AN EXPERIMENTAL STUDY OF "INTEGRATED GUIDANCE FOR SHELTER MANAGEMENT"

(Summary of Final Report)

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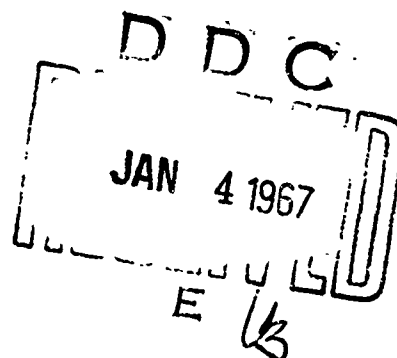AMERICAN INSTITUTES FOR RESEARCH
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THE PROBLEM

In 1965, under contract OCD-PS-64-57 (Work Units 1533A and 1542A), the American Institutes for Research produced a set of documents designed to aid persons with shelter management responsibilities in carrying out both their peacetime and emergency duties. The first volume in the set is a training text which serves as an introduction to the subject of shelter management. The second volume is a guidance document for planning a group fallout shelter. The final document is for in-shelter use, to assist the management staff in organizing and operating a shelter under occupancy conditions. Together, the three documents make up an integrated guidance package which covers the broad range of information and action requirements for shelter planning and management.

The objective of the research program described herein was to obtain empirical data on the individual effectiveness of these guidance documents and to assess the effectiveness of various combinations of these materials in enhancing the peacetime and emergency shelter management functions. Peacetime responsibilities consist primarily of shelter planning, that is, placing a fallout shelter in a state of operational readiness and maintaining this readiness. Emergency responsibilities fall under the common label of shelter management, and include the duties that are part of organizing, operating, and managing a shelter under conditions of actual occupancy. Test instruments were developed to assess both shelter planning and shelter management effectiveness.

From the point of view of shelter planning the experiment was designed to examine the effectiveness of:

1. Planning guidance versus no guidance.

2. Planning guidance versus other types of guidance materials.

3. Planning guidance as a supplement to other types of formal preparation.

In the area of shelter management in time of emergency the salient dimensions of the research problem were:

1. Management guidance versus no management guidance.

2. Trained versus untrained managers.

3. Training with an occupancy exercise versus training without an exercise.

4. Shelter management training versus other types of preparation.

Two additional issues which apply to both the peacetime and emergency aspects of management are:

1. Simple versus complex shelter situations.

2. Executive versus non-executive planners and managers.

This study described on the following pages was developed and conducted within a complex framework of assumptions and convictions. It represents, within the constraints of this framework, an initial attempt at rigorous and empirical evaluation of the process and product of fallout shelter management.

APPROACH

Experimental Design

The problem described above was examined using the experimental paradigm illustrated in Figure 1. The dependent variables involved in this design were shelter planning and shelter management. The independent variables included shelter management training, shelter planning orientation and planning experience, the presence or absence of shelter management guidance, the nature of the shelter situation, and the background (student versus executive) of the subjects.
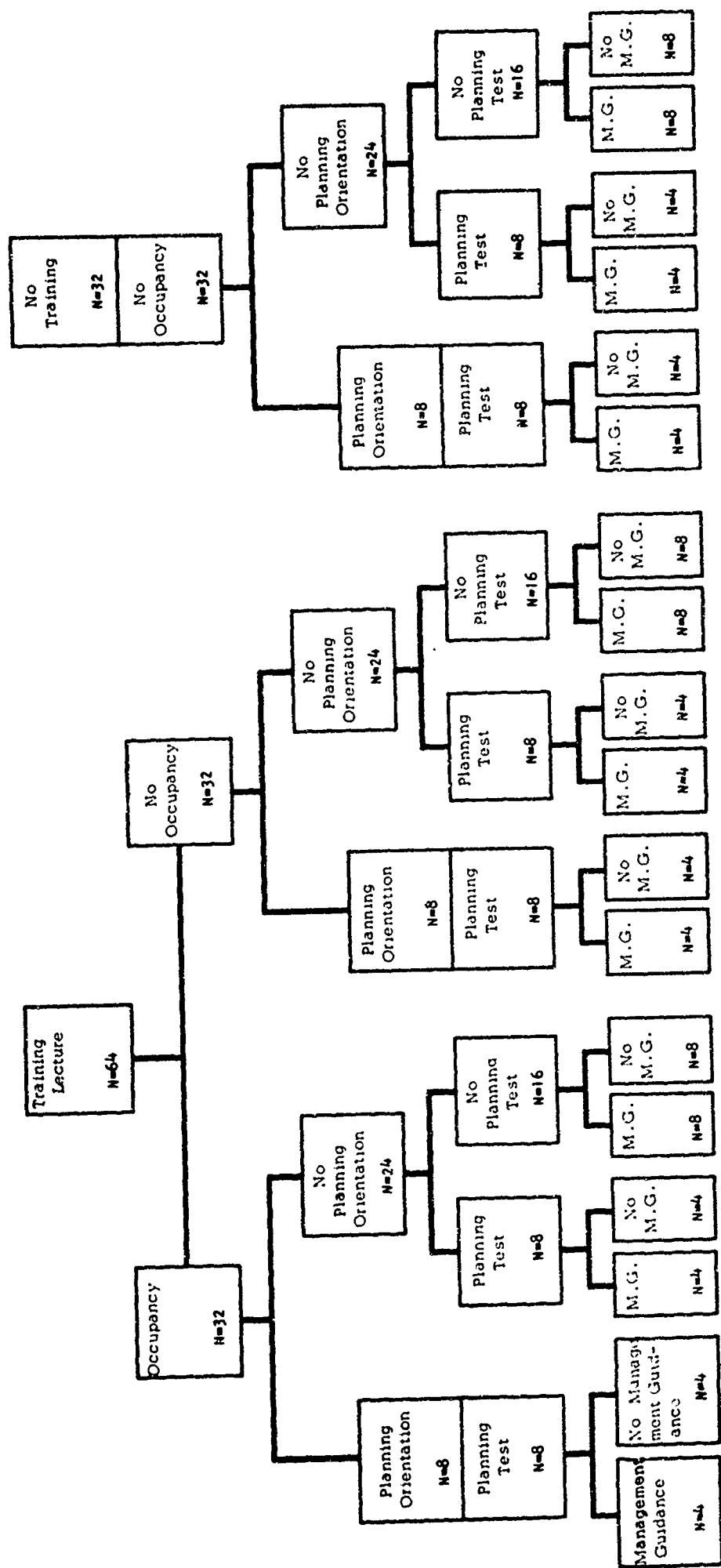
Figure 1. Experimental Paradigm

Shelter Management Training

Two-thirds of the subjects received shelter management training consisting of approximately eight hours of classroom instruction. The basic text for this training was An Introduction to Shelter Management (Bend & Collins, 1965), which is Volume I of the Institute's Integrated Guidance for Shelter Management.

Half of the shelterees receiving shelter management training also participated in a shelter occupancy exercise.

Inclusion of an occupancy exercise in the research design resulted in essentially three "training conditions": (1) training with occupancy, (2) training without occupancy, and (3) no training.

Planning Orientation

Eight subjects from each of these three training groups were given shelter planning orientation. This orientation consisted of a four hour study session during which the subjects read Volume II of the Integrated Guidance, Planning A Group Shelter (Smith & Lasky, 1965).

Planning Testing

At the next point in the experimental paradigm all of the subjects who had received planning orientation and one-third of those who had not were tested on their ability to plan a shelter. An additional variable not evident in Figure 1 was introduced as part of this planning testing. Identical Planning Tests were administered for two different shelter situations. These different situations, involved shelter size, available resources, etc. All of the subjects took the Planning Test for both planning situations with each subject acting as his own control. The order in which the tests were taken was randomized. The paradigm at this point can be summarized on the following page.

