ISSUES CONCERNING THE PSYCHOLOGICAL IMPACT OF TACTICAL NUCLEAR WARFARE

The BDM Corporation
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One uncertainty associated with the effectiveness of military operations in a nuclear environment is the nature of the psychological response of combat personnel and the impact of this response on individual performance. The objective of this study is to summarize the current status of research in this area, to identify the major issues, and to recommend direction for further study. To support this objective, studies concerning human response under stress and analyses of psychological response to conventional warfare...
were reviewed, and interviews with fifteen experts in the areas of human behavior and performance and tactical nuclear warfare were conducted. Resulting issues were summarized and prioritized, key points identified, and shortcomings determined. Specific recommendations for continued research are presented.
ISSUES CONCERNING THE PSYCHOLOGICAL IMPACT OF TACTICAL NUCLEAR WARFARE

SUMMARY

OBJECTIVE

One uncertainty associated with the effectiveness of military operations in a nuclear environment is the nature of the psychological response of combat personnel and the impact of this response on individual performance. Present doctrine assumes no qualitative difference in response to conventional or nuclear warfare. Current concern regarding the validity of this assumption, the increasing sophistication of tactical equipment, and the realization of the significance of human factors in military operations has prompted a reexamination of this issue.

The objective of this program is to summarize the current status of research in this area, to identify the major issues, and to recommend directions for further study.

APPROACH AND METHOD

Studies concerning human response under stress and analyses of psychological response to conventional warfare were reviewed, and interviews with fifteen experts in the areas of human behavior and performance and tactical nuclear warfare were conducted. Both the literature review and the interviews focused on issues concerning: problem relevance; status of research; key issues; response control; and ideas for further study. The resulting issues were summarized and prioritized, key points identified, and shortcomings in available knowledge determined. Based on a consideration of these findings, specific recommendations for continued research were developed.

MAJOR FINDINGS

Available studies and current research relevant to this issue are extremely limited, while community opinion is diverse. Two points of general concensus concern: first, the significance of this issue; and second, the need for training in establishing an effective "performance repertoire" within a nuclear environment. Lack of quantification represents the major difficulty in this research area. A specific recommendation for the inclusion of human performance variation in existing combat simulations is proposed as a first step in the development of a quantitative tool.
ISSUES CONCERNING PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

DEFENSE NUCLEAR AGENCY
PSYCHOLOGICAL RESPONSE
TO TACTICAL NUCLEAR WARFARE

BRIEFING OUTLINE

- OBJECTIVES
- APPROACH
- KEY STUDY QUESTIONS
- THE LITERATURE
- THE COMMUNITY
- SUMMARY OF ISSUES
- RECOMMENDATIONS
- SUMMARY
PSYCHOLOGICAL RESPONSE
TO TACTICAL NUCLEAR WARFARE

OBJECTIVES

- TO IDENTIFY AND PRIORITIZE ISSUES CONCERNING THE PSYCHOLOGICAL IMPACT OF NUCLEAR WARFARE ON COMBAT PERSONNEL

- TO PROPOSE ALTERNATIVE METHODS FOR THE INVESTIGATION OF THESE ISSUES
PSYCHOLOGICAL RESPONSE
TO TACTICAL NUCLEAR WARFARE

RESEARCH OVERVIEW

WHY CONSIDER THIS ISSUE?

• RELEVANT DATA EXISTS, BUT IT IS INCONCLUSIVE

• SERIOUS INTEREST IS DEVELOPING BECAUