.T. ^b	—	11.8	190

^aBased on all 30 questions.

^bNot tested at this stage.

After completion of the indoctrination program, participants' knowledge rose sharply above that of non-participants. The average score on the same 30 questions, as measured at the post-indoctrination stage (Study B), was 21.6 for participants and 11.0 for non-participants. On 26 of the 30 questions, the number of participants replying correctly at the post-indoctrination stage was significantly larger ($p < .05$) than the number replying correctly at the baseline stage.^c Among the non-participants, none of the 30 questions showed a significant change toward increased information. Three questions changed significantly in the direction of less information.^d

Participants' knowledge did not change significantly after the time the post-indoctrination test was given. The mean information score achieved by participants on the same 30 questions was 21.9 immediately after the maneuver (Study C) and 22.1 eighteen days later (Study D).

Non-participants likewise did not show any significant changes between the post-indoctrination (Study B) and the delayed effects (Study D) stages. Their average score at the latter stage was 11.8, as compared with a mean score of 11.0 at the earlier stage.

The following statements can be made about changes in information obtained over the entire period of the research (from Stages A through D):

1. Participants achieved considerable gain in information during the period extending from the baseline test to the post-indoctrination test.
2. Thereafter, their over-all knowledge remained stable. While gains were recorded on a few questions, these gains were offset by losses on a few other questions.

^cUnless otherwise specified, t-tests are used as a measure of significance throughout this report.

^dFor a rationale of this decrease, see under "Methods of Analysis," page 27.

TABLE 6
MEAN PERCENTAGES OF CORRECT RESPONSES
TO "PERSONAL INJURY" AND "NON-INJURY" QUESTIONS
AT EACH STAGE OF THE RESEARCH

Group Designation	Stage			
	Baseline	Post- indoctrination	Post-bomb	Delayed Effects
<i>Participants</i>	(N = 112)	(N = 122)	(N = 91)	(N = 91)
	%	%	%	%
"Personal injury"	38	79	81	80
"Non-injury"	53	75	77	79
<i>Non-participants</i>	(N = 150)	(N = 190)	N.T. ^a	(N = 190)
	%	%	%	%
"Personal injury"	37	33	---	40
"Non-injury"	52	49	---	49

^aNot tested at this stage.

3. On 26 of 30 questions, the number of participants answering correctly was significantly larger ($p < .05$) at the last stage of the research than at the first.

4. Non-participants—starting out at roughly the same level as participants—did not show gains in information over the period of the research.

The gain in information was greatest for questions dealing with self-protection during an atomic detonation. (See Table 6.) The 17 true-false questions concerning information on atomic effects were dichotomized between effects which could be interpreted by the troops to connote personal injury and effects which could not be so interpreted.^a The average proportion of correct responses to questions suggesting personal injury increased among the participants by 41 percentage points from baseline to post-indoctrination stages. The corresponding increase for the non-injury items was only 22 percentage points. Among non-participants, the level of information remained approximately constant for both sets of questions.

^aFor questions falling into each of these groups, see Appendix C, p. 129.

TABLE 7
SELF-CONFIDENCE AT EACH STAGE OF THE RESEARCH

Response (Paraphrased)	Stage			
	Baseline	Post- indoctrination	Post-bomb	Delayed Effects
<i>Participants</i>	(N = 112)	(N = 144)	(N = 91)	(N = 91)
	%	%	%	%
Do all right in actual fighting	40	43	57	62
Do all right in A-bomb fighting	N.I. ^a	62	73	73
<i>Non-participants</i>	(N = 150)	(N = 190)	N.T. ^b	(N = 190)
	%	%		%
Do all right in actual fighting	42	44	—	55
Do all right in A-bomb fighting	N.I.	25	—	37

^aQuestion not included in this stage.

^bNot tested at this stage.

FINDINGS RELATED TO CONFIDENCE

Confidence in Self

Self-confidence among participant troops increased consistently over the whole period of the research.¹ (See Table 7.) While, with one exception, the changes from any one stage of the research to the subsequent one were not statistically significant, they moved consistently in the upward direction, so that over the entire period of the research the increase was significant at the 1 per cent level. The largest stage-to-stage gain in confidence was registered between the post-indoctrination stage (Study B) and the post-bomb test (Study C), i.e., following participation in the maneuver.

Non-participants showed a somewhat smaller increase in self-confidence. The gain in self-confidence among the non-participants

¹Two questions were used to estimate self-confidence. "If you were sent into actual combat now, how do you think you would do?" and "If you were sent into actual fighting now, how would you do?" The first question was used at all four stages of the research. The second question could only be introduced at the post-indoctrination stage. Thus, the latter question, the gain in self-confidence among the participants as a result of the indoctrination can only be deduced by comparing participants with non-participants at the post-indoctrination stage.

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TABLE 8
CONFIDENCE IN OUTFIT'S COMBAT READINESS
AT EACH STAGE OF THE RESEARCH

Response (Paraphrased)	Stage							
	Baseline		Post- Indoctrination		Post-bomb		Delayed Effects	
	%	N	%	N	%	N	%	N
Outfit is combat-ready now, or in a few weeks								
Participants	66	112	75	122	70	91	58	91
Non-participants	73	150	68	190	N.T.*	—	75	190

*N.T. tested at this stage.

which occurred between the post-indoctrination and delayed effects stages suggests that participants and non-participants might have communicated with one another. Possibly the knowledge that no one was hurt during the maneuver served to increase the self-confidence of some of the non-participant troops.

At all stages following the baseline (i.e., B, C, and D), more of the participants indicated that they would do all right in A-bomb fighting than indicated that they would do all right in conventional fighting. This finding suggests that the men might have regarded combat in the area of an atomic bomb as different and possibly less exacting than conventional combat. By contrast, more of the non-participants indicated that they would do all right in conventional fighting than in A-bomb fighting.

Confidence in Outfit

Another measure related to confidence made use of a "semi-projective" question on combat readiness.¹⁰⁰ (See Table 8.) Although these findings may be interpreted as another measure of self-confidence, they may have become contaminated by factors outside the experiment.

Responses to the questions on how well the men thought they would do in conventional and in A-bomb fighting may have been influenced by the following factor: Some men who answered these questions positively might have revealed their doubts about their own combat performance by answering negatively to the question about their outfit's readiness for combat.

¹⁰⁰Do you think your outfit is ready to go into combat now if it had to?

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From the post-bomb to the delayed effects stage, a decrease was observed in the proportion of participants saying that their outfit was ready for combat ($.05 < p < .10$). It is not clear, however, whether this decrease reflects a projected loss of self-confidence or the evaluation of some extraneous factor such as a transfer of officers, reorganization of platoons, or levees on troops for overseas duty.

Confidence in Experts

While more than three-quarters (78 per cent) of the participants at the post-indoctrination stage expressed confidence in the experts' ability to control the A-bomb, only 28 per cent of the non-participants expressed confidence in the experts at that stage. (See Table 9.) The question about the experts could not have been asked before the men had received indoctrination; thus, no comparison is possible between pre-indoctrination and post-indoctrination stages. The difference between participants and non-participants, however, permits the inference that the greater confidence shown by participants may be related to their indoctrination. Moreover, the participants' high level of confidence in the experts persisted throughout the later stages of the experiment.

Among non-participants an increase in confidence in experts, considerable ($p < .01$) although appreciably lower than that which occurred among the participants, was also observed. The proportion of non-participants expressing confidence in experts increased from one-fourth at the post-indoctrination stage to one-half at the delayed effects stage. Again it might be surmised that this gain is attributable to intercommunication among the troops.

TABLE 9
CONFIDENCE IN EXPERTS' CONTROL OVER A-BOMB
AT EACH STAGE OF THE RESEARCH

Response (Percentage)	Stage							
	Baseline		Post- Indoctrination		Post-bomb		Delayed Effects	
	%	N	%	N	%	N	%	N
Experts know enough to use A-bombs safely in maneuvers								
Participants	N.I. ^a	—	78	127	83	91	78	91
Non-participants	N.I.	—	28	196	N.T. ^b	—	48	196

^aQuestion not included at this stage.
^bNot asked at this stage.

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TABLE 10
ESTIMATES OF LETHAL RANGE OF ATOMIC BLAST
AT EACH STAGE OF THE RESEARCH

Kind of Estimate	Stage			
	Reaction	Post-Indoctrination	Post-bomb	Delayed Effects
Participants	(N = 112)	(N = 122)	(N = 21)	(N = 91)
	%	%	%	%
Underestimate	6	9	31	25
Correct response	14	47	45	47
Overestimate	54	41	20	27
Can't guess	26	3	4	3
Non-participants	(N = 150)	(N = 190)	N.T. ^a	(N = 190)
	%	%		%
Underestimate	9	7	—	11
Correct response	19	18	—	19
Overestimate	50	49	—	44
Can't guess	22	26	—	26

^aNot tested at this stage.

Changes in Estimates of the Bomb's Effectiveness

What may be interpreted as overestimation of the effects of the A-bomb among participants appeared to have decreased considerably following the indoctrination. It should be noted, however, that only two questions^a permitted a measure of overestimation as well as underestimation of the effects of the A-bomb. Both questions required an estimate of danger in terms of distance; in both cases the correct response is "3 miles." Responses of "1 mile," therefore, could be interpreted as a tendency to underestimate the effect of the A-bomb. Responses of "5 miles" or of "7 miles," on the other hand, could be taken as a tendency to overestimate the effect of the A-bomb.

The distribution of underestimates, correct responses, and overestimates at each of the four stages of the research is given in Tables 10 and 11. The data summarized in the tables suggest that the

^aThese questions are:

- "The blast effect of an A-bomb air burst at 2000 feet would not kill anybody beyond a distance of ___ 1 mile; ___ 3 miles; ___ 5 miles; ___ 7 miles; ___ can't guess."
- "The blast effect on exposed skin caused by the heat energy from a Hiroshima type A-bomb burst at 2000 feet would be expected up to a distance of: ___ 1 mile; ___ 3 miles; ___ 5 miles; ___ 7 miles; ___ can't guess."

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indoctrination successfully reduced overestimation among the participant troops, and that the detonation produced a noteworthy increase in the direction of underestimation.

Among the non-participants, neither a reduction in overestimation nor an increase in underestimation was observed. The proportions of non-participants in each response category remained relatively stable for both questions over the entire period of the research.

TABLE 11
ESTIMATE OF FLASH BURN RANGE OF ATOMIC FIRE FLASH
AT EACH STAGE OF THE RESEARCH

Kind of Estimate	Stage			
	Baseline	Post-Indoctrination	Post-bomb	Delayed Effects
Participants	(N = 112)	(N = 122)	(N = 91)	(N = 91)
	%	%	%	%
Underestimate	13	17	35	32
Correct response	31	60	49	47
Overestimate	34	19	11	18
Can't guess	22	4	5	3
Non-participants	(N = 150)	(N = 100)	N.T. ^a	(N = 100)
	%	%		%
Underestimate	12	15	—	15
Correct response	25	17	—	28
Overestimate	38	43	—	33
Can't guess	25	25	—	27

^aNot tested at this stage.

FINDINGS RELATED TO EXPRESSED ANXIETY

Anxiety concerning effects of the A-bomb apparently decreased considerably following the indoctrination. (See Table 12.) The effect of the indoctrination on anxiety can be inferred from a comparison of the indoctrinated participants and the unindoctrinated non-participants at the post-indoctrination stage. Less than one-fifth of the non-participants (13 per cent to 18 per cent) at the post-indoctrination stage said that they would "not be worried at all" about any single effect of the A-bomb; on the other hand, between one-half and three-fifths of the participants (50 per cent to 63 per cent) said they "would not be worried at all."

Despite this decrease following indoctrination, anxiety about the effects of the A-bomb remained at a high absolute level. Even after

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indoctrination, only slight majorities of the participants (53 per cent to 62 per cent) did not express worry about the general effects of the bomb.

From the evidence, the detonation seems to have been a frightening experience. At the post-bomb stage, only minorities said they were not frightened at all by the fire flash (46 per cent) and by the blast (38 per

TABLE 12
LACK OF ANXIETY AT THREE STAGES^a OF THE RESEARCH
AS INDICATED BY ESTIMATES OF WORRY, FRIGHT, AND DANGER

Response (Percentage)	Stage		
	Pre-indoctrination	Post-bomb	Delayed Effects
Participants	(N = 122)	(N = 91)	(N = 91)
	%	%	%
Not worried at all about:			
The A-bomb maneuvers	83	88	56
The fire flash (fireball)	62	N.I. ^b	N.I.
The explosion (blast effect)	53	N.I.	N.I.
Radiation at time of explosion	59	N.I.	N.I.
Residual radiation (after explosion)	53	N.I.	N.I.
Not frightened at all by:			
The fire flash (fireball)	N.I.	46	44
The explosion (blast effect)	N.I.	38	43
Radiation at time of explosion	N.I.	79	75
Residual radiation (after explosion)	N.I.	74	73
The last test A-bomb detonation	N.I.	84	75
Thinks is no danger from:			
The fire flash (fireball)	N.I.	41	24
The explosion (blast effect)	N.I.	42	25
Radiation at time of explosion	N.I.	41	31
Residual radiation (after explosion)	N.I.	68	51
Handling of field equipment left in advanced positions	N.I.	62	66
Nonparticipants	(N = 198)	—	(N = 198)
	%	—	%
Would not be worried at all about:			
The A-bomb maneuvers	15	N.T. ^c	21
The fire flash (fireball)	18	N.T.	20
The explosion (blast effect)	16	N.T.	19
Radiation at time of explosion	19	N.T.	23
Residual radiation (after explosion)	13	N.T.	17

^aThe questions pertaining to estimates of worry, fright, and danger were not included in the questionnaires administered at the bomb test.

^bQuestion not included in this stage.

^cNot tested at this stage.

cent). Similarly, only two of every five men considered fire flash, explosion, and radiation at the time of the explosion not dangerous to the troops.¹² No direct comparison can be made between the participants' anxieties at the post-indoctrination and at the post-bomb stages because of variations in question wording on the two questionnaires.

No decrease in anxiety among the participants was noted between the post-bomb stage and the delayed effects stage. On the contrary, there is indirect, suggestive evidence of an increase: About the same proportions of troops at both stages said they were not frightened by the fire flash and by the explosion. Following a lapse of 18 days after the detonation, however, significantly fewer men ($.01 < p < .05$) than on E-day said that fire flash and explosion were not dangerous to the troops.

This "semi-projective" estimate of anxiety—i.e., the perception of danger to the troops in general—may reflect a man's anxiety about the A-bomb with less distortion than the more ego-involved questions about his own fright. If it be assumed that anxiety did increase among the participants, it may be further speculated that this increment was related to the dissipation of any euphoria attendant upon the conclusion of the maneuver. Support for this speculation is offered by the finding that significantly fewer participants ($p < .01$) at the delayed effects stage (56 per cent) as compared with the post-bomb stage (80 per cent) reported that they were "not worried at all" about being on an A-bomb maneuver.

Non-participants showed small, consistent decreases in anxiety between the post-indoctrination and delayed effects stages, but anxiety remained at a high absolute level.

FINDINGS RELATED TO VERBAL STATEMENTS OF TENSION

Ideally, it would have been desirable to test the hypotheses:

1. Maximum tension can be expected at the climactic stage, i.e., during the detonation.
2. Maximum tension will be evoked at some earlier stage in the sequence of events (anticipatory tension).

It was not possible, however, in the present study to secure data for examination of either hypothesis. Such evidence as is available suggests that tension manifestations remained relatively stable throughout the experiment, except that there was a decrease in tension at the post-bomb stage: On three of the seven tension items significantly fewer participants ($p < .05$) reported at the post-bomb stage as compared to the post-indoctrination stage ever having experienced these reactions.

Although this finding would seem to be illogical and to reflect on the reliability of the tension items, it should be noted that the rationale of the tension items is not based on the literal accuracy of the items.

¹² An apparent contradiction is that 84 per cent of the men said they were not frightened when the test A-bomb went off.

responses, but on the inferences that can be drawn from them about the psychological state of the respondents at the time the questions were answered. The inference suggested here is that euphoria was present at the post-bomb stage. On the afternoon of D-day, the men might have felt relief that no one had been hurt during the maneuver. It is likely that they were looking forward to breaking camp and to receiving passes. But apparently this euphoria had only a momentary or short-term effect, since 18 days after D-day there appeared to be a tendency to return to the responses given at the baseline test.

TABLE 13
LACK OF TENSIONS AT EACH STAGE OF THE RESEARCH

Physiological Reaction	Stage			
	Baseline	Post-Information	Post-bomb	Delayed Effects
Participants	(N = 112)	(N = 122)	(N = 91)	(N = 91)
	%	%	%	%
Percentage of men reporting never having been bothered by:				
Hands trembling	62	44	76	69
Nervousness	48	39	56	51
Heart beating hard	56	58	58	56
Shakiness of mouth	5	78	74	74
Mouth sweating	37	48	55	58
Upset stomach	26	27	26	25
Cold sweat	58	59	57	66
Non-participants	(N = 150)	(N = 190)	N.T. ^a	(N = 190)
	%	%		%
Percentage of men reporting never having been bothered by:				
Hands trembling	65	62	—	60
Nervousness	43	38	—	42
Heart beating hard	51	57	—	54
Shakiness of mouth	71	72	—	64
Mouth sweating	45	46	—	50
Upset stomach	25	24	—	31
Cold sweat	59	52	—	54

^aNot tested at this stage.

FINDINGS RELATED TO VOLUNTEERING

As reflected in responses on two of three questions, participants' willingness to volunteer diminished as the experiment proceeded.

Three of every four of the participants (74 per cent) questioned at the post-indoctrination stage stated that if given a choice between an A-bomb maneuver and a conventional maneuver without A-bombs, they would have chosen the former. (See Table 14.) Again, the effect of the

TABLE 14
WILLINGNESS TO VOLUNTEER AT EACH STAGE OF THE RESEARCH

Response (Paraphrased)	Stage			
	Baseline	Post- Indoctrination	Post-bomb	Delayed Effects
Participants	(N = 112)	(N = 122)	(N = 91)	(N = 91)
	%	%	%	%
Would volunteer for another A-bomb maneuver	N.I. ^a	82	73	79
Would volunteer for a secret, dangerous mission	56	57	43	47
Would have chosen the A-bomb maneuver over maneuver with no A-bomb	N.I.	74	82	63
Non-participants	(N = 150)	(N = 190)	N.T. ^b	(N = 190)
	%	%		%
Would volunteer for another A-bomb maneuver	N.I.	73	—	78
Would volunteer for a secret, dangerous mission	49	55	—	53
Would choose an A-bomb maneuver over maneuver with no A-bomb	N.I.	41	—	35

^a Not included at this stage.

^b Not tested at this stage.

indoctrination may be inferred by contrasting this with the percentage of non-participants (41 per cent) who reported at the post-indoctrination stage that they would have chosen the A-bomb maneuver.

From the post-bomb to the delayed effects stage, a sharp decrease, from 82 to 63 per cent ($p < .01$), was observed in the proportion of participants who stated that they would have chosen an A-bomb maneuver. On the other hand, the non-participants showed a sharp increase in preference for the A-bomb maneuver (from 41 to 55 per cent ($p < .05$)) between the post-indoctrination and delayed effects stages.

Four out of five (80 per cent) of the participants expressed willingness to volunteer for another A-bomb maneuver if the Army should need experienced men for such a maneuver in the future. This proportion remained stable from the post-indoctrination test through the later stages. Willingness of non-participants to volunteer for an A-bomb maneuver increased slightly ($.10 < p < .20$) over the course of the experiment from post-indoctrination (Stage B) to the final test (Stage D) and approached the absolute level of the participants.

Significantly fewer participants at the post-bomb stage as compared with either of the two preceding stages were willing to volunteer for a secret, dangerous mission ($.01 < p < .05$). This lower level of willingness to volunteer for such a mission persisted through the delayed effects stage (Study 1). Non-participants showed no significant changes from one stage to another on this item.

SUMMARY EVALUATION OF THE ABOVE FINDINGS¹

Determinants of the findings reported on information, confidence, anxiety, tensions, and volunteering are interrelated. In varying measure, all of these findings contribute toward answering the two basic questions of the attitude assessment research:

1. To what extent did the indoctrination and the maneuver increase the troops' level of information about atomic warfare?
2. To what extent did the indoctrination and the maneuver increase confidence and reduce anxiety and fear in the participants?

A clear answer can be given to the first question:

As measured by the techniques of this study, a substantial increase in the troops' level of information about atomic warfare was shown to follow the indoctrination. This higher level of information persisted throughout the experiment.

Less clearly interpretable are the findings related to confidence and reduction of anxiety and fear:

On the positive side, significantly more men stated by the end of the experiment that they thought they would do well in combat, including combat involving an A-bomb. Throughout the experiment, large proportions of the men expressed confidence that the experts know enough about the A-bomb to use it with safety in military maneuvers. Furthermore, large proportions expressed willingness to volunteer for another A-bomb maneuver.

On the negative side, large proportions of men admitted having been frightened by the flash and blast, both immediately

¹In addition, a number of secondary findings are reported in Appendix E.

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after the detonation and as long as 18 days later. Also, immediately after the detonation, men's willingness to volunteer for a secret, dangerous mission diminished. By the time 18 days had elapsed following the detonation, the number of men who indicated worry about being sent on this A-bomb maneuver had increased, and fewer men preferred the A-bomb maneuver over a conventional maneuver. Finally, confidence in the outfit's readiness for combat regressed and men's estimates of danger of various effects of the A-bomb to the troops increased between the time of the detonation and the end of the study.

It appears from these findings that there is some possibility of an increase in men's self-confidence; as men were given first-hand experience with the A-bomb, some of their fears were reduced. There are other indications, however, that considerable proportions of men retained fears, persisted in what might be exaggerated estimates of the danger of the A-bomb, and did not really consider themselves ready for A-bomb fighting.

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CHAPTER 4

INFORMATION AND SELF-CONFIDENCE AS FACTORS IN TROOPS' RESPONSES

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Chapter 4

**INFORMATION AND SELF-CONFIDENCE
AS FACTORS IN TROOPS' RESPONSES¹****INFORMATION IN RELATION TO OTHER CHARACTERISTICS**

Substantial individual differences were observed in the men's level of information about atomic warfare and in their gain in information resulting from indoctrination. In the baseline study (Study A), for example, among participant troops, the lowest number of correct responses made by any man to the 30 questions related to atomic weapons and warfare was zero, and the largest number, 29. The mean number of correct responses was 12.1 with a standard deviation of 5.2. This relatively great individual variation persisted through the post-indoctrination stage (Study B), although its range (from 5 to 28) was somewhat reduced. Further, the mean number of correct responses rose to 21.6 with a standard deviation of 4.1. A wide range in individual gain in information from baseline to post-indoctrination was also observed (from -3 to +23).²

With these large individual differences as a point of departure, three groups of hypotheses were developed.

1. It was hypothesized that level of information would be higher, and gain in information greater, among those troops who (a) had had relatively more schooling; (b) had volunteered for the Army; (c) had been in their outfits for a relatively longer time; (d) preferred their own Army branch; and (e) reported fewer manifestations of tension.³

2. It was further hypothesized that level of information was positively related to the troops' confidence in (a) themselves, (b) their outfits, and (c) the ability of the experts to control the A-bomb. As a corollary, it was reasoned that fewer of the better-informed troops would express anxiety about the maneuver as a whole, or about the effects of the A-bomb. A second implication was that more of the better-informed troops would be willing to volunteer both for another A-bomb maneuver and for an unspecified but implicitly dangerous mission.

¹This chapter was written by Shepard G. Schwartz and John L. Flynn. The section, "Information in Relation to Other Characteristics" was prepared with the collaboration of Joseph P. Hochstein and D. J. Cahalan.

²This finding is based on a comparison of the same men at the baseline and post-indoctrination stages.

³As indicated by self-reports of various physiological reactions. See Chapter 5.

3. Last, it was hypothesized that if self-confidence were determined, at least in part, by information level, prediction of self-confidence at a later stage from level of information at a preceding stage would be possible.

TABLE 15
MEAN INFORMATION SCORES;^a
INDOCTRINATED AND NON-INDOCTRINATED TROOPS
BY EDUCATION AND OTHER CHARACTERISTICS

Characteristics	Troops			
	Non-indoctrinated		Indoctrinated	
	Mean Score	N	Mean Score	N
<i>Educational Level</i>				
High school graduates	2.0	179	7.3	96
Non-high school graduates	1.7	271	6.4	137
<i>Method of Entry into Army</i>				
Volunteers	1.7	320	6.7	165
Non-volunteers	2.0	127	6.8	64
<i>Time in Outfit</i>				
More than 6 months	1.9	339	6.7	133
6 months or less	1.5	112	6.9	99
<i>Branch Preference</i>				
Airborne infantry	1.8	200	7.0	107
Other Army branch	1.8	252	6.6	126
<i>Tension Manifestations</i>				
Below average	1.7	112	6.5	65
Average	1.9	204	6.8	95
Above average	1.8	136	6.9	74

Example: Before indoctrination, high school graduates gave correct answers to an average of 2 of 10 questions; non-high school graduates to 1.7 questions. After indoctrination, high school graduates gave correct answers to 7.3 of 10 questions; non-high school graduates to 6.4 questions.

^aThis score is based on the 10 information items judged to be most difficult on the basis of the number of correct answers at the non-test stage. Adjustment was made for different probabilities of guessing. This score correlated .88 with the 30-item score. It was utilized because the distributions were sharply in terms of change between the various subgroups. See Appendix C, p. 132.

Education and Other Characteristics *

The data summarized in Table 15 indicate that the better-educated troops exhibited significantly more knowledge after indoctrination than did the lesser-educated ($p < .01$). Although no significant difference in information was found between the two groups prior to indoctrination. The data, however, do not confirm the hypothesis that information level or information gain were related to the troops' method of entry into the Army, length of time in outfit, preference for service in the Airborne, or tension manifestations.

Confidence

Following indoctrination, significantly more of the better-informed troops (as compared with the lesser-informed) stated that they would do well in conventional combat, as well as in combat involving the use of an A-bomb against an enemy. There was only a suggestive difference, however, between the better-informed and lesser-informed troops with respect to confidence in the ability of the experts to control the A-bomb, and there was no significant difference in their confidence in the outfit's readiness for combat. (See Table 16.)

An additional finding of some interest concerning the interrelationship between confidence and knowledge results from analysis of the two items in the questionnaire, the responses to which permit overestimation or underestimation of the A-bomb's effectiveness. (See page 43 and Table 10.) Analysis of these error choices of all troops in the sample who answered these questions incorrectly indicates that on the question concerning blast effect, 31 per cent of the self-confident troops, as compared with 57 per cent of the non-self-confident (or "other" troops), overestimated the bomb's effectiveness; on the question concerning fire flash, 21 per cent of the self-confident troops, and 48 per cent of the non-self-confident tended to overestimate.

Anxiety

Consistent with the finding about self-confidence, significantly more of the better informed men stated just prior to the detonation that they were "not worried at all" about the maneuver or about the various effects of the A-bomb. (See Table 17.)

*Since no single combination of groups could be used for testing all three hypotheses, it was necessary for purposes of correlative analysis to use different groupings. For testing the first series of hypotheses (the relationship between information and the various background or attitudinal characteristics), participant Group 1 and non-participant Groups 5, 6, and 7 were combined into one non-indoctrinated group, while participant Groups 1 and 2 were combined into an indoctrinated group. For testing the second series of hypotheses (the relationship between information level, and confidence, anxiety, and volunteering behavior), participant Groups 1 and 2 were utilized. For testing the hypothesis that self-confidence could be predicted from information level, participant Groups 2 and 9 were analyzed at Stages B and C (post-indoctrination and post-bomb, respectively).

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TABLE 16
CONFIDENCE BY LEVEL OF INFORMATION
ABOUT ATOMIC WARFARE

Response (Paraphrased)	Information Level: ^a			Level of Significance ^b
	Low (N = 62)	Medium (N = 117)	High (N = 50)	
	%	%	%	
Do all right in actual fighting	29	44	62	$p < .01$
Do all right in A-bomb fighting	50	66	82	$p < .01$
Outfit is combat-ready now, or in a few weeks	73	69	65	—
Experts know enough to use A-bombs safely in maneuvers	74	77	85	$.20 < p < .30$

^a"Low" information is of men who answered the approximate quartile of men who correctly answered less than 20 questions at the post-information stage. "High" information level denotes the approximate quartile of men giving correct answers to 25 or more questions. All other men are included under "Medium" information level.

^bChi-square tests were used as measures of significance for Tables 16 through 19.

Willingness to Volunteer

On volunteering behavior the findings are inconsistent. More of the better-informed men stated that they were willing to volunteer for "a secret dangerous mission" and indicated a preference for an A-bomb maneuver over a similar maneuver without an A-bomb. On the other

TABLE 17
ANXIETY BY LEVEL OF INFORMATION
ABOUT ATOMIC WARFARE

Response (Paraphrased)	Information Level			Level of Significance
	Low (N = 42)	Medium (N = 117)	High (N = 55)	
	%	%	%	
Not worried at all about:				
The A-bomb maneuver	37	82	94	$p < .01$
Radiation at time of explosion	36	60	71	$p < .01$
Residual radiation (after explosion)	47	56	76	$p < .01$
The fire flash (flash light)	45	68	71	$p < .01$
The explosion (blast effect)	39	56	53	$.01 < p < .05$

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hand, there were no differences between the proportions of better-informed and lesser-informed troops expressing willingness to volunteer for another A-bomb maneuver.

TABLE 18
VOLUNTEERING BY LEVEL OF INFORMATION
ABOUT ATOMIC WARFARE

Response (Paraphrased)	Information Level			Level of Significance
	Low (N = 62)	Medium (N = 117)	High (N = 98)	
	%	%	%	
Would volunteer for a secret, dangerous mission	45	55	66	.05 < p < .10
Would volunteer for another A-bomb maneuver	73	78	73	—
Would have chosen the A-bomb maneuver over maneuver with no A-bomb	61	79	71	.01 < p < .05

Prediction of Self-confidence

The hypothesis that the troops' information level at the post-indoctrination stage may be used to predict their self-confidence at the post-bomb stage appears to be tenable, although it is based on very small numbers. Significantly larger proportions of the men who were better informed prior to the detonation indicated, following the detonation, that they thought they would do all right in conventional combat, as well as in combat in which an A-bomb was used against an enemy.

TABLE 19
SELF-CONFIDENCE AT POST-BOMB STAGE (C)
BY LEVEL OF INFORMATION ABOUT ATOMIC WARFARE
AT POST-INDOCTRINATION STAGE (B)^a

Response (Paraphrased) at Stage C	Information Level at Stage B			Level of Significance
	Low (N = 40)	Medium (N = 91)	High (N = 50)	
	%	%	%	
Do all right in actual fighting	40	57	78	p < .05
Do all right in A-bomb fighting	61	72	85	.01 < p < .05

^aBased on the highest information index (see Footnote a, Table 15).

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Summary

A positive relationship, though not necessarily causal, was observed in this study between information on the one hand and such characteristics as self-confidence and lack of anxiety on the other. A positive relationship was also observed between the troops' gain in information and their educational level. Contrary to expectation, no such relationship was observed between information and method of entry into the Army, time in outfit, branch preference, and susceptibility to tensions.

SELF-CONFIDENCE IN RELATION TO OTHER CHARACTERISTICS

It has been noted that a major problem of operational and research concern was the effect which training in atomic warfare might have upon the self-confidence of the troops receiving it. Related to the research findings secured through the measurement of troops' self-confidence at the various stages of training¹ is the finding that a relatively high interrelationship existed between the troops' self-confidence and their knowledge of atomic warfare. It was hypothesized that self-confidence was related to various other of the troop characteristics measured. The present section describes the findings examined in the light of this hypothesis.

As previously noted,² the estimates of self-confidence utilized were based on the troops' responses to two items, one involving the troops' self-evaluations of how well they thought they would do in combat, the other involving self-evaluations of how well they thought they would do in combat in which A-bombs were used against an enemy. It was considered justifiable to use the single question concerning performance in A-bomb combat to separate the self-confident from the non-self-confident troops. The choice of this item was largely based on its greater relevance to the training program. Performance in atomic combat would constitute the ultimate criterion of training in atomic warfare, and this item probably approximated such a criterion more closely than any other in the questionnaire.³

In order to secure a sufficient number of cases for analysis, all of the men in Groups 2, 3, 8, and 10 (i.e., all participants) who had been questioned in the post-manuever study at Stage C were pooled.⁴ Of the

¹See "Findings Related to Confidence," pp. 40-44.

²P. 10.

³The tetrachoric correlation coefficient (r_t) between the responses concerning self-confidence in A-bomb combat and in conventional combat is .77.

⁴See Appendix, Table B-2, p. 125.

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332 men in these groups, 240 (72 per cent) had indicated at Stage C that they would do all right in atomic combat. These respondents were considered self-confident; the remaining 92 men (28 per cent), non-self-confident.²

TABLE 20
BACKGROUND CHARACTERISTICS;
SELF-CONFIDENT AND NON-SELF-CONFIDENT TROOPS

Background Characteristic	Troops		Level of Significance of the Difference ^a
	Self-confident (N = 240)	Non-self-confident (N = 92)	
	%	%	
Draftees	27	33	.20 < p < .30
Never married	79	79	
Under 22 years of age	50	55	
In outfit more than 6 months	50	49	
High school graduate	45	32	.01 < p < .05
Non-commissioned officer	37	23	p < .01
In Army more than 1 year	47	36	.05 < p < .10

^aFor Tables 20-24, t-tests were used as measures of significance of the difference.

Background Characteristics

The two groups proved to be quite similar with respect to such background variables as age, marital status, and length of time in outfit. In educational background, rank, and length of time in service, however, differences were found which achieved or approached significance. (See Table 20.) Self-confident troops had had more schooling, held higher rank, and had been in the Army longer than the non-self-confident troops. Less conclusive differences were observed with respect to method of entry into the Army: draftees were proportionately somewhat fewer among the self-confident.

Attitudes Toward Military Service

Relatively more of the self-confident troops appeared to have a favorable attitude toward military life than did the non-self-confident. Larger proportions of the self-confident troops expressed: (1) unwillingness to accept an immediate honorable discharge; (2) the belief that

²The responses checked by the 92 non-self-confident troops were: "Would have trouble at first"—46; "I haven't any idea how I would do"—33; "Not very well"—7; "No answer"—6.

TABLE 21
ATTITUDES TOWARD MILITARY SERVICE,
SELF-CONFIDENT AND NON-SELF-CONFIDENT TROOPS

Response (Paraphrased)	Troops		Level of Significance of the Difference
	Self-confident (N = 240)	Non-self-confident (N = 92)	
	%	%	
Would not accept immediate honorable discharge	20	9	$p < .01$
Serve country better as soldier than as civilian	58	43	$.01 < p < .05$
Prefer Army to any other military service	39	27	$.01 < p < .05$
Prefer Airborne to other Army branch	47	35	$.01 < p < .05$

they could serve their country better as soldiers than as civilians; (3) a preference for the Army over any other service; and (4) a preference for their own Army branch (in this case the Airborne) over any other Army branch.

TABLE 22
ATTITUDES TOWARD OUTFIT;
SELF-CONFIDENT AND NON-SELF-CONFIDENT TROOPS

Response (Paraphrased)	Troops		Level of Significance of the Difference
	Self-confident (N = 240)	Non-self-confident (N = 92)	
	%	%	
Very proud, or fairly proud, of outfit	83	77	$.20 < p < .30$
Got a square deal in company	82	64	$p < .01$
Company takes very good, or fairly good, care of welfare and personal problems	79	68	$.05 < p < .10$
Would rather go into combat with present company than some other	76	57	$p < .01$

Attitudes Toward Own Outfit

As was the case with attitudes toward military life, proportionately more of the self-confident troops expressed favorable attitudes toward

their own outfits. This was indicated in the troops' responses to a cluster of four related items. (See Table 22.)

Attitudes Toward Army Job

Analysis of the three items concerning job attitudes indicates no difference between the groups. Almost exactly equal proportions of the self-confident and non-self-confident men regarded their work or training as necessary to the Army, not excessive, and generally satisfying.

TABLE 23
JOB ATTITUDES;
SELF-CONFIDENT AND NON-SELF-CONFIDENT TROOPS

Response (Troops' word)	Troops	
	Self-confident (N = 240)	Non-self-confident (N = 22)
All, or almost all, work or training necessary	79	78
Amount of work about right	74	76
Satisfied, or very satisfied, with Army job	64	64

Self-confidence in Relation to Other Confidence Items

As previously stated,¹⁰ self-confidence as measured by a man's prediction of his performance in atomic combat proved to be interrelated ($r_s = .77$) with self-confidence as measured by his prediction of performance in conventional combat. The troops' self-confidence in their ability to engage in atomic combat proved, moreover, to be related to their responses to several other items falling in the same general area. (See Table 24.) Considerably larger proportions of the self-confident than of the non-self-confident troops indicated that they were also confident about the combat-readiness of their outfits, and the experts' ability to control the A-bomb.

Willingness to Volunteer

The same patterns prevailed in responses to items concerning volunteering as did in the responses to items assessing confidence. Larger proportions of the self-confident troops indicated their willingness to volunteer for explicitly or implicitly dangerous missions.

¹⁰p. 58, supra.

TABLE 24

RESPONSES TO OTHER QUESTIONS ASSESSING CONFIDENCE;
SELF-CONFIDENT AND NON-SELF-CONFIDENT TROOPS

Response (Paraphrased)	Troops		Level of Significance of the Difference
	Self-confident (N = 240)	Non-self-confident (N = 92)	
	%	%	
Do all right in actual fighting	72	17	$p < .01$
Outfit is combat-ready now, or in a few weeks	81	65	$p < .01$
Experts know enough to be able to use A-bombs safely in maneuvers	93	76	$p < .01$

Tension Manifestations

A pronounced negative relationship appeared to exist between self-confidence and tension, as indicated by the responses of the two groups to the series of questions concerning physiological or psychological evidences of stress. On each of the seven questions about tension manifestations (Table 25), proportionately more of the self-confident than of the non-self-confident troops reported never having experienced the particular reaction indicated.

TABLE 25

WILLINGNESS TO VOLUNTEER;
SELF-CONFIDENT AND NON-SELF-CONFIDENT TROOPS

Response (Paraphrased)	Troops		Level of Significance of the Difference
	Self-confident (N = 240)	Non-self-confident (N = 92)	
	%	%	
Would volunteer for a secret, dangerous mission	57	39	$p < .01$
Would volunteer for another A-bomb maneuver	88	75	$p < .01$
Would have chosen the A-bomb maneuver over maneuver with no A-bombs	89	65	$p < .01$

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TABLE 26
LACK OF TENSIONS;
SELF-CONFIDENT AND NON-SELF-CONFIDENT TROOPS

Physiological Reaction	Troops		Level of Significance of the Difference
	Self-confident (N = 240)	Non-self-confident (N = 92)	
Percentage of men reporting never having been bothered by:	%	%	
Hands trembling	76	61	$p < .01$
Nervousness	56	35	$p < .01$
Heart beating hard	63	51	$.01 < p < .05$
Shortness of breath	74	64	$.05 < p < .10$
Hands sweating	53	46	$.20 < p < .30$
Upset stomach	35	26	$.05 < p < .10$
Cold sweats	67	49	$p < .01$

War Pessimism

Consistent with the findings already reported in this section, the self-confident troops appeared to be more optimistic with respect to the imminence of a war with Russia. Differences in response to questions concerning the probable duration of such a war and estimates of Russia's supply of atomic bombs were, however, inconclusive. (See Table 27.)

TABLE 27
WAR PESSIMISM;
SELF-CONFIDENT AND NON-SELF-CONFIDENT TROOPS

Response (Percentage)	Troops		Level of Significance of the Difference
	Self-confident (N = 240)	Non-self-confident (N = 92)	
Do not expect war with Russia within 2 years	48	29	$p < .01$
A war with Russia would last longer than World War II	26	31	$.20 < p < .30$
Russia's supply of A-bombs is as good or better than that of the United States	22	24	—

An unexpected incidental finding was that a large number of non-self-confident troops checked "no opinion" in response to the question, "Do you think the United States will ever be at war against Russia?" The entire distribution of responses to this question is presented in Table 28.

TABLE 28
EXPECTATION OF WAR WITH RUSSIA;
SELF-CONFIDENT AND NON-SELF-CONFIDENT TROOPS

Question Response	Troops	
	Self-confident (N = 240)	Non-self-confident (N = 92)
	%	%
Yes, within the next few months	3	2
Yes, within the next year	6	7
Yes, within the next 2 years	20	16
Yes, within the next 5 years	26	11
Yes, within the next 10 years	9	4
No, not for a long time, if at all	13	14
No opinion	23	43
No answer	0	3
Total	100	100

Knowledge About Atomic Weapons and Warfare

The interrelationship between self-confidence and knowledge about atomic warfare has been previously reported.² It is recalled that the self-confident troops were better informed than the non-self-confident.

Anxiety and Estimates of Danger

In their responses to the series of items concerning worry, fright and estimates of danger, the self-confident troops appeared to have been less anxious about the maneuver than were the non-self-confident. (See Table 29.) More of the self-confident men indicated that they were not frightened about the bomb or the maneuver, and fewer of them tended to exaggerate the dangerousness of the bomb's effects. With respect to expressions of fright about the bomb's specific effects, however, the differences between the two groups were small and inconclusive. There were no differences in responses to two of the items included in this cluster, and only suggestive differences in the others.

TABLE 29

ANXIETY ABOUT THE A BOMB AND ESTIMATES OF DANGER;
SELF-CONFIDENT AND NON-SELF-CONFIDENT TROOPS

Response (Paraphrased)	Troops		Level of Significance of the Difference
	Self-confident (N = 240)	Non-self-confident (N = 92)	
	%	%	
Not worried at all about the A-bomb maneuver	84	70	$p < .01$
Hardly frightened at all when the test A-bomb went off	86	66	$p < .01$
Never wondered during maneuver if able to do job	92	78	$p < .01$
Not frightened at all by: The fire flash (fireball)	46	46	—
The explosion (blast effect)	46	49	—
Radiation at time of explosion	83	75	$.10 < p < .20$
Residual radiation (after explosion)	80	70	$.05 < p < .10$
Troops in no danger from: The fire flash (fireball)	45	35	$.05 < p < .10$
The explosion (blast effect)	47	38	$p < .01$
Radiation at time of explosion	51	38	$.01 < p < .05$
Residual radiation (after explosion)	49	47	$p < .01$

Interaction Between Education and Self-confidence

From the findings reported, it is apparent that there were important differences between the self-confident and the non-self-confident troops. Nevertheless, because self-confidence as an attitude proved to be related to education as a background characteristic, these differences could not be taken at face value. To what extent were the superior characteristics of the self-confident group—their better adjustment to military life, greater freedom from tension and anxiety, greater knowledge of the indoctrination materials, as well as the self-confidence itself—related to the general superiority of background implied by greater schooling?

In an attempt to answer this question, the groups originally characterized as self-confident or as non-self-confident were subdivided, depending on whether or not the individuals contained in them had

TABLE 30
RESPONSES TO SELECTED GROUPS OF QUESTIONS; HIGHER-EDUCATED AND LOWER-EDUCATED TROOPS BY SELF-CONFIDENCE

Response (Paraphrased)	Troops							
	Higher-educated				Lower educated			
	Self-confident (N = 107)	Non-self-confident (N = 27)	Level of Significance of the Difference		Self-confident (N = 131)	Non-self-confident (N = 59)	Level of Significance of the Difference	
Attitudes Toward Military Service	%	%		%	%		%	%
Would not accept immediate honorable discharge	20	0	$p < .01$	21	10			$.01 < p < .05$
Serve country better as soldier than as civilian	53	41	$.20 < p < .30$	61	44			$.01 < p < .05$
Prefer Army to any other military service	38	19	$.01 < p < .05$	40	32			$.01 < p < .30$
Prefer Airborne to other Army branch	52	33	$.05 < p < .10$	44	37			—
Attitudes Toward Outfit								
Very proud, or fairly proud, of outfit	83	67	$.05 < p < .10$	82	86			—
Get a square deal in company	86	63	$.01 < p < .05$	79	67			$.10 < p < .20$
Company takes very good, or fairly good, care of welfare and personal problems	79	67	$.20 < p < .30$	77	73			—
Would rather go into combat with present company than with other	82	56	$.01 < p < .05$	73	61			$.10 < p < .20$
Other Confidence-Related Questions								
Do all right in actual fighting	73	11	$p < .01$	71	19			$p < .01$
Outfit is combat-ready now or in a few weeks	78	67	$.20 < p < .30$	84	68			$.01 < p < .05$
Experts know enough to be able to use A-bombs safely in 1 year	93	74	$.01 < p < .05$	92	76			$p < .01$
Willingness to Volunteer								
Would volunteer for a secret, dangerous mission	55	41	$.10 < p < .20$	58	39			$.10 < p < .05$
Would volunteer for another A-bomb mission	89	74	$.05 < p < .10$	86	83			—
Would volunteer for the A-bomb mission over someone with no A-bomb	93	74	$.01 < p < .05$	85	66			$p < .01$

completed high school. The four groups resulting from this breakdown, together with the number of men in each, are:

1. Self-confident, higher-educated troops (107)
2. Non-self-confident, higher-educated troops (27)
3. Self-confident, lower-educated troops (131)
4. Non-self-confident, lower-educated troops (59).

Analysis of the four resultant sub-groups indicated that the breakdown by education appeared to have little effect on most of the differences originally observed. On attitudes toward military service and toward their outfits, and in their general confidence, willingness to volunteer, tension manifestations, and knowledge of atomic warfare, the self-confident groups—whether higher- or lower-educated—tended to resemble each other somewhat more closely than they did the non-self-confident troops of comparable educational level." (See Tables 30 and 31.) In two important areas, however, the breakdown by education indicated relationships that were not apparent in the simple comparison of self-confident and non-self-confident troops.

From the findings concerning the background characteristics, which are presented in Table 32, it appears that those higher-educated troops who were lacking in self-confidence differed considerably from the other three groups. Disproportionately fewer of the troops in this group were volunteers, were non commissioned officers, and had had more than one year of Army service. The possibility is suggested, therefore, that among higher-educated troops, self-confidence may be a positive function of method of entry or length of service in the Army, or of rank, which is closely related to time in service.

The findings concerning the cluster of items related to fear of the atomic bomb and its specific effects, as well as estimates of the danger attending these effects, were less clear-cut. In analyzing this group of questions (see Table 33), it was assumed that perception of danger, fear of specific A-bomb effects, and general fear of the atomic bomb were interrelated. In the case of the lower-educated troops, this interrelationship was clearly observed: larger proportions of the non-self-confident than of the self-confident men described the explosion of the bomb as frightening, admitted fear of its various effects, and described them as dangerous.

A similar interrelationship was not observed in the responses of the higher-educated troops to this cluster of questions. A significantly larger proportion of the non-self-confident among the higher-educated troops reported that they were frightened by the A-bomb explosion. In contrast to this, however, significantly larger numbers of the self-confident

"The minor discrepancies between the number of troops described here and the numbers recorded on pp. 58-59 resulted from the failure of some men to answer the question on education.

"Attention is directed to two noteworthy variations in responses which are contrary to the general pattern. Among the large proportions of non-self-confident, lower-educated troops indicated pride in their outfits and willingness to volunteer for another A-bomb maneuver.

TABLE 31
TENSION AND INFORMATION;
HIGHER-EDUCATED AND LOWER-EDUCATED TROOPS BY SELF-CONFIDENCE

Index	Troops					
	Higher-educated			Lower-educated		
	Self- confident (N = 107)	Non- self-confident (N = 27)	Level of Sig- nificance of the Difference	Self- confident (N = 131)	Non- self-confident, (N = 59)	Level of Sig- nificance of the Difference
Tension (proportion checking fewer than 4 of 7 reactions) ^a	.66	.41	.01 < p < .05	.56	.42	.05 < p < .10
Information (mean no. "correct" responses, 0-1 on Information Index) ^b	7.6	6.8	.01 < p < .05	6.9	5.8	p < .01

^a Listed in Table 26, p. 6.

^b Listed in Appendix C, p. 132.

TABLE 32
BACKGROUND CHARACTERISTICS:
HIGHER-EDUCATED AND LOWER-EDUCATED TROOPS BY SELF-CONFIDENCE

Background Characteristic	Troops					
	Higher-educated			Lower-educated		
	Self- confident (N = 107)	Non- self-confident (N = 27)	Level of Sig- nificance of the Difference	Self- confident (N = 131)	Non- self-confident (N = 59)	Level of Sig- nificance of the Difference
	%	%		%	%	
Draftee	36	55	.05 < p < .10	21	20	---
Non-commissioned officer	37	15	p < .01	37	27	.10 < p < .20
In Arm. less than 1 year	42	15	p < .01	51	44	---

TABLE 33
ANXIETY ABOUT THE A-BOMB AND ESTIMATES OF DANGER;
HIGHER-EDUCATED AND LOWER-EDUCATED TROOPS BY SELF-CONFIDENCE

Responses (Paraphrased)	Troops						Level of Significance of the Difference
	Higher-educated			Lower-educated			
	Self-confident (N = 107)	Non-self-confident (N = 27)	%	Self-confident (N = 127)	Non-self-confident (N = 59)	%	
Not worried at all about the A-bomb maneuver	89	85		79	69		.10 < p < .20
Hardly frightened at all when the test A-bomb went off	92	78		81	66		.01 < p < .05
Not frightened at all by							
The fire flash (fireball)	39	52		51	42		.10 < p < .20
The explosion (blast effect)	36	59		54	46		—
Radiation at time of explosion	84	81		82	73		.10 < p < .20
Residual radiation (after explosion)	83	78		77	67		.10 < p < .20
Troops in no danger at all from							
The fire flash (fireball)	48	56		43	29		.05 < p < .10
The explosion (blast effect)	50	48		46	25		p < .01
Radiation at time of explosion	53	52		50	36		.05 < p < .10
Residual radiation (after explosion)	72	59		66	46		p < .01

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than of the non-self-confident reported fear of the A-bomb's blast, while there were no conclusive differences on fear of flash, immediate radiation, or residual radiation. In estimates of danger the differences between the two higher-educated groups were almost negligible.

Summary

Comparison of the self-confident and non-self-confident troops revealed a number of relatively clear, consistent differences between the two groups. The self-confident troops tended to differ from the non-self-confident in the following respects. They were: (1) better educated; (2) of higher rank; (3) of longer Army service; (4) better adjusted to Army life; (5) better adjusted to their outfits; (6) more confident about their outfits and about the ability of the experts to use the A-bomb safely; (7) less susceptible to nervousness and tension; (8) more optimistic with respect to the imminence of war with Russia; (9) better informed about atomic weapons and atomic warfare; (10) more willing to volunteer; (11) less inclined to be worried or fearful about the A-bomb and about the maneuver; and (12) less inclined to exaggerate the dangerousness of the bomb's specific effects.

Further analysis, in which the educational background of the self-confident and non-self-confident troops was held constant, did not substantially alter the findings listed above. Two possibilities were suggested: (1) among higher-educated troops self-confidence may be a function of length of time in and method of entry into the Army; (2) perception of danger, fear of specific A-bomb effects, and general fear of the A-bomb were interrelated in the case of lower-educated troops but not in the case of higher-educated troops.

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CHAPTER 5

VEREAL REPORTS OF PHYSIOLOGICAL REACTIONS

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Chapter 5

VERBAL REPORTS OF PHYSIOLOGICAL REACTIONS¹

On D-day, at the post-bomb stage, the men were asked a series of questions² about physiological reactions which they might have experienced on the day of the maneuver. On these items, relatively few (from 1 per cent to 6 per cent of the men) reported having experienced at least one of the reactions. It was hypothesized that reports of such physiological reactions might be related to attitudes toward the Army, to self-confidence, to anxiety, to tensions, and even to the ability to learn about atomic warfare; therefore, responses of all the men who answered affirmatively to at least one of the physiological reaction questions were isolated for comparison with responses of the group who answered all the questions negatively.

In order to increase the number of cases for this analysis, data on all of the men (Groups 2, 3, 9, and 10, totaling 332) who were questioned at the post-bomb stage (Study C) were combined.³ Of this combined group, 67 (20 per cent) said that they had experienced at least one of the physiological reactions. These men are designated "physiological reactors" (PR's) in the following analysis.

As might be expected, this group of 67 men varied within itself. Some reported only one, others more than one reaction; some reported mild reactions, others more violent reactions. While a detailed analysis of the different types of reactors would be of great interest, the small number of men available for analysis did not permit such a breakdown. In the absence of such a possibility, the first comparison was made between the 67 PR's and the 265 non-reactors (NR's).

¹This chapter was written by Joseph R. Hackett, Peter A. Borden, and John W. Finsen.

²Soldiers who have been present during explosions report different physical reactions. Did you yourself have any of the following reactions on the same day that the last fear bomb went off?

- a. Violent pounding of the heart
- b. Staking feeling in the stomach
- c. Feeling of weakness or feeling faint
- d. Feeling sick at the stomach
- e. Cold sweat
- f. Vomiting
- g. Shaking or trembling all over
- h. Urinating in pants
- i. Losing control of urination

(Items j through n dealing with trouble with eyes, ears, and muscles were not used for the tabulation because they were judged not necessarily to imply anxiety.)

³For comparability of these groups, see Appendix Table B-2, p. 125.

OVER-ALL DIFFERENCES BETWEEN PHYSIOLOGICAL REACTORS AND NON-REACTORS

This initial analysis¹ indicates that larger proportions of PR's than of NR's were (1) lacking in self-confidence; (2) tense and nervous; (3) unfavorably disposed toward the Army and their outfit; (4) unwilling to volunteer for another A-bomb maneuver or for a secret, dangerous mission; (5) frightened by the A-bomb and its effects; (6) pessimistic about war with Russia; (7) incorrect in their responses to information questions associated with anxiety. On most background variables, however (age, method of entry into the Army, marital status, rank, length of service in the Army and in the outfit), physiological reactors did not differ from the non-reactors. Only in their education did they differ: the PR's were less well educated; only 69 per cent of the PR's as compared with 82 per cent of the NR's had gone beyond grade school (.05 < p < .10).

Further analysis of the education factor showed:

1. There was a higher incidence of PR's among lower-educated than among higher-educated troops.² One out of four (24 per cent) of the 194 men who had not completed high school said that he had experienced at least one physiological reaction, as compared with one out of seven (15 per cent) of the 136 men³ who had completed high school (.01 < p < .05).
2. The lower-educated PR's reported having experienced more reactions per man (2.1⁴) than the higher-educated PR's (1.0).
3. The lower-educated PR's reported having experienced reactions of a more violent character than did the higher-educated PR's. The 46 lower-educated PR's reported 35 of the more violent reactions, whereas the 21 higher-educated PR's reported only 3 of the more violent reactions.⁵

DIFFERENCES BETWEEN PHYSIOLOGICAL REACTORS AND NON-REACTORS BY EDUCATIONAL LEVEL

Since there was a suggestive background difference between PR's and NR's on educational level, it seemed necessary to determine whether this educational variable rather than the PR-NR variable was a confounding, or co-variant, with the relationships between physiological reaction and other items on the questionnaire. Therefore, the findings for PR's and NR's of the two levels were analyzed separately.

¹See Appendix D.

²"Higher-educated" denotes men who had completed high school; "lower-educated" those who had not.

³In addition, two men did not answer the question on education.

⁴The reactions were arbitrarily classified as follows: More violent—cold sweat, vomiting, shaking, not smiling all over, urinating in pants, losing control of muscles; less violent—shaking (feeling in the stomach), feeling of weakness or feeling faint, vicinal pounding of the heart, feeling sick at the stomach. The total frequencies for each reaction are shown in Appendix Table D-12, p. 119.

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This analysis yielded four groups: higher-educated physiological reactors (21 men), lower-educated physiological reactors (46 men), higher-educated non-reactors (115 men), lower-educated non-reactors (148 men). It is recognized that analysis based on such small groups is highly tenuous, but such analysis is necessary because the two major groups (PR's and NR's) proved to be more heterogeneous than appeared at first.

Both because of the small number of subjects and because some of the differences between groups prove to be statistically inconclusive, this analysis serves only to suggest hypotheses for test in additional studies. The detailed analysis makes it apparent that not all the attitudinal differences listed above can be related to the single factor of experiencing physiological reactions; for while some appear to be thus related, others are more closely related to the interaction between educational level and experiencing physiological reactions. Thus, when attitudes are classified according to these relationships, four possible categories emerge, based upon those differences which appear to be chiefly a function of:

1. The interaction between higher education and physiological reaction
2. The interaction between lower education and physiological reaction
3. The single factor of physiological reaction
4. The single factor of educational level.

Interaction between Higher Education and Physiological Reaction

Higher-educated PR's indicated some difficulty in adjusting to military life, as compared with higher-educated NR's. Fewer of these PR's wanted to stay in the Army, fewer of them thought well of their outfits, and fewer of them were satisfied with their present Army job. (See Table 34.)

Comparison between higher-educated PR's and lower-educated PR's on these items is difficult because of the extremely small number of cases in the two groups. The observed differences, however, are at least suggestive of non-random variations.

Another conclusion that can be drawn from the data in Table 34 is that the differences between higher-educated PR's and higher-educated NR's were larger, on the average, than the differences between lower-educated PR's and lower-educated NR's.

As will be shown subsequently,* however, on many other attitudinal questions (such as those related to self-confidence, to anxiety, and those testing information), the higher-educated PR's tended to be similar to the higher-educated NR's. There is some suggestion, nevertheless,

*See Tables 35 and 37.

TABLE 34

ATTITUDES REFLECTING ADJUSTMENT TOWARD MILITARY LIFE;
PHYSIOLOGICAL REACTORS AND NON-REACTORS AT TWO EDUCATIONAL LEVELS

Response (Paraphrased)	Troops				Level of Significance of the Difference	
	PR's		NR's		Lower- educated PR's vs. NR's	Higher- educated PR's vs. NR's
	Lower- educated (N = 46)	Higher- educated (N = 21)	Lower- educated (N = 148)	Higher- educated (N = 115)		
	%	%	%	%		
Attitudes Toward Military Service						
Would not accept immediate, honorable discharge	13	5	19	17	—	p < .05
Serve country better as soldier than as civilian	41	33	60	54	p < .05	p < .10
Attitudes Toward Outfit						
Get square deal in company	74	82	74	86	—	p < .01
Company takes very good, or fairly good care of welfare and personal problems	65	82	78	88	p < .10	p < .05
Would rather go into combat with present company than some other	50	62	74	78	p < .01	p < .20
Very proud, or fairly proud, of outfit	78	62	84	83	—	p < .10
Attitudes Toward Army Job						
Satisfied or very satisfied with Army job	73	82	66	68	—	—
Amount of work about right	70	87	62	78	p < .20	p < .20

that the higher-educated PR's differed from the higher-educated NR's in having experienced more manifestations of tension in the past. (See Table 35.)^a

Interaction between Lower Education and Physiological Reaction:

On most background characteristics, the lower-educated, physiological reactors proved not to be different from the lower-educated non-reactors.

^aAttention is directed to the phrasing of the "tension" item as distinct from the phrasing of the PR item in the questionnaire. The former require the respondent to indicate whether he had ever experienced the reaction described; the PR item is concerned only with reactions experienced during the day of the maneuver.

TABLE 35
SELF-CONFIDENCE, ANXIETY, AND TENSIONS;
PHYSIOLOGICAL REACTORS AND NON-REACTORS AT TWO EDUCATIONAL LEVELS

Reactions (Paraphrased)	Troops				Level of Significance of the Difference	
	PR's		NR's			
	Lower- educated (N = 46)	Higher- educated (N = 21)	Lower- educated (N = 148)	Higher- educated (N = 115)	Lower- educated PR's vs. NR's	Higher- educated PR's vs. NR's
	%	%	%	%		
Self-confidence						
Do all right in actual fighting	43	52	58	61	$p < .10$	—
Do all right in A-bomb fighting	50	70	73	80	$p < .01$	—
Never wavered during maneuver if able to do job	45	75	89	95	$p < .01$	—
Anxiety and Fears						
Not worried at all about the A-bomb maneuver	67	85	77	86	$p < .20$	—
Hardly frightened at all when the last test A-bomb went off	41	90	86	87	$p < .01$	—
Not frightened at all by:						
The fire flash (rocket)	33	43	54	42	$p < .01$	—
The explosion (blast effect)	29	38	59	40	$p < .01$	—
Radiation at time of explosion	76	80	65	83		—
Residual radiation (after explosion)	57	71	80	83	$p < .01$	$p < .20$
Tumors (Physiological Reactions)						
Percentage of men reporting never having been bothered by:						
Hands trembling	46	85	71	82	$p < .01$	—
Nervousness	26	47	52	59	$p < .01$	$p < .30$
Heart beating hard	46	47	62	63	$p < .19$	$p < .19$
Shortness of breath	60	52	71	80	$p < .01$	$p < .05$
Head sweating	28	24	93	95	$p < .01$	$p < .01$
Upset stomach	9	24	39	26	$p < .01$	$p < .30$
Cold sores	36	32	60	70	$p < .01$	$p < .20$

The survey findings, summarized in Table 35, indicate with considerable consistency that this group of men (lower-educated PR's) was, more than any other, lacking in self-confidence and beset by anxieties. Indeed, it appears that they had difficulty absorbing information that was associated with anxiety.

Note: For the most part, the indoctrination procedures had served two purposes: (1) informing the troops about the atomic bomb and its effects; (2) reducing excessive anxieties. Some of the factual information given the men was necessarily combined with efforts to conserve such anxieties as would be appropriate to the actual dangers of the situation. It was hypothesized that data containing components of anxiety might not be absorbed equally well by PR's and NR's. To test this possibility, the 30 information questions were examined and divided into two groups: (1) the 20 questions deemed to contain anxiety implications; (2) the 8 questions thought to appraise information alone ("pure" information) (3 items not classified).¹⁰ This classification was made a priori, without reference to the answers given on the questionnaires by PR's and NR's.

TABLE 36
BREAKDOWN OF RESPONSES TO INFORMATION QUESTIONS

Educational Groupings	Number of Questions Answered Correctly by		Total
	A smaller % of PR's than NR's	A larger or equal % of PR's than NR's	
Lower-educated Men			
Pure information questions	5	3	8
Anxiety-information questions	17	3	20
Total	22	6	28
Higher-educated Men			
Pure information questions	4	4	8
Anxiety-information questions	9	1	10
Total	13	5	18

A comparison of answers of physiological reactors and non-reactors to the two sets of questions shows clearly that the PR's were as successful as the NR's in assimilating "pure" information, but that the lower-educated PR's tended to fall below the level of all the other groups on

¹⁰See Appendix Table C-1, pp. 130-31, for the items included in each group.

TABLE 37

AVERAGE PERCENTAGE OF CORRECT RESPONSES TO PURE INFORMATION QUESTIONS;
PHYSIOLOGICAL REACTORS AND NON-REACTORS AT TWO EDUCATIONAL LEVELS

Kind of Questions	Troops				Level of Significance of the Difference
	PR's		NR's		
	Lower- educated % N	Higher- educated % N	Lower- educated % N	Higher- educated % N	Lower-educated vs Higher-educated PR's and NR's
Pure information	61 46	75 21	62 148	76 115	.01 < p < .05

those information items which were judged to contain some element of anxiety. As is shown in Table 36, lower-educated PR's had somewhat more difficulty than lower-educated NR's in giving correct answers to information-anxiety items than to purely factual questions.

TABLE 38

CONFIDENCE IN OUTFIT, SERVICE PREFERENCE, AND WAR PESSIMISM;
PHYSIOLOGICAL REACTORS AND NON-REACTORS AT TWO EDUCATIONAL LEVELS

Response (Prepared)	PR's		NR's		Level of Significance of the Difference
	Lower- educated (N = 46)	Higher- educated (N = 21)	Lower- educated (N = 148)	Higher- educated (N = 115)	
	%	%	%	%	
Confidence in Outfit					
Outfit is combat-ready now, or in a few weeks	63	62	82	77	p < .01
Service Preference					
Prefer Army to any other military service	15	17	43	36	p < .01
Prefer Airborne to other Army branch	29	41	45	49	.04 < p < .05
War Pessimism					
Expect war with Russia within 2 years	37	24	29	24	.23 < p < .30
A war with Russia would last longer than World War II	43	43	20	29	p < .01
Russia's supply of A-bombs is as good as better than that of the United States	30	33	22	17	.05 < p < .10

Differences Associated with Education

Physiological reactors who had completed high school apparently had no more trouble than similarly educated non-reactors in acquiring either anxiety-associated or "pure" information. (See Table 36.) In fact, on the 8 information questions judged not to be associated with anxiety, the main difference observed was between higher-educated and lower-educated men, independent of their physiological reactions (see Table 37).

TABLE 39
RESPONSES IN THREE ATTITUDE AREAS;
PHYSIOLOGICAL REACTORS AND NON-REACTORS AT TWO EDUCATIONAL LEVELS

Response (Percentage)	PR's		NR's	
	Lower-educated (N = 48)	Higher-educated (N = 31)	Lower-educated (N = 140)	Higher-educated (N = 118)
Confidence in Experts	%	%	%	%
Experts know enough to use A-bombs safely in military maneuvers	87	88	87	93
Willingness to Volunteer				
Would volunteer for another A-bomb maneuver	75	81	85	85
Would volunteer for a secret, dangerous mission	59	38	52	54
Would have chosen the A-bomb maneuver over other maneuver with an A-bomb	74	85	79	82
Evaluation of Induction Program				
The training talks helped a great deal	88	88	82	79
Need an more, or little more, information regarding atomic weapons and protection	59	48	57	66
Movie and lectures enough additional training for A-bomb combat	25	38	35	43

Differences Associated with Physiological Reaction

Physiological reactors of both educational levels seemed to have less confidence in their outfits, less favorable attitudes toward being in the Army, and tended to be more pessimistic about a future war than non-reactors (see Table 38).

Additional Findings

In all four groups, very high proportions of men expressed confidence in the A-bomb experts. On two areas of questioning, willingness to volunteer and evaluation of the information program, no pattern related either to educational level, to physiological reactions, or to interactions between these two variables could be discerned. (See Table 39.)

HYPOTHESES ABOUT THE RELATIONSHIP BETWEEN PHYSIOLOGICAL REACTION AND OTHER VARIABLES

Two hypotheses may be postulated from the preceding findings:

1. The differences in attitude between physiological reactors and non-reactors observed after the maneuver are attributable to relatively fixed personality factors.
2. The differences in attitude between physiological reactors and non-reactors observed after the maneuver are attributable to a stress reaction limited to the particular situation studied.

These hypotheses suggest three questions for study:

1. Can the physiological reactors be predicted from their responses to questionnaires given at the preceding stage of research? Would it have been possible at Stage B to identify the men who were later to reveal themselves as physiological reactors at Stage C?
2. Do changes in the responses of physiological reactors from one questionnaire stage to another parallel those of non-reactors?
3. Did the differences between physiological reactors and non-reactors exhibited at Stage C--immediately after the detonation--persist at Stage D when the men had returned to Fort Campbell?

Comparisons between physiological reactors and non-reactors were made in an effort to answer these questions.⁴⁴ The results secured, however, do not yield a conclusive answer to them. PR's did not differ significantly from NR's at Stage B, or in changes between Stages B and C. However, if lack of statistical significance is disregarded and the pattern of results alone is examined, indications are seen of a constant relationship which serves to differentiate the two groups. Although these differences between PR's and NR's are only in degree, at every stage of the experiment, the physiological reactors tended to respond less favorably, from an Army standpoint, than did the non-reactors. More

⁴⁴In these comparisons PR's and NR's were not analyzed by education because the extremely small number of cases did not permit such a breakdown. The number of PR's available for analysis was 42 at Stage B, and 25 at Stage D.

light will be shed on this problem by evidence obtained by HUMPRO in a later study based on another A-bomb detonation at Camp Desert Rock.

Lack of Significant Differences at the Post-indoctrination Stage

Groups 2 and 9 [196 participants who were questioned both at the post-indoctrination (B) and at the post-bomb (C) stages] were divided into two groups: 42 men who said at the post-bomb stage that they had experienced one or more physiological reactions during the maneuver, and 154 men who said they had not experienced any such reaction. The answers of these two groups at the post-indoctrination stage (before the detonation of the bomb) were studied separately.

Comparison between the two groups on relevant questions at the two stages shows that only on three questions did the PR's differ significantly ($p < .05$) from the NR's at the post-indoctrination stage. On only two other questions did the differences measure up to the 10 per cent level of significance. The fact that these questions are not drawn from a single area of content throws further doubt on their usefulness as predictors.¹⁴ Finally, the correlation between seven items measuring indications of tension at the post-indoctrination stage and the incidence of physiological reaction during the maneuver was rather low ($r = .24$).

Lack of Significant Differences in Attitude Changes

The hypothesis could be advanced that physiological reactors differed from non-reactors on change of attitude from one stage to another.

Along this line of reasoning, the following predictions were made:

1. When attitudes of both groups change in the favorable direction, a smaller proportion of PR's than of NR's will change.
2. When attitudes change in the unfavorable direction, a larger proportion of PR's than of NR's will change.
3. When the changes go in opposite directions, the PR's will change toward the unfavorable side, the NR's toward the favorable side.

To test these predictions, changes from the post-indoctrination stage (B) to the post-bomb stage (C) were analyzed separately for the two groups, and significance tests were applied to these changes.

Forty-seven questions were tested,¹⁵ but the differences in only three questions were large enough to be significant on the 5 per cent level. Two of these differences conformed to the hypothesis. The third difference was opposite from what was expected.

¹⁴For individual questions, see Appendix Table D-13, p. 141.

¹⁵A rigorous test was used to compute the standard error of the difference in before-after change between physiological reactors and non-reactors. For a description of the test, see C. L. Hovland, A. A. Leshaine, F. D. Sheffield, *The American Soldier: Vol. III, Experiments on Mass Communication* (Princeton, Princeton University Press, 1949), Appendix C, p. 321.

If the differences in changes of attitude between physiological reactors and non-reactors were distributed normally, a result like the one obtained is just about what one would expect to happen by chance alone." Therefore the data available from this study are insufficient to prove or disprove the basic difference between PR's and NR's with respect to change of attitude.

Comparison between PR's and NR's
at Three Different Stages of the Research

A final analysis was made to get some clues as to whether the differences found between physiological reactors and non-reactors at the post-bomb stage were related to the particular situation (i.e., the stress of the maneuver) or whether they might reflect a more fixed determinant of men's reactions persisting over a period of time."

The answers to 78 questions which were common to all three stages were classified into three groups:

1. Questions which a larger proportion of physiological reactors than of non-reactors answered favorably."
2. Questions which a smaller proportion of physiological reactors than of non-reactors answered favorably.
3. Questions which an approximately equal proportion of physiological reactors and non-reactors answered favorably.

These comparisons are based only on an inspection of patterns because lack of independence among the individual questions would violate assumptions required for rigorous statistical tests."

The pattern of responses as arranged in Table 40 remained similar at the several stages of the experiment. In 28 of 33 comparisons (based on clusters of questions), the physiological reactors answered more questions less favorably than the non-reactors. While this pattern was most pronounced at Stage C, immediately after the detonation of the bomb, it had also been quite evident at Stage B, after the indoctrination, and remained at Stage D, three weeks after the maneuver.

"About 5 per cent of the questions (i.e., in the above example, about 2 or 3 questions), would fall outside the two sigma sections of the area under the normal curve and about half of them would be on the positive side and half on the negative side.

"The following groups of men were used in this analysis:

- a. At the post-indoctrination stage (B), groups 2 and 9, a total of 196 men, including 42 PR's and 154 NR's.
- b. At the post-bomb stage (C), groups 2, 3, 9, and 10, a total of 332 men, including 67 PR's and 265 NR's.
- c. At the delayed effects stage (D), groups 3 and 10, a total of 136 men, including 25 PR's and 111 NR's.

"For definition of "favorable," see Chapter 2, footnote 9, p. 43.

"Respondents answering one question in the affirmative might have been likely to answer some of the other questions in the affirmative too. This lack of independence among the individual questions precludes the computation of the probabilities of obtaining results such as the ones observed.

TABLE 4C
BREAKDOWN OF FAVORABLE RESPONSES TO CLUSTERS OF QUESTIONS,
PHYSIOLOGICAL REACTORS VS. NON-REACTORS

Questions		Questionnaire Stage								
		Post-indoctrination % PR's More Favorable than NR's			Post-bomb % PR's More Favorable than NR's			Delayed Effects % PR's More Favorable than NR's		
		Larger	Smaller	Equal	Larger	Smaller	Equal	Larger	Smaller	Equal
Toward Army	6	2	4	0	1	5	0	1	5	0
Toward Company	7	1	6	0	0	7	0	0	5	2
War Possibilities	3	1	1	1	2	1	0	2	1	0
Self- confidence	4	1	3	0	0	4	0	1	3	0
Volunteering Efforts	3	1	2	0	0	3	0	0	3	0
Tensions	10	0	10	0	0	10	0	0	10	0
Maneuver Worries	5	0	4	1	0	5	0	0	5	0
Information- anxiety	22	7	11	4	4	17	1	7	15	0
"Pure" Information	8	2	5	1	1	4	3	4	2	1
Adequacy of Information	3	0	3	0	0	3	0	1	1	1
Miscellaneous	7	3	4	0	2	5	0	0	7	0
Total No. Questions	78	18	53	7	10	64	4	16	58	4

For example: At the post-indoctrination stage, on 2 of 6 questions measuring Attitudes Toward Army, a larger percentage of PR's than of NR's gave favorable answers; on 4 questions the percentage of PR's giving favorable answers was smaller than the corresponding percentage of NR's.

These results could possibly be interpreted to support the hypothesis that the men who turned out to be PR's differed from the NR's in some relatively fixed, personality characteristics, and that this difference was most pronounced under the stress of the maneuver.

SUMMARY

Despite the small number of cases, it is possible to develop a number of hypotheses. Subject to further verification, the following statements can be offered:

1. Physiological reactors were more likely to be found among the lower-educated than among the higher-educated troops.
2. The group of greatest concern was the lower-educated PR's. In general, they were the men who were least likely to exhibit self-confidence and most likely to exhibit anxiety. Further, more of them seemed to have difficulty in absorbing information that was designed to alleviate anxiety.
3. The higher-educated physiological reactors did not differ in most of the important aspects from higher-educated non-reactors. It appears, however, that among this group more men found it difficult to adjust themselves to their role in the Army. They may be regarded as the critical people, the "grumblers," the disaffected.
4. Physiological reactors, generally, regardless of education, differed from non-reactors in their greater tendency not to prefer the Army over other services and the Airborne over other branches of the Army.
5. As might be expected, lower-educated men in general differed from the higher-educated in that they did not absorb as much information.
6. While PR's differed significantly from NR's in their attitudes at the post-bomb stage (C), the attitude differences between these same two groups at the post-inocriation stage (B), were not larger than could be expected by chance.
7. The hypothesis that PR's differed from NR's not only in level of attitude but also in change of attitude is not found to be tenable.
8. Some relatively stable personality factors might have contributed to the less favorable response of the physiological reactor group, but there is no conclusive proof of this.

SECURITY **RESTRICTED** INFORMATION

CHAPTER 6

DIRECT MEASURES OF PHYSIOLOGICAL REACTIONS

SECURITY **RESTRICTED** INFORMATION

Chapter 6

DIRECT MEASURES OF PHYSIOLOGICAL REACTIONS¹**METHODOLOGY**

Another approach to the study of anxiety, specifically designed to investigate phenomena about which the subject might not be able or willing to report accurately, is the identification of tension states by physiological indexes. Following this approach, the Operations Research Office simultaneously recorded verbal and physiological reactions of participants prior to and after D-day. Another group of non-participants was tested after D-day. A continuous polygraphic record of each subject's respiratory and circulatory changes was made as he answered questions presented in a systematic manner by the examiner. From several different indexes, available from the polygrams, heart rate and relative systolic blood pressure were selected for quantitative treatment.

The participants, 29 jump-trained paratroopers² who were members of the Battalion Combat Team, were tested with the polygraph on D minus 3 and D minus 1. Records of their verbal and physiological responses to a series of questions were obtained. During the period of D plus 13 through D plus 26, 27 of the paratroopers were given a similar polygraph test at Fort Campbell.

The non-participants, a group of 29 members of the 11th Airborne Division selected as controls, were given only the second polygraph test at Fort Campbell during the period of D plus 24 through D plus 33. Unlike the participants, these men did not receive A-bomb indoctrination, did not participate in Exercise DESERT ROCK, and did not have jump experience.

The questions used to elicit both verbal and physiological responses were of two types: questions related to the atomic bomb, and control questions. Although unrelated to the A-bomb, some of the control questions might be expected to have emotional significance for the subjects. Prior to D-day, the participants were tested with a series of 12 questions; after D-day, a second set of 11 questions was administered to both

¹This chapter was written by Howard H. McFann and John L. Fisher.

²The 29 paratroopers were selected from a random sample of 100 participants of the 1st Battalion, 98th Airborne Infantry Regiment, 11th Airborne Division. None of these men were included in the sample studied by I & E or HUMPRO.

TABLE 41
COMPARISONS OF PARTICIPANT TEST-RETEST GROUP
AND NON-PARTICIPANT CONTROL GROUP
IN BACKGROUND CHARACTERISTICS

Characteristic Compared	Test-Retest Group	Control Group	Level of Significance ^a
Rank			
Officers & Non-commissioned officers	.44	.45	.20 < p < .30
Privates	.70	.55	---
Unit			
In Lettered Company	.53	.35	---
In Headquarters, Lettered Company, & Medical Detachment	.37	.62	.01 < p < .05
Unknown	0	.03	---
Combat Service			
Yes	.22	.29	---
No	.78	.86	---
Time in Service			
2 years & over	.41	.41	---
Less than 2 years	.59	.59	---
Age			
Mean years of age	22.3	22.5	---
Range in years	17-31	18-36	---

^aDifferences tested by t-test.

the participant and non-participant groups.^a The second series of questions had three items in common with the first series and also included a question related to jumping from an airplane. The order and sequence of questions for each of these series were held constant.

FINDINGS

Comparison of Background Characteristics of Participants and Non-participants

Table 41 permits comparisons of participants (tested before and after D-day) and the non-participant control group with respect to available

^aThe questions used for each condition are presented in Appendix F, pp. 151-2.

background characteristics. The groups are seen to have been similar in age, combat service and time in the Army, and rank. However, they differed markedly in unit and tended to differ in rank. This difference may be attributed partially to the necessity for limiting the control group to non-jumpers.

The lack of comparability of the participant and non-participant groups with respect to unit makes employment of the non-participants as a control group somewhat questionable. This does not, however, obviate the usefulness of comparing the two groups in attempting to obtain suggestions concerning the effect of the A-bomb maneuver.

Comparison of General Physiological Reactions of Participants Taken Before the Shot at Desert Rock and Afterwards at Fort Campbell

The 27 participant paratroopers who were tested both before and after D-day exhibited significantly higher mean heart rate reaction in the before-test at Desert Rock than in the after-test given at Fort Campbell.¹ The mean heart rate for the subjects in their first (Desert Rock) test was 95, whereas the mean heart rate in their second (Fort Campbell) test was 76. On the test before D-day, heart rates for the 27 subjects ranged from 68-132, with 9 subjects showing a rate of 100 or more. On the retest, given after D-day at Fort Campbell, the range extended only from 57-92.

In an effort to eliminate the possibility that the higher mean heart rate of participants before D-day was attributable to their initial experience with the polygraph test itself, a comparison was made of differences in heart rate on repeated polygraph measurements on 17 male civilians.² It was reasoned that if the test itself evoked tension in the subjects, as reflected by increased heart rate, this effect would probably decrease on the second test. Such a decrease was not evident in the civilian group. The mean heart rate on the first test for the civilian group was 88; for the second test with the same group approximately the same mean (86) was obtained.³ On the basis of these findings it would appear that the greater initial heart rate shown by participants before D-day was related in some way to one or more aspects of the Desert Rock situation. How much of the initial increment is attributable to tension cannot be determined from the data since heart rate could have been influenced by other

¹The number of pulse beats occurring within the 15-second interval immediately following the asking of the first question was determined for each of the 27 subjects on each test. In every case, this figure was multiplied by 4 to obtain a value corresponding to heart rate per minute. (As indicated by means of the t-test, the difference is significant beyond the .01 level.)

²The civilian records had been taken for security purposes at Oak Ridge. Test procedures and instructions were similar to those used with the paratroopers. The civilians were approximately the same age as the paratrooper sample.

³The present analysis is not concerned with absolute level but with relative changes; as such, the absolute difference between the military and civilian groups probably is not critical.

factors, such as differences in temperature, altitudes, and in living and testing conditions, in addition to the indeterminate reliability of heart rate as a measure.

Systolic blood pressure provided a second index of physiological change.⁷ As shown in Table 42, on the test before D-day, 19 of the 21

TABLE 42
COMPARISON OF RELATIVE SYSTOLIC BLOOD PRESSURE CHANGES
TO INITIAL QUESTIONS, SHOWN BY PARTICIPANTS
TESTED BOTH PRIOR TO AND AFTER D-DAY

	Before D-day	After D-day
Mean rise in pressure (in mm.) ^a	4.1	1.1
Range of rise in pressure (in mm.) ^b	0-16	0-4
Number showing rise in pressure	19	13
Number showing no rise in pressure	2	8

^aStatistics compiled by Operations Research Office.

^bExpressed in millimeter deflection of the recording pen.

men on whom such data were available reacted to the first question ("Is your first name _____?") with a blood pressure rise; these rises ranged up to 16 mm. The mean blood pressure response of the entire group was 4.1 mm. On the test after D-day, 13 of the 21 paratroopers showed a blood pressure rise in response to the first question ("Did you eat any breakfast today?"); these rises ranged up to 4 mm.⁸ The mean increment for the group of 21 subjects on this test was 1.1 mm. As tested by the *t*-test for related measures, the difference between the mean blood pressure increments on these two tests is significant.⁹

⁷This is a measure of relative change in blood pressure, expressed in terms of the greatest millimeter deflection of the recording pen during the interval following the asking of the specific question. It is not a measure of absolute blood pressure rise expressed in millimeters of mercury.

⁸Unless it is assumed that such questions were initially comparable in eliciting reaction indicative of tension, this comparison is questionable.

⁹Beyond the .01 level of confidence.

Physiological Reactions of Participants to the Three Questions Which Were Administered Both Before and After D-day

To provide a contrast for evaluating the significance of troops' physiological reactions to questions pertaining to the atomic bomb, a number of questions unrelated to the A-bomb were included in the polygraph tests administered before and after D-day. The questions unrelated to the A-bomb might also be expected to have had some emotional significance for the subject (e.g., "Do you think your outfit is a good one?"; "Do the fellows in your outfit think you may let them down in combat?"). One question concerning a fear which most airborne troops claim to experience, that of making a parachute jump, was included both in the test administered to the participant paratroopers after D-day and to the non-participant subjects untrained in jumping.

In Table 43 a comparison of participants' mean blood pressure responses to the three questions used both before and after D-day is presented. Although for each question the subjects' mean blood pressure reaction before D-day at Desert Rock was measured as greater than

TABLE 43^a
MEAN RELATIVE SYSTOLIC BLOOD PRESSURE RESPONSE TO POLYGRAPH QUESTIONS BY DESERT ROCK PARTICIPANTS TESTED BEFORE AND AFTER D-DAY

Question	No. Cases ^b	Before D-day	After D-day	Difference in mm. ^c	Level of Significance ^d
		Mean Response in mm. ^e	Mean Response in mm. ^e		
Reaction					
Avoid to handle equipment within 1-1/2 miles of A-bomb burst before it is mentioned?	28	5.5	2.8	2.7	.01 < p < .05
Atomic Warfare					
Chance of coming out unhurt under atomic warfare as good as under regular warfare?	22	5.1	3.8	1.3	.10 < p < .20
Outfit					
Think your outfit is a good one?	20	3.3	2.4	0.9	.20 < p < .50

^aCourtesy of Operations Research Office. Adapted from Technical Memorandum, ORO-T-170, p. 12. Table declassified from SECRET to RESTRICTED Security Information, 2 September 1962.

^bAlthough a total of 27 men was tested, records were available for only those indicated.

^cFigures in millimeters of deflection of the recording pen, not in millimeters of mercury.

^dSignificance tested by t-test.

TABLE 44^a

MEAN RELATIVE SYSTOLIC BLOOD PRESSURE RESPONSE TO POLYGRAPH QUESTIONS
BY DESERT ROCK PARTICIPANTS AND BY NON-PARTICIPANT CONTROL SUBJECTS

Questions	Participants		Control Subjects ^b		Difference in mm. ^d	Level of Significance ^e
	No. Cases	Mean ^c Response in mm. ^d	No. Cases	Mean ^c Response in mm. ^d		
Radiation						
Afraid to handle equipment within 1-1/2 miles of A-bomb burst before it is monitored?	28	5.2	29	2.4	2.7	$p < .01$
Atomic Warfare						
Chance of coming out unharmed under atomic warfare as good as under regular warfare?	27	4.4	29	5.2	0.8	$.05 < p < .10$
Outfit						
Think your outfit is a good one?	26	2.9	29	2.8	0.1	$.05 < p < .10$
Jump						
Have complete control of spaces as jump out door of plane?	25	4.9	29	3.8	1.1	$p < .01$

^aROSO, *Ibid.*, p. 84.

^bN.E., non-participants.

^cThese are mean responses to questions on the test administered at Desert Rock before D-day except in the case of the jump question which was included in the after D-day test only.

^dExpressed in millimeters deflection of the recording pen, 0.1 is millimeters of movement.

^eDifferences tested by *t*-test.

after D-day at Fort Campbell, this difference is significant^a only in the case of the question pertaining to danger of atomic radiation. Since the conditions under which the successive tests were administered differed, test-retest effects cannot be separated from effects of other determinants.

^aAt the .02 level of significance.

Comparison of Physiological Reactions of Participants and Non-participants to the Three Test-Retest Questions and to a "Jump" Question

As seen in Table 44, troops at Desert Rock before D-day did not differ from non-participants in their mean blood pressure response to the questions concerning their unit and their chances of being hurt in atomic warfare as compared with conventional warfare. The non-participants' mean blood pressure response to the atomic warfare question was considerably larger than to the other questions, equalling the largest reaction of the participant group (i.e., radiation question)."

It is difficult to ascertain from the data whether the observed differences reflect real differences between the groups' reactions to tension or differences possibly attributable to the few questions or to the instability of the measures.

There was a marked difference in the physiological reactions of participants and non-participants to the question on radiation. This difference might indicate that the participants, prior to D-day, had reacted with greater tension toward radiation than did the non-participants. Support for the hypothesis that the relative blood pressure reaction has some validity as an index of tension comes from the finding that paratroopers tested at Fort Campbell gave a significantly larger mean blood pressure response to the jump question than did the "non-jumpers." It is reasonable to expect that the "jumpers," most of whom admitted experiencing tension before making a jump, would have shown a greater physiological response to the question than would the untrained non-participants.

Comparison of Participants' and Non-participants' Physiological Reactions to Bomb Questions with Reactions to a Standard Non-bomb Question

A study was made of the differences in mean blood pressure responses to a "presumably" non-emotional question and to A-bomb and jump questions. Results of these comparisons are presented in Table 45.

Prior to D-day, participant troops tested at Desert Rock showed significantly larger blood pressure responses to three of five bomb-oriented questions than to a standard question. After D-day, on the question concerning willingness to handle unmonitored equipment, neither participants' nor non-participants' reactions differed significantly from their reactions to the non-emotional question. Both participants and non-participants, however, did show significantly larger reactions to the atomic-conventional warfare question and to the parachute jump question when compared to the standard control question.

Since 7 of the 11 comparisons between the A-bomb and jump question and the presumably non-emotional question reveal statistically significant differences, it may be concluded that the bomb- and jump-oriented questions tended to arouse more tension, as here measured, than did the control question.

"This suggests that the non-participants' tension, as measured, was greater for the atomic warfare question than for the other questions.

TABLE 45*

COMPARISON OF MEAN RELATIVE SYSTOLIC BLOOD PRESSURE RESPONSES
TO STANDARD (OUTFIT) QUESTION AND TO SCENE AND JUMP QUESTIONS
BY PARTICIPANTS AND NON-PARTICIPANTS

Question	Participants				Non-participants	
	Before Jump		After Jump		No.	Mean Response in mm. h
	No.	Mean Response in mm. h	No.	Mean Response in mm. h		
Chance of coming out unhurt under atomic warfare as good as under regular warfare?	26	4.3	21	3.9	29	5.2
Standard question		2.9		2.3		2.8
Difference		1.4		1.6		2.4
t ratio =		1.74		2.10 ^c		4.77 ^d
Feel will be safer in A-bomb attack if do what told to do?	26	3.8				
Standard question		2.9				
Difference		.9				
t ratio =		1.79				
Afraid to handle equipment within 1-1/2 miles of A-bomb burst before it is monitored?	26	4.7	21	2.8	29	2.4
Standard question		2.9		2.3		2.8
Difference		1.8		.5		.4
t ratio =		2.90 ^e		.80		.75
Feel safe in being in machine gunnery when A-bomb goes off?	26	4.3				
Standard question		2.9				
Difference		1.4				
t ratio =		2.67 ^e				
Expect to black out or be hurt when A-bomb goes off?	26	4.8				
Standard question		2.9				
Difference		1.9				
t ratio =		2.67 ^e				
Have complete control of senses as jump out doors of plane?			21	5.9	29	3.6
Standard question				2.3		2.8
Difference				2.7		1.0
t ratio =				3.10 ^d		2.56 ^f

*See, this, p. 34.

^bResponse in millimetre deflection of the recording pen, not in millimetre of mercury.
^c.01 < p < .05.
^dp < .01.

Relation of Verbal Responses and Physiological Reactions of Participants and Non-participants to A-bomb Questions

In contrast to the finding reported above, evidence gathered from post-D-day interviews with 45 participants and statements by 21 participant observers interviewed prior to D-day, indicates that the troops expressed little apprehension concerning the maneuver and a great deal of confidence in their personal safety during the impending D-day events.

On the basis of verbal testimony, about one-third of the participants expressed, prior to D-day, fear of handling unmonitored equipment, whereas approximately three-fourths of the non-participants expressed such fear. Yet, the participants before D-day showed significantly larger systolic blood pressure responses than the non-participants to the above question on radiation. (See Table 46.)

On the other hand, verbal responses were not in disagreement with physiological reactions on the conventional versus atomic warfare question. The differences between participants and non-participants were not marked for either the verbal responses or the relative blood pressure reactions.

Such discrepancies between verbal and physiological measures of tension point up the complexity of the problem of obtaining reliable indexes of tension, as well as the need for some performance criterion to use as a validating measure. The inverse relationship noted above may suggest that when fear can be verbally expressed, its physiological concomitant is reduced. An alternative interpretation is that either or both measures are unreliable.

GENERAL IMPLICATIONS

Within the limitations of the behavioral measures that could be feasibly employed at Desert Rock, no evidence was obtained of disruption of performance attributable to increased tension. The complexity of the problem of measuring tension, the necessary differences in testing conditions existing between Desert Rock and Fort Campbell, the smallness and possible non-random selection of the samples, together with the unavoidable attrition of subjects, all serve to limit any conclusions drawn from the data.

Pending further study of the problem, the following tentative relationships may be offered:

1. Troops anticipating taking part in A-bomb maneuvers tend to show more generalized tension (that evoked by the general situation) than do troops not anticipating taking part.
2. Troops taking part in A-bomb maneuvers tend to show greater tension before than after the maneuver; to question is related to the maneuver.

TABLE 66
VERBAL AND PHYSIOLOGICAL RESPONSES BY PARTICIPANTS
BEFORE D-DAY AND NON-PARTICIPANTS AFTER D-DAY TO TWO A-BOMB QUESTIONS

Question	Verbal		Level of Significance ^a	Mean Systolic Blood Pressure		Level of Significance ^a
	Participant (N = 29)	Non-Participant (N = 29)		Participant (N = 29)	Non-Participant (N = 29)	
Willinger is to handle equipment 2-1/2 miles from A-bomb burst before it is neutralized	15	29	$p < .05$	5.5	2.4	$p < .01$
Chances of being hit in ground, surface regular system	29	29	$.05 < p < .10$	8.1	5.2	—

^aSignificance level by test 6

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3. Both participants and non-participants tend to show greater physiological reactions to questions concerning the A-bomb than to neutral questions.

4. Verbal and physiological measures of anxiety appear to be in partial disagreement.

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RESEARCH IN PROGRESS

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RESEARCH IN PROGRESS

Following the Exercise on which the present report is based, a second atomic exercise provided an opportunity for further testing of a number of hypotheses. In the second investigation, the design was expanded to consider several additional factors essential to an evaluation of troop efficiency under conditions of simulated atomic warfare. The following techniques were added as an attempt to gain further insight into the problems studied:

1. An effort was made to isolate experimentally the influence of the on-site indoctrination on men's attitudes and reactions to the maneuver by withholding this indoctrination from a group of the participant troops.
 2. In order to separate the effects of witnessing the detonation from those attributable to inspecting the damage, a battery of tests was administered to the men between the time of explosion and their movement into the damaged area.
 3. To probe for anxieties which the men were not willing or able to admit in response to direct questions, a projective test was developed for use in the new study.
 4. To secure a physiological measure of emotional stress, the amount of sweating was measured under both normal and fear-provoking conditions by means of two different chemical techniques.
 5. An attempt was made to measure the effects of the detonation on efficiency of performance with the use of a rifle disassembly-reassembly test.
 6. In an effort to obtain a measure that could be interpreted as an approximate criterion of combat performance, a realistic volunteering situation was staged on the day following the maneuver. The men were informed by their officers that they would participate in a second atomic maneuver and were required to choose between occupying the same positions they had held the day previously or another set of positions a mile closer to ground zero.
- Findings derived from this further study will be summarized in a forthcoming report on EXERCISE ROCK IV.

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APPENDIX A

SUMMARY OF THE QUESTIONNAIRES

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This appendix contains a complete list of the questions included in the questionnaires. The questions analyzed in this report are arranged by attitude area.

A number of questions included in the questionnaires are not analyzed in this report for the following reasons:

1. Design analysis was precluded for questions which were asked at only one stage of the research.
2. Questions related to the dissemination experiment had to be omitted from the analysis because of the severe limitations of the experiment. (See Footnote 3, page 16.)
3. A number of questions were not analyzed, because they appeared to be either insufficiently discriminating or over-sensitive to extraneous factors.

All of these questions are listed in the last section of this appendix.

I. Background Characteristics of the Troops

<u>Asked at:</u>	<u>Question</u>
All stages	1. How did you come into the Army this time?
"	2. BIRTH DATE (write in): _____ (day) (month) (year)
"	3. In what state were you born?
"	4. How far have you gone in school?
"	5. Are you married, single, divorced or separated, widowed?
"	6. What is your Army grade?
"	7. How much ACTIVE military duty altogether have you had?
"	8. How long have you been in the company, battery, or detachment that you are in now?
"	9. What branch of the Army are you in now?
"	10. Have you ever been in combat or under enemy fire?

II. Troops' Information on Atomic Warfare and Weapons*

<u>Asked at:</u>	<u>Question</u>
All stages	1. Suppose the A-bomb were used against enemy troops by exploding it 2000 feet from the ground and suppose all enemy troops were killed. How dangerous do you think it would be for our troops to enter the area directly below the explosion <u>within a day</u> ? (Not dangerous at all)

*The correct answers are given in parentheses following the questions.

Asked at:

II. Question (continued)

All stages

2. Supposing an A-bomb like the one at Hiroshima were exploded at 2000 feet. In how much danger would you be if you were five miles away, lying flat on the ground? (If no danger at all)
3. If caught in the open by an A-bomb attack, what is the first thing you should do? (Take cover or fall flat)
4. After an A-bomb air burst attack, what is the first thing you should do? (Take care of yourself, help your buddies, care for injured)
5. Which kind of clothing gives better protection against an atomic explosion? (Light-colored loose-fitting clothing)
6. If an A-bomb were exploded at 2000 feet, under what conditions would it be safe to move into the spot directly below, right after the explosion? (Safe if you wore regular field clothing)
7. Which one of the following is the best description of what "radiation" from an A-bomb explosion is like? (Like X-rays from an X-ray machine)
8. What caused the greatest number of casualties from the A-bomb attacks on Hiroshima and Nagasaki? (Blast effect and falling objects)
9. Which of the three types of possible atomic explosions would do the most damage right away? (Air burst)
10. Which type of atomic explosion do you think has the greatest "residual" (long-lasting) radiation? (Surface or underwater burst)
11. The blast effect of an A-bomb air burst at 2000 feet (like the Hiroshima bomb, in flat, open country and average atmospheric conditions) would not kill anybody beyond a distance of _____? (Three miles)
12. Flash burns on exposed skin, caused by the heat wave from a Hiroshima type A-bomb burst at 2000 feet (in flat country and average atmospheric conditions) would be expected up to a distance of _____? (Three miles)
13. Suppose an A-bomb like the one at Hiroshima were exploded at 2000 feet. Would harmful radioactive materials fall to the earth? (No harmful materials would reach the earth)
14. Read each of the following statements carefully. Then check, for every item, whether you think it is true or false.
 - a. All elements consist of atoms. (True)
 - b. Radiation four miles from an A-bomb explosion can make men permanently sterile. (False)

Asked at:II. Question (Continued)

All stages

14. c. Radiation sickness is nearly always fatal. (False)
 d. Doubling the size of the A-bomb does not double the amount of damage. (True)
 e. Mis-shapen children are being born in Japan now because of the A-bombs in 1945. (False)
 f. Radioactivity can be contagious. (False)
 g. Some of the ships in the Bikini tests had to be sunk because they were too radioactive to be used again. (False)
 h. Instruments (Geiger counters, etc.) are dependable for detecting any dangerous radiation after A-bomb explosions. (True)
 i. There is no protection against the atom bomb within five miles of the center of the burst. (False)
 j. An area that has been A-bombed can be de-contaminated (made safe). (True)
 k. Radioactivity caused a good many skin burns in the A-bombings of Japan. (False)
 l. People cannot feel, taste, or smell radiation. (True)
 m. Watching an A-bomb explode five miles away can cause permanent blindness. (False)
 n. Radiation four miles from an A-bomb explosion can make men unable to have sexual intercourse. (False)
 o. Any radiation that can be detected on a Geiger counter is strong enough to be dangerous. (False)
 p. Drinking water in sealed steel cans two miles from an A-bomb explosion is safe to drink right away. (True)
 q. Scrubbing with soap and water can remove most radioactive particles from the skin. (True)

III. Troops' Confidence in Themselves, Their Outfits, and the Experts' Ability to Control the A-bomb

Asked at:Question

All stages

1. If you were sent into actual fighting now, how do you think you would do?

Asked at:III. Question (Continued)Bp, Bn, C,
Dp, Dn^a

All stages

Bp, Bn, C,
Dp, Dn

C

2. If you were sent into actual fighting now in which we used A-bombs against an enemy, how do you think you would do?
3. Do you think your outfit is ready to go into combat now if it had to?
4. Do you think the experts really know enough about the effects of A-bombs to use them in military maneuvers without harming our troops?
5. Was there any time during the A-bomb maneuver that you wondered whether you would be able to do your job?

IV. Attitudes of the Troops Toward Military Service**A. Identification with the Army**Asked at:Question

All stages

"

"

"

1. If you had your own free choice right now, which one of the military services would you prefer to be in?
2. Which branch of the Army would you most like to be in now?
3. If you were offered an **HONORABLE DISCHARGE** today and if you knew you would not be drafted, would you take it?
4. Right now, in what way do you think you could be of greatest service to your country?
By being a soldier
By going to school as a civilian
By working on a civilian job or farm

B. Attitudes Toward Job and OutfitAsked at:Question

All stages

"

1. Do you feel that the work or training you have to do is necessary to the Army or not?
2. How do you feel about the amount of work or training you have to do?

^aA - BaselineB_p - Participants at post-indoctrination stageB_n - Non-participants at post-indoctrination stage

C - Post-bomb stage (participants only)

D_p - Participants at delayed effects stageD_n - Non-participants at delayed effects stage

Asked at:IV. B. Question (Continued)

All stages

3. How satisfied or dissatisfied are you with your present Army job?
4. Do you feel proud of the particular company, battery, or detachment that you are in now?
5. Do you think you are getting a square deal in the company you are in now?
6. How do you think the men in your company usually feel when they carry out the orders of their officers?
7. How good a job does your company do in taking care of the welfare and personal problems of the enlisted men?
8. How do you think the men in your company usually feel when they carry out the orders of their non-coms?
9. Assuming your work would be the same, if you were going into combat would you rather go with your present company, or would you rather go with a different company?

V. War Pessimism of the Troops

Asked at:Question

All stages

1. Do you think that the United States will ever be at war against Russia?
2. If we do go to war against Russia, how long do you think the war would last?
3. How good a supply of atomic bombs do you think the Russians actually have at present?

VI. Anxiety of the Troops

A. Concerning Participation in the A-bomb Maneuver

Asked at:QuestionBp, Bn, C,
Dp, Dn

1. How worried do you honestly think you are [were, would be] about the [this] A-bomb maneuver [if you were sent on a maneuver in which A-bombs were used]?

B. The Bomb

Asked at:Question

C, Dp

1. Just how frightened would you say you were when the last test A-bomb went off?

VI. C. Effects of A-bomb

Asked at:QuestionBp, Bn,
Dn

1. Suppose you were taking part in a maneuver in which a standard A-bomb was exploded at 2000 feet in the air several miles from you.^a How worried are you [do you think you would be] about each of the following effects of the A-bomb explosion?
 - a. The fire flash (fireball)
 - b. The explosion (blast effect)
 - c. Radiation at time of explosion
 - d. Residual radiation (after the explosion)
2. How frightening did you find each of the following effects of the last A-bomb explosion?
 - a. The fire flash (fireball)
 - b. The explosion (blast effect)
 - c. Radiation at time of explosion
 - d. Residual radiation (after the explosion)

C, Dp

D. Estimates of Danger

Asked at:Question

C, Dp, Dn

1. In your opinion, how dangerous to the troops in the maneuver (that is, likely to kill or seriously hurt a man) were [was] each of the [following] effects of the last [recent] A-bomb test explosion?
 - a. The fire flash (fireball)
 - b. The explosion (blast effect)
 - c. Radiation at time of explosion
 - d. Residual radiation (after the explosion)

VII. Prevalence of Tension Manifestations and Physiological Reactions Among the Troops

A. Tension Manifestations

Asked at:Question

All stages

"

"

"

1. Do your hands ever tremble enough to bother you?
2. Are you ever bothered by nervousness?
3. Have you ever been bothered by your heart beating hard?
4. Have you ever been bothered by shortness of breath when you were not exercising or working hard?

^a This sentence was not included in the questionnaire at Stage Dp.

Asked at:

VII. A. Question (Continued)

All stages

5. Are you ever troubled by your hands sweating so that they feel damp and clammy?
6. How often are you bothered by having an upset stomach?
7. Have you ever been troubled by "cold sweats"?

B. Prevalence of Physiological Reactions Among the Troops on the Day of the Maneuver

Asked at:

Question

C

1. Soldiers who have been present during explosions report different physical reactions. Did you yourself have any of the following reactions on the same day that the last test bomb went off?
 - a. Violent pounding of the heart
 - b. Sickening feeling in the stomach
 - c. Feeling of weakness or feeling faint
 - d. Feeling sick at the stomach
 - e. Cold sweat
 - f. Vomiting
 - g. Chaking or trembling all over
 - h. Urinating in pants
 - i. Losing control of bowels

VIII. Willingness to Volunteer Among the Troops

Asked at:

Question

Bp, Ba, C,
Dp, Da

1. If you had [been given] your choice between going on this [another] A-bomb maneuver, or some other [regular] maneuver with no A-bomb[s], which would you choose [have chosen]?

Bp, C, Dp

2. Sometime in the future the Army probably will need experienced men to be in another A-bomb maneuver like this one. Do you think you will volunteer if you are asked?

Ba, Da

2. Sometime in the future the Army probably will need volunteers to take part in a maneuver in which there will be a standard A-bomb air burst (2000 feet from the ground) with troops moving into the area right after the explosion. Do you think you would volunteer to take part if you were asked?

All stages

4. Suppose a call went out for volunteers for a small outfit which was to be specially trained and then carry out a secret dangerous mission, would you volunteer?

X. Troops' Evaluation of the Indoctrination Program.**Asked at:****Question**

All stages

1. Have these talks helped you to understand how you can best protect yourself in case of such an attack?

"

2. Do you think you need more information regarding the atomic weapons and protection from an atomic attack?

Bp, Bn, C,

Dp, Dn

3. If a soldier were well trained for ordinary combat, how much additional training do you think he would absolutely need before being sent into combat in which A-bombs would be used?

X. Items Included in the Questionnaires but not Analyzed in the Present Report**Asked at:****Question**

All stages

1. Have you been in combat or under enemy fire during the Korean War?

"

2. Have you ever had a course in physics or chemistry in school?

"

3. Since you have been in the Army, how many training talks have you heard on defense against atomic attacks?

"

4. Rate each of the following on how effective you think it would be in winning another war, if there is one.

a. Atomic bombs

b. Regular artillery

c. Regular (long-range) bombing

d. Tactical (short-range) bombing

e. Bacterial (germ) warfare

f. Airborne infantry

g. Ground infantry

h. Armored vehicles (tanks)

i. Naval surface warships

j. Submarines

"

5. Do you feel the development of the A-bomb has changed the importance of the ground infantry?

"

6. Do you feel the development of the A-bomb has changed the importance of the airborne infantry?

Bp, Bn, C,

Dp, Dn

7. Do you feel the development of the A-bomb has changed the importance of the Air Force?

Asked at:

X. Question (Continued)

All stages

8. If we ever go to war against Russia, do you think we should use the A-bomb against Russian cities?
9. Do you feel that the A-bomb should be used against enemy troops in the Korean war?
10. Would you say you are the type that makes (a very good, a good, not such a good, or a poor soldier)?
11. Which branch of the Army would you like least to be in now?
12. When your officers give you something to do, do they tell you enough about it so you can do a good job?
13. In general, what sort of physical condition would you say you are in at the present time?
14. Do you ever worry about whether you will be injured in combat?
15. How much does it bother you when you are ordered to do things that you don't see a good reason for doing?
16. Exactly what further information would you like to have about atomic weapons? (Form of question: at all stages except Stage A)
On what things, if any, regarding atomic weapons would you like to learn more? Please list them here. (Form of question at Stage A)
17. If you think you have been given any misleading or inaccurate information about atomic weapons by official sources (the Army or the government), please write down what you thought was not correct.
18. Have you ever gone through an infiltration course where you had to be close to explosions or flying bullets?
19. Do you think it would be a good idea or a poor idea for every soldier to go through such an infiltration course before going into combat?
20. Do you think the A-bomb could be used against enemy troops without great danger to our own front-line troops?
21. Were you living on a farm, in the country, or in a town or city, just before you came into the Army this time?
22. What is your primary MOS? Write the MOS number here.
23. Tell here just what kind of duties you actually perform most of the time.
24. What is the most interesting rumor you have heard lately?
25. Do you think the rumor is true, or false?

Bp, En, C,

Dp, Da

"

Dp, Da

A

"

"

"

"

Asked at:X. Question (Continued)

- Bp 26. What do you think will happen to the field equipment that your outfit is leaving in an advanced position, when the A bomb goes off?
- " 27. Were there any particular points in the talks or movies you have had lately about the A-bomb that were hard to understand?
- C 28. Was there anything about the last A-bomb explosion that you did not fully expect in advance?
- " 29. When the last A-bomb exploded, how far would you say you were from ground zero (the spot on the ground directly where the bomb exploded)?
- " 30. How close would you say the nearest edge of the ball of fire came to you when the last test A-bomb exploded?
- " 31. Did you feel any heat from the blast at the time of the explosion?
- C, Dp, Da 32. In the maneuver after the explosion, how close would you guess you went to ground zero (the spot on the ground directly below where the last A-bomb exploded)? (Form of question at Stages C and Dp)
From what you have heard, how close did the troops go to "ground zero" (the spot on the ground directly below the last A-bomb explosion) in the maneuver after the explosion? (Form of question at Stage Dn)
- C, Dp 33. After the A-bomb's explosion, what did you think about handling the field equipment that your outfit had left in an advanced position?
- C, Bp 34. At what location did [is] your unit leave [leaving] its equipment for the last A-bomb test? (Write the location here: _____)
- C, Dp 35. How safe do you think human beings would have been if they had been located at the same spot as the animals that you saw after the explosion?
- " 36. Was there anything in the talks and movies about the A-bomb that you now think was unnecessary?
- Bp, C, Dp 37. Has the training you have had so far on A-bombs made nuclear radiation seem more dangerous or less dangerous than you think it really is? (Form of question at Stage Bp)
Did you think the training you had, before the last test A-bomb, makes [made] nuclear radiation seem more dangerous or less dangerous than you now think it is? (Form of question at Stages C and Dp)
- C 38. In the part of the maneuver that you saw following the explosion, did anything get jumbled up?

Asked at:

X. Question (Continued)

- C 39. Soldiers who have been present during explosions report different physical reactions. Did you yourself have any of the following reactions on the same day that the last test bomb went off?
- j. Muscles stiff and sore
 - k. Ears ringing or hurting for hours
 - l. Trouble with your eyes for hours
 - m. Trouble with your eyes for a few minutes
- Up 40. To whom have you yourself described the A-bomb explosion and maneuver?
- " 41. About how many people would you say you talked to concerning your experiences in the A-bomb maneuver?
- " 42. In general, would you say the people you have talked to about the A-bomb maneuver were interested in what you had to say?
- " 43. a. In general, do you think the A-bomb maneuver was realistic enough?
b. If you do not think it was realistic enough, in which ways do you think it should have been made more realistic? (Write your suggestions below.)
- " 44. The Army would like to have any other ideas that you may have for improving A-bomb maneuvers like the one in which you took part. Any ideas you have will be carefully considered for future maneuvers, so please be sure to write them in detail on the lines below.
- Da 45. Have you heard anything about the recent maneuvers where men from this Division saw an A-bomb explosion?
- " 46. Have you yourself talked with anyone who was in the recent A-bomb maneuver?
- " 47. From which one of the following do you think you got the most true account of what happened in the A-bomb maneuver? (Enlisted men who were there, officers who were there, people who were not there, from news reports [radio, magazines, newspapers, newsreels])
- " 48. In general, do you think that what you have heard about the A-bomb maneuver was true?
- " 49. How interested were you in learning what took place during the A-bomb maneuver?
- " 50. After hearing or reading about it, have you yourself talked about the A-bomb maneuver with any of the following people? (Other soldiers in your Division, other soldiers not in your Division, your family, your friends not in the service)

Asked at:

K. Question (Continued)

- Dn 51. a. Did what you hear about the A-bomb maneuver change your opinion on how dangerous our own A-bomb might be for our own troops?
- " b. If anything you have heard about the A-bomb maneuver made the A-bomb seem even a little more dangerous than you had thought, what was it that made you think so? (Write your answer here)
- " 52. If there were any other things about the last A-bomb test explosion that you think were dangerous for the troops in the maneuver, please write them here.
- Dp, Dn 53. If you were in on another A-bomb maneuver exactly like the last one, would you volunteer to stay in a fox-hole two miles from "ground zero" during the burst? (Form of question at Stage Dp)
From what you have heard about the A-bomb maneuver, would you volunteer to stay in a fox-hole two miles from "ground zero" during the burst? (Form of question at Stage Dn)
- Rp, Dp 54. If there are any other things about this A-bomb maneuver that worry you [you found frightening], please write them here:
- Bp 55. Do you think the training you have had so far on A-bombs has made you more worried or less worried about the effects of A-bombs?
- " 56. If the training you have had on A-bombs has made you more worried, what did you hear or see that made you more worried? (Write your answers below.)
- Dp 57. After the burst, when you moved up toward "ground zero", did you feel that you were getting too much radiation at any time?

TABLE A-1
CHANGES IN STATISTICAL SIGNIFICANCE
OF DIFFERENCES IN RESPONSES¹

Questions	Net Difference in Percentage Points	
	With Control Groups	Without Control Groups
Questions statistically significant at the 5 per cent level with but not without control groups		
Do you think your outfit is ready to go into combat now if it had to? (Yes; now, or within a few weeks)	23	10
How effective do you think the ground infantry would be in winning another war, if there is one? (Very effective)	22	12
Questions statistically significant at the 5 per cent level without but not with control groups		
If you had your own free choice right now, which one of the military services would you prefer to be in? (Army)	-16	-19
Do you feel the development of the A-bomb has changed the importance of ground infantry? (More important)	11	0
Do you feel the development of the A-bomb has changed the importance of airborne infantry? (More important)	10	15
Is it true or false that some of the ships in the Bikini tests had to be sunk because they were too radioactive to be used again? (False;	1	14

¹From Stage A to Stage B when the standard error of the difference is computed for the
participant group only.

²Paraphrased to simplify presentation but with no change in meaning.

SECURITY **RESTRICTED** INFORMATION

APPENDIX B

BACKGROUND CHARACTERISTICS

SECURITY **RESTRICTED** INFORMATION

TABLE B-1
BACKGROUND CHARACTERISTICS COMPARED FOR ALL GROUPS

Background Characteristics	Participants				Non-participants		
	Total of Groups 1,2,3 (N = 325)	Groups			Total of Groups 5,6,7 (N = 340)	Groups	
		1 (N=112)	2 (N=124)	3 (N=91)		5 (N=150)	6 & 7 (N=190)
	%	%	%	%	%	%	%
Method of Entry into Army							
Drafted	27	25	28	29	26	28	26
Volunteered	69	70	69	56	71	70	71
From Reserve or National Guard	2	3	1	2	2	2	1
No answer	2	2	2	3	1	0	2
Total	100	100	100	100	100	100	100
Education							
Finished 8th grade or less	18	21	20	13	19	19	19
Finished 9th-11th grade	39	34	40	40	42	39	46
Finished 12th grade	32	34	29	35	30	31	29
Some college	11	11	10	12	8	11	5
No answer	0	0	1	0	1	0	1
Total	100	100	100	100	100	100	100
Age							
Under 18 years	1	2	1	1	1	1	2
18-20 years	38	36	35	41	43	43	43
21-23 years	42	41	56	48	44	47	40
24 years and over	10	17	7	6	9	8	11
No answer	3	4	1	4	3	1	4
Total	100	100	100	100	100	100	100
Time in Army							
Under 6 months	1	1	1	1	0	0	1
6-12 months	57	54	60	56	68	78	55
Over 12 months	42	44	39	43	31	21	39
No answer	0	1	0	0	1	1	1
Total	100	100	100	100	100	100	100
Time in Outfit							
Under 2 months	10	6	13	10	2	3	1
2 to 5 months	38	42	34	37	15	15	15
6 to 12 months	47	46	49	46	79	72	76
Over 12 months	5	5	4	7	4	0	8
No answer	0	1	0	0	0	0	0
Total	100	100	100	100	100	100	100

TABLE B-1 (Continued)
BACKGROUND CHARACTERISTICS COMPARED FOR ALL GROUPS

Background Characteristics	Participants				Non-participants		
	Total of Groups 1,2,3, (N=225)	Groups			Total of Groups 5,6,7 (N=340)	Groups	
		1 (N=112)	2 (N=122)	3 (N=91)		5 (N=150)	6 & 7 (N=190)
	%	%	%	%	%	%	%
Army Grade							
Private	21	22	23	16	34	39	29
Private First Class	47	46	46	51	43	44	42
Corporal	17	17	19	15	13	9	17
Sergeant	15	15	12	18	10	8	12
No answer	0	0	0	0	0	0	0
Total	100	100	100	100	100	100	100
Actual Combat Experience							
None	85	81	89	85	90	90	89
Under enemy fire or bombing	2	4	1	1	3	3	4
In actual combat	13	15	10	14	6	7	6
No answer	0	0	0	0	1	0	1
Total	100	100	100	100	100	100	100
Marital Status							
Married	17	17	16	16	14	13	14
Single	81	81	81	84	84	86	83
Divorced, widowed, or separated	2	2	3	0	2	1	3
No answer	0	0	0	0	0	0	0
Total	100	100	100	100	100	100	100
Birthplace by Census Regions							
New England	12	11	12	9	14	17	13
Middle Atlantic	25	25	24	28	29	36	24
East North Central	14	17	10	15	12	10	14
West North Central	19	18	22	21	4	7	8
South Atlantic	7	4	7	12	9	9	8
East South Atlantic	4	6	4	1	7	5	8
West South Atlantic	7	6	8	7	7	5	9
Mountain	6	5	7	3	3	2	4
Pacific	4	3	2	2	4	4	3
U. S. Unspecified	0	0	1	0	2	0	4
U. S. Possessions	1	1	2	1	1	2	1
Foreign	0	0	0	0	3	2	2
No answer	1	4	1	1	1	1	1
Total	100	100	100	100	100	100	100

TABLE B-2
BACKGROUND CHARACTERISTICS OF GROUPS 2, 3, 9, AND 10

Background Characteristics	Group 2 (N = 122)	Group 3 (N = 91)	Group 9 (N = 74)	Group 10 (N = 45)
	%	%	%	%
Volunteer	61	56	64	60
Non-high school graduate	59	53	61	64
21 years or older	74	67	72	76
In Army less than 1 year	58	57	54	51
In outfit 6 months or less	45	47	51	62
Private or Private First Class	66	67	69	67
Never married	78	84	78	76

SECURITY **RESTRICTED** INFORMATION

APPENDIX C

ADDITIONAL DATA RELATED TO INFORMATION PROBLEMS

SECURITY **RESTRICTED** INFORMATION

LIST OF 7 INFORMATION QUESTIONS
CONCERNED WITH PERSONAL INJURY
AND 10 INFORMATION QUESTIONS
NOT CONCERNED WITH PERSONAL INJURY

Question Number ¹	Personal Injury Questions	Correct Response
7	Radiation 4 miles from A-bomb explosion can make men permanently sterile.	False
8	Radiation sickness is nearly always fatal.	False
9	Misshapen children are being born in Japan now because of the A-bombs in 1945.	False
10	Radioactivity can be contagious.	False
15	Radioactivity caused a good many skin burns in the A-bombings of Japan.	False
16	Watching an A-bomb explode 5 miles away can cause permanent blindness.	False
17	Radiation 4 miles from an A-bomb explosion can make men unable to have sexual intercourse.	False
<u>Non-personal Injury Questions</u>		
27	All elements consist of atoms.	True
28	Doubling the size of the A-bomb does not double the amount of damage.	True
11	Some of the ships in the Bikini tests had to be sunk because they were too radioactive to be used again.	False
12	Instruments (Geiger counters, etc.) are dependable for detecting any dangerous radiation after A-bomb explosions.	True
13	There is no protection against the atom bomb within 5 miles of the center of the burst.	False
14	An area that has been A-bombed can be de-contaminated (made safe).	True
30	People cannot feel, taste, or smell radiation.	True
18	Any radiation that can be detected on a Geiger counter is strong enough to be dangerous.	False
19	Drinking water in sealed steel cans two miles from an A-bomb explosion is safe to drink right away.	True
20	Scrubbing with soap and water can remove most radioactive particles from the skin.	True

¹Number preceding each question is the number assigned to that question in Appendix Table C-1.

TABLE C-1

PERCENTAGE OF TROOPS GIVING CORRECT RESPONSES TO ALL 30 INFORMATION
QUESTIONS AT VARIOUS STAGES OF THE RESEARCH

Correct Responses (Transcribed)	Stage						Non-Participant					
	Participants			Delayed Effects			Base-line			Post-Indoctrination		
	Base-line	Post-Indoctrination	Post-bomb	%	%	%	Base-line	%	%	Post-Indoctrination	%	%
(1) It is safe to enter area below explosion within 1 day	7	74	82	85	8	9	12					
(2) One is safe below explosion, 5 miles away, in prone position	16	57	64	66	10	9	16					
(3) It is safe to enter area below explosion in regular field clothing	5	48	62	68	6	6	13					
(4) Least effect of air burst is not fatal beyond 3 miles	14	47	45	47	19	18	19					
(5) Flash burns on exposed skin would be expected up to 3 miles	31	60	49	47	25	17	25					
(6) No harmful materials reach the earth in an air burst	4	22	19	19	7	6	6					
(7) Radiation 4 miles from burst could cause permanent sterility	37	87	93	87	36	30	39					
(8) Radiation sickness is not "nearly always" fatal	40	70	85	81	47	44	49					
(9) A-bombs in Japan, 1945, have not caused miscarriages or stillbirths	42	79	73	71	42	41	38					
(10) Radioactivity is not contagious	39	78	75	80	33	39	45					
(11) No ships at Bikini were sunk because they were too motionless	21	35	42	42	14	17	19					
(12) Instruments can dependably detect dangerous radiation	69	89	91	92	69	67	64					

(16) Watch' as a burst at 5 miles cannot cause

(13) Protection is possible, even within 5 miles of the area of the burst

(14) An A-bomb area can be de-contaminated

(15) Radioactivity did not cause "a good many" skin burns in Japan

(16) Watching a burst at 5 miles cannot cause permanent blindness

(17) Radiation at 4 miles cannot cause an ail impotence

(18) Radiation, detectable by a Geiger counter, is not necessarily dangerous

(19) Water in sealed steel cans 2 miles from a burst is safe to drink

(20) You: radioactive particles can be scrubbed off skin with soap and water

(21) Immediately after an air burst attack, care for yourself and the injured

(22) Light colored, loose fitting clothing gives better protection

(23) Worst effect, falling objects caused most casualties in Japan in 1945

(24) Air bursts do the most immediate damage

(25) Surface and underwater bursts have most residual radiation

(26) Nuclear radiation is like X-rays from X-ray machine

(27) All elements consist of atoms

(28) Doubt if an A-bomb's size does not double the damage

(29) If caught in water in A-bomb attack, to be covered or fall flat

(30) People cannot feel, taste or smell radiation

74	95	92	92	78	68	64
76	83	90	90	76	68	68
11	65	65	55	16	7	12
37	79	79	82	30	27	47
58	92	95	96	49	45	53
40	84	86	85	31	33	37
19	83	89	96	21	21	30
60	96	96	33	67	59	59
37	61	74	67	25	24	26
46	54	55	47	53	49	54
23	93	74	78	9	10	12
61	79	75	71	67	66	53
54	81	77	80	60	56	51
29	91	86	85	27	28	31
67	55	59	68	65	64	66
44	20	29	35	4	41	43
83	98	100	99	87	84	87
57	97	92	96	61	48	44

Questions 1 through 28 are "Auxiliary-Information" questions, 21 through 28 are "Pure Information," 29 and 30 are in neither category. Responses are given in Questions C of the Post-bomb Report.

SECURITY **RESTRICTED** INFORMATION

LIST OF QUESTIONS COMPRISING
10-ITEM INFORMATION INDEX*

1. Radioactivity caused a good many skin burns in the A-bombings of Japan. (False)
2. Suppose an A-bomb like the one at Hiroshima were exploded at 2000 feet. Would harmful radioactive materials fall to the earth? (No harmful materials would reach the earth)
3. If an A-bomb were exploded at 2000 feet, under what conditions would it be safe to move into the spot directly below, right after the explosion? (Safe if you wore regular field clothing)
4. Suppose the A-bomb were used against enemy troops by exploding it 2000 feet from the ground and suppose all enemy troops were killed. How dangerous do you think it would be for our troops to enter the area directly below the explosion within a day? (Not dangerous at all)
5. Some of the ships in the Bikini tests had to be sunk because they were too radioactive to be used again. (False)
6. Drinking water in sealed steel cans two miles from an A-bomb explosion is safe to drink right away. (True)
7. What caused the greatest number of casualties from the A-bomb attacks on Hiroshima and Nagasaki? (Blast effect and falling objects)
8. Watching an A-bomb explode five miles away can cause permanent blindness. (False)
9. Any radiation that can be detected on a Geiger counter is strong enough to be dangerous. (False)
10. Radiation four miles from an A-bomb explosion can make men permanently sterile. (False)

*Correct responses are shown in parentheses.

SECURITY **RESTRICTED** INFORMATION

SECURITY **RESTRICTED** INFORMATION

APPENDIX D

**ADDITIONAL COMPARISONS BETWEEN
PHYSIOLOGICAL REACTORS AND NON-REACTORS**

SECURITY **RESTRICTED** INFORMATION

TABLE D-1

BACKGROUND CHARACTERISTICS;
PHYSIOLOGICAL REACTORS AND NON-REACTORS

Background Characteristic	PR's (N = 67)	NR's (N = 265)	Level of Significance of the Difference ^a
	%	%	
Draftee	28	29	---
Never married	73	77	---
Under 22 years	58	52	---
In Army more than 1 year	42	44	---
In outfit more than 6 months	43	51	.20 < p < .30
High school graduate	31	43	.05 < p < .10
Non-commissioned officer	33	32	---

^aSignificance was measured by t-tests in this appendix, except in Tables D-5 and D-6, in which Chi-square tests were used.

TABLE D-2

INFORMATION LEVEL;
PHYSIOLOGICAL REACTORS AND NON-REACTORS

Number and Kind of Information Questions	Mean % Correct Answers		Level of Significance of the Difference
	PR's (N = 67)	NR's (N = 265)	
	%	%	
All 30 information	72.9	73.3	---
20 Anxiety information	69.9	71.6	---
8 Pure information	67.0	67.6	---

TABLE D-3

CONFIDENCE;
PHYSIOLOGICAL REACTORS AND NON-REACTORS

Response (Paraphrased)	PR's (N = 67)	NR's (N = 265)	Level of Significance of the Difference
	%	%	
Do all right in actual fighting	46	66	.01 < p < .05
Do all right in A-bomb fighting	57	76	p < .01
Outfit is now half-ready now or in a few weeks	63	81	p < .01
F parts know enough to use A-bomb safely in maneuvers	87	92	---

TABLE D-4
ANXIETY ABOUT THE A-BOMB AND ESTIMATES OF THE DANGER
OF THE A-BOMB'S EFFECTS, PHYSIOLOGICAL REACTORS AND NON-REACTORS

Response (Paraphrased)	PR's (N = 67)	NR's (N = 265)	Level of sig- nificance of the Difference
	%	%	
Not worried at all about the A-bomb maneuver	73	82	.10 < p < .20
Hardly frightened at all when the last test A-bomb went off	57	86	p < .01
Not frightened at all by:			
The fire flash (fireball)	33	49	.01 < p < .05
The explosion (blast effect)	33	51	p < .01
Radiation at time of explosion	78	82	—
Residual radiation (after explosion)	61	91	p < .01

TABLE D-5
TENSION MANIFESTATIONS,*
PHYSIOLOGICAL REACTORS AND NON-REACTORS

Number of Physiological Reactions	PR's (N = 67)	NR's (N = 266)	Level of Sig- nificance of the Difference ^b
	%	%	
No reactions	30	90	p < .01
1 reaction	24	33	p < .01
2 or 3 reactions	37	14	p < .01
4 to 7 reactions	9	3	p < .01

*Physiological reactions experienced in the past.
^bBased on Chi-square.

TABLE D-6

WILLINGNESS TO VOLUNTEER,
PHYSIOLOGICAL REACTORS AND NON-REACTORS

Response (Paraphrased)	PR's (N = 67)	NR's (N = 285)	Level of Significance of the Difference ^a
	%	%	
Would volunteer for a secret, dangerous mission	46	54	.20 < p < .30
Would volunteer for another A-bomb maneuver	76	86	.10 < p < .20
Would have chosen the A-bomb maneuver over other maneuver with no A-bomb	78	83	---

^aBased on Chi-square.

TABLE D-7

ATTITUDES TOWARD MILITARY SERVICE,
PHYSIOLOGICAL REACTORS AND NON-REACTORS

Response (Paraphrased)	PR's (N = 67)	NR's (N = 285)	Level of Significance of the Difference
	%	%	
Would not accept immediate, honorable discharge	10	18	.05 < p < .10
Serve country better as soldier than as civilian	39	57	p < .01
Prefer Army to any other military service	16	44	p < .01
Prefer airborne infantry to other Army branch	33	46	.01 < p < .05

TABLE D-8
ATTITUDES TOWARD ARMY JOBS;
PHYSIOLOGICAL REACTORS AND NON-REACTORS

Response (Paraphrased)	PR's (N = 67)	NR's (N = 265)	Level of Significance of the Difference
	%	%	
All, or almost all, of work or training necessary	76	79	---
Amount of work about right	66	76	.10 < p < .20
Satisfied or very satisfied, with Army job	66	64	---

TABLE D-9
ATTITUDES TOWARD OUTFIT;
PHYSIOLOGICAL REACTORS AND NON-REACTORS

Response (Paraphrased)	PR's (N = 67)	NR's (N = 265)	Level of Significance of the Difference
	%	%	
Get square deal in company	67	79	.05 < p < .10
Company taken very good, or fairly good, care of welfare and personal problems	61	78	p < .01
Would rather go into combat with present company than some other	54	75	p < .01
Men in company usually feel enthusiastic, or very willing, when carrying out orders of officers	39	48	.10 < p < .20
Men in company usually feel enthusiastic, or very willing, when carrying out orders of non-coms	27	42	---

TABLE D-10

EVALUATION OF THE INDOCTRINATION PROGRAM;
PHYSIOLOGICAL REACTORS AND NON-REACTORS

Response (Paraphrased)	PR's (N = 67)	NR's (N = 265)	Level of Significance of the Difference
	%	%	
The training talks helped a great deal	72	61	.10 < p < .20
Need no more, or little more, information regarding atomic weapons and protection	55	52	---
Movies and lectures enough additional training for A-bomb combat	30	41	.05 < p < .10

TABLE D-11

WAR PESSIMISM;
PHYSIOLOGICAL REACTORS AND NON-REACTORS

Response (Paraphrased)	PR's (N = 67)	NR's (N = 265)	Level of Significance of the Difference
	%	%	
Expect war with Russia within 2 years	33	26	.20 < p < .30
A war with Russia would last longer than World War II	43	24	p < .01
Russia's supply of A-bombs is as good or better than that of the United States	33	26	.01 < p < .05

TABLE D-12

INCIDENCE OF PHYSIOLOGICAL REACTIONS ON D-DAY
AMONG 372 PARTICIPANT TROOPS

Physiological Reactions	Percent Reporting Reactions
Violent pounding of the heart	5
Sinking feeling in the stomach	3
Feeling of weakness or feeling faint	5
Feeling sick at the stomach	6
Cold sweat	3
Vomiting	2
Shaking or trembling	3
Urinating in pants	2
Losing control of bowels	1

TABLE D-13

QUESTIONS ON WHICH THE PROPORTION OF FAVORABLE ANSWERS
OF PHYSIOLOGICAL REACTORS DIFFERED SIGNIFICANTLY
OR SUGGESTIVELY FROM THAT OF NON-REACTORS
AT THE POST-IL DOCTRINATION STAGE

Questions with differences statistically significant at the 5 percent level ^a	Per cent answering favorably	
	PR's	NR's
	%	%
If you had your own free choice right now, which one of the military services would you prefer to be in? (Army)	12	40
If you had been given your choice between going on this A-bomb maneuver or some other maneuver with no A-bombs, which would you have chosen? (A-bomb maneuver)	64	84
If you were sent into actual fighting now in which we used A-bombs against an enemy, how do you think you would do? (Would do all right)	42	64

Questions with differences statistically significant at the 10 per cent level	Per cent answering favorably	
	PR's	NR's
In general, what sort of physical condition would you say you are in at the present time? (Good or Very Good)	60	75
If we go to war against Russia, how long do you think the war would last? (Shorter than World War II)	33	47

^aFavorable replies are in parentheses.

SECURITY **RESTRICTED** INFORMATION

APPENDIX E

ADDITIONAL FINDINGS

SECURITY **RESTRICTED** INFORMATION

SECRET **RESTRICTED** INFORMATION

This appendix includes six tables which present findings concerning (1) attitudes toward being in the Army, (2) troops' evaluations of the indoctrination program, and (3) troops' estimates of a possible war with Russia. The inclusion of these questions in the questionnaire was based, in part, on the hypothesis that some measurable troop demoralization would accompany the exercise. It was believed that should this demoralization occur, it would be evidenced in:

1. Increased incidence of unfavorable attitudes toward military service.
2. Increased incidence of unfavorable evaluations of the indoctrination.
3. Increased incidence of pessimistic estimates concerning war with Russia.

The findings presented in this section fail to indicate the development of the hypothesized demoralization. Responses to these question clusters reveal no consistent pattern. They appear to reflect the operation of influences extraneous to the experience.

Such extraneous influences on responses to the question on whether or not the troops would accept an immediate honorable discharge, for example, might be: proposed revisions in the Selective Service Laws; changes of Army policy concerning discharges; and the course of the Korean peace negotiations.

SECRET **RESTRICTED** INFORMATION

TABLE E-1
ATTITUDES TOWARD MILITARY SERVICE,
PARTICIPANTS AND NON-PARTICIPANTS AT EACH STAGE OF THE RESEARCH

Response (Paraphrased)	Stage			
	Base- line	Post- Indoctrination	Post- bomb	Delayed Effects
	%	%	%	%
<i>Participants</i>				
Serve country better as soldier than as civilian	66	60	58	51
Would not accept immediate, honorable discharge	12	15	16	11
Prefer Army to any other military service	47	28	35	30
Prefer Airborne to other Army branch	48	48	59	45
<i>Non-participants</i>				
Serve country better as soldier than as civilian	57	53	N.T. ^a	47
Would not accept immediate, honorable discharge	12	14	—	19
Prefer Army to any other military service	28	32	—	25
Prefer Airborne to other Army branch	49	46	—	49

^aNot tested at this stage.

TABLE E-2
ATTITUDES TOWARD OUTFIT;
PARTICIPANTS AND NON-PARTICIPANTS AT EACH STAGE OF THE RESEARCH

Response (Paraphrased)	Stage			
	Base- line	Post- indoctrination	Post- bomb	Delayed Effects
	%	%	%	%
Participants				
Get a square deal in company	71	74	74	73
Company takes very good, or fairly good, care of welfare and personal problems	71	62	74	67
Would rather go into combat with present company than some other	80	77	86	85
Very proud, or fairly proud, of outfit	33	34	40	24
Men in company usually feel enthusiastic or very willing when carrying out orders of officers	46	40	49	42
Men in company usually feel enthusiastic or very willing when carrying out orders of non-coms	31	29	36	46
Non-participants				
Get a square deal in company	68	60	N.T. ^a	65
Company takes very good, or fairly good, care of welfare and personal problems	71	58	---	67
Would rather go into combat with present company than some other	85	92	---	93
Very proud, or fairly proud, of outfit	48	38	---	40
Men in company usually feel enthusiastic or very willing when carrying out orders of officers	44	46	---	50
Men in company usually feel enthusiastic or very willing when carrying out orders of non-coms	28	24	---	41

^aNot tested at this stage.

TABLE 2-3
ATTITUDES TOWARD ARMY JOB;
PARTICIPANTS AND NON-PARTICIPANTS AT EACH STAGE OF THE RESEARCH

Response (Paraphrased)	Stage			
	Base- line	Post- induction	Post- bomb	Delayed Effects
	%	%	%	%
<i>Participants</i>				
All, or almost all, of work or training necessary	38	38	34	28
Amount of work about right	69	76	68	68
Satisfied, or very satisfied, with Army job	65	57	58	60
<i>Non-Participants</i>				
All, or almost all, of work or training necessary	47	32	N.T. ^a	40
Amount of work about right	74	68	—	71
Satisfied, or very satisfied, with Army job	64	58	—	61

^aNot tested at this stage.

TABLE E-4
EVALUATION OF THE INDOCTRINATION PROGRAM,
PARTICIPANTS AND NON-PARTICIPANTS AT EACH STAGE OF THE RESEARCH

Response (Paraphrased)	Stage			
	Base- line	Post- Indoctrination	Post bomb	Delayed Effects
	%	%	%	%
<i>Participants</i>				
The training talks helped a great deal	28	84	76	73
Need no more, or little more, information regarding atomic weapons and protection	22	50	59	60
Movies and lectures enough additional training for A-bomb combat	N.T. ^a	41	38	47
<i>Non-participants</i>				
The training talks helped a great deal	25	26	N.T. ^b	24
Need no more, or little more, information regarding atomic weapons and protection	36	16	—	21
Movies and lectures enough additional training for A-bomb combat	N.T.	22	—	17

^aQuestion not included at this stage.

^bNot tested at this stage.

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TABLE E-5
WAR PESSIMISM,
PARTICIPANTS AND NON-PARTICIPANTS AT EACH STAGE OF THE RESEARCH

Response (Percentage)	Stage			
	Baseline	Post- indoctrination	Post- bomb	Delayed Effects
	%	%	%	%
<i>Participants</i>				
Expect war with Russia within 2 years	32	23	27	22
A war with Russia would last longer than World War II	45	29	32	37
Russia's supply of A-bombs is as good or better than that of the United States	30	22	27	28
<i>Non-participants</i>				
Expect war with Russia within 2 years	39	37	N.T.*	33
A war with Russia would last longer than World War II	42	39	—	32
Russia's supply of A-bombs is as good or better than that of the United States	31	32	—	28

*Not tested at this stage.

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APPENDIX F

**QUESTIONS USED BY THE OPERATIONS RESEARCH OFFICE
TO ELICIT PHYSIOLOGICAL RESPONSES**

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QUESTIONS ADMINISTERED TO PARTICIPANT TROOPS ONLY¹

1. Is your name _____? (First name)
2. Are you in _____? (Military unit)
3. Are you worried about something now?
4. When the A-bomb goes off do you expect to black out or be hurt?
5. If you were transferred, would you want your new unit to be chosen for an A-bomb mission?
6. Do you ever smoke?
7. Would you be afraid to handle equipment within 1-1/2 miles of the A-bomb burst, before it is monitored?
8. Under atomic warfare do you feel your chances are as good for coming out unhurt, as under regular warfare?
9. Do you feel you will be unhurt in an A-bomb attack if you do what you have been told here to do?
10. Would you feel safe in being in those foxhole positions when the A-bomb goes off?
11. Would you want your unit to attack with A-bombs, if the Army uses A-bombs?
12. Do you think the outfit you are in is a good one?
13. Are you more scared of jumping than of being in atomic warfare?

¹Before D-day.

²Questions administered both before and after D-day.

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QUESTIONS ADMINISTERED TO
NON-PARTICIPANT AND PARTICIPANT TROOPS*

1. Did you eat any breakfast today?
2. If we use A-bombs on enemy troops and cities will it hasten our victory?
3. Do you know the total population figure for the state of Kentucky?
4. Have any of the fellows in your outfit thought you queer?
5. Do the fellows in your outfit think you may let them down in combat?
6. As you jump out the door of the plane do you have complete control of all your senses?
7. Do you have any experience driving an Army tank?
8. Your unit is defending itself against an atomic attack - Do you feel your chances to live are less than in regular attack?
9. Suppose your weapon was left 1-1/2 miles from the ground zero of an A-bomb burst, would you use it before it was monitored?
10. Do you think your outfit is a good one?
11. Would you say that you are more scared of atomic warfare than of your jumps from a plane?

Alternate: If you were in your foxhole in Nevada when that A-bomb went off, would you have felt safe?

*After D-day.

*Questions administered to participants both before and after D-day.

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