Training

	1	2	3		
1				1	
				2	Situation
2				1	
				2	

Planning
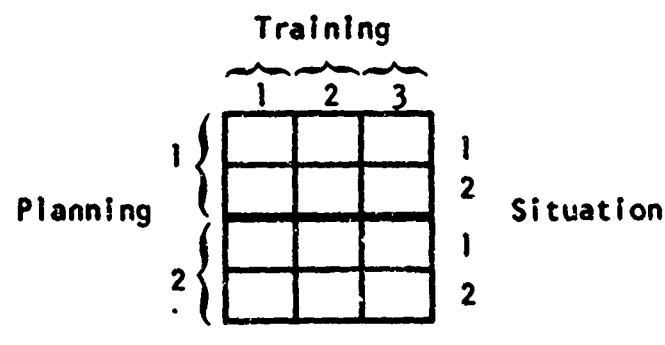
T1 = Occupancy
T2 = No Occupancy
T3 = None
P1 = Orientation
P2 = No Orientation
S1 = Simple
S2 = Complex

Management Testing

The final step in the paradigm was the Shelter Management Test, which was taken by all of the subjects. Half of the subjects were provided with the Shelter Manager's Guide (Brandegee & Bend, 1965) to be used during the Management Test. This guide is Volume III of the Integrated Guidance for Shelter Management. Each subject, acting as his own control, took two forms of the test, each based on a different shelter situation.

Subjects came to this test with one of three planning backgrounds (planning orientation and testing, planning testing, and no planning experience). Performance on the Management Test could then be evaluated as follows:

Training

Planning

Situation
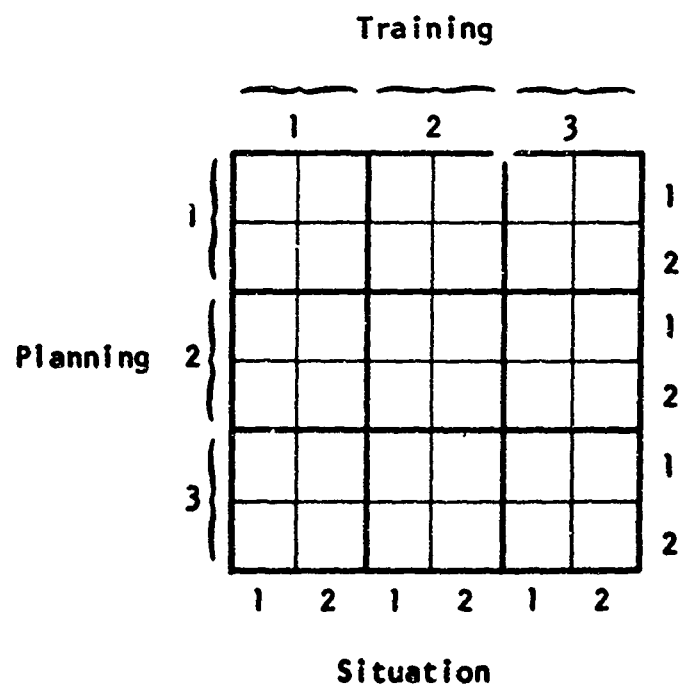
Management Guidance

T1 = Occupancy
T2 = No Occupancy
T3 = None
P1 = Orientation & Testing
P2 = Testing
P3 = None
MG1 = Yes
MG2 = No
S1 = Simple
S2 = Complex

Intelligence Testing

The Adaptability Test of mental ability (Tiffin & Lawske, 1954) was administered to all subjects as part of their participation in the study. This provided an opportunity to evaluate and control for the relationship of mental ability to both of the dependent variables.

Subjects

Ninety-six subjects were adequate to meet the requirements of the experimental design. Most of the subjects (N=72) were college students. Because the Institute felt that it was important to investigate the performance of executives on both tests, 24 executives were also used as subjects. A proportionate number of executives were randomly assigned to each of the eighteen experimental groups.

Development of Shelter Situations

In an effort to examine a broad base of planning and management skills, two widely different shelter situations were used as a basis for the Planning and Management Tests. A "shelter situation" is defined in terms of the characteristics of the building housing a shelter facility. This should not be confused with the "attack scenario" or with what happens at the shelter following an attack warning.

Pictures and floor plans of the shelter, along with two verbal supplements were designed to provide all of the information that the subject would need to write a shelter plan or to manage the shelter in that building.

Test Development

Planning

The Shelter Planning Tests were designed to evaluate the subject's ability to identify and deal with the basic factors associated with shelter planning, such as food, water, radiological protection, etc. Two types of measures were developed. One was designed to measure planning comprehensiveness and the other was designed to measure the "goodness of solution" of typical planning problems.

Comprehensiveness in shelter planning was defined in terms of the number of shelter planning factors which could be identified by the subjects. In order to obtain this measure the subjects were asked at the beginning of the Planning Test session to prepare a topical outline of a shelter plan. The major headings of this outline were to include "...everything you consider necessary and important in planning a fallout shelter." These factors were further defined as the "...major functions necessary for survival...". Food and fire protection were given as examples. A copy of the instructions given the subjects is included in Appendix C.

The other test instrument was designed to assess the extent to which the subject could develop effective solutions for dealing with specific planning factors. Rather than requiring the subjects to write a complete shelter plan, the test sampled from the realm of planning factors. Twenty-one problems were developed, covering virtually every major shelter function.

Management

The 21 shelter problems that make up the scenario are of two types. Some of them deal with "normal" shelter operations, such as establishing an organization, allocating supplies, and the like. Others deal with

contingency events--non-routine situations that have a reasonable likeli-
hood of occurrence in a wide range of community shelter types, e.g.,
temperature extremes, power failure, psychological problems.

For each problem, the subject was asked to supply a number of
answers to specific questions focusing upon the actions the manager should
take in response to the problem, and the information he requires to arrive
at his decisions.

Test Scoring

Planning

Three separate scores were derived for shelter planning. Planning
comprehensiveness was determined by counting the number of planning factors
included in the topical outline prepared by the subjects. The "goodness"
of the solutions offered for specific planning problems was expressed
in terms of two scores, quality and thoroughness.

Management

A subject's score on the Management Test was based on the number of
correct concept elements contained in each of his answers.

A concept element is a broadly described management duty or responsibility
that is relevant to the solution of a particular management problem. For
example, correct concept elements in the managers response to the warning
signal include: (1) verification of the signal, (2) assumption of command,
(3) preparation of the shelter for occupancy, and (4) provision of infor-
mation to building occupants.

The primary score on the Management Test was the total number of
concept elements listed by the subject, converted into a percentage of
the total possible concept elements. In addition, two sub-scores were derived

from sub-sample of the test. One was a "technical operations" score based upon the answers to several questions that dealt with technical information (e.g., ventilation problems). The second sub-score was a "human relations" or "psycho-social" score, based on the answers to questions that dealt with interpersonal problems in the shelter.

Two other measures associated with test performance were obtained. One was the length of time to complete each problem, and the other was the subject's perceived difficulty in arriving at a solution.

Data Analysis

The Pearson product-moment coefficient of correlation was used to define the relationship between the SRA Adaptability Test scores and performance on the Planning and Management Tests.

A standard analysis of variance program was applied to the Planning Test data to investigate differences within variables and interactions between them.

An analysis of variance with a correction for unequal cell entries was applied to the Management Test data. The correction was applied to permit the analysis of data available from extra subjects in some of the Management Test cells.

Finally, T-tests were used, where appropriate, to assess differences between specific variables or conditions.

RESULTS

The results of both the planning and management testing may be summarized as follows:

1. Use of the planning guide in itself significantly improved both the thoroughness and the comprehensiveness of shelter planning.

2. Shelter manager training and occupancy in themselves significantly improved the quality and thoroughness of shelter planning.

3. Participation in an occupancy exercise significantly contributed to the quality of shelter planning by trained shelter managers.

4. The use of planning guidance consistently resulted in better planning scores by those who had received training and occupancy than for those with no training. This improvement was significant in the cases of planning comprehensiveness.

5. Participation in the eight-hour lecture training course based upon the Introduction to Shelter Management led to a significant increase in the total score on the shelter management tests.

6. Use of the Shelter Manager's Guide as a management aid while taking the tests resulted in a significant improvement in management performance, measured by the total test score.

7. Exposure to a shelter planning experience also significantly increases scores on the Management Tests.

8. General intelligence was highly related to effective shelter planning and management regardless of formal preparation.

9. No significant differences were found between the test performance of students versus executives.

These findings were reviewed and interpreted in relation to the research problems outlined at the beginning of the study.

The results of this study are interesting and in some respects, provocative. They relate directly to key issues in the current fallout shelter program. The data should be cautiously applied to these issues, however. Subject performance was measured in an environment which was quite different from that encountered in an operational situation. This was especially true in the case of shelter management testing, which was conducted out of the context of an actual shelter situation.

For this reason care should be exercised in translating these research findings into operational recommendations.

REFERENCES

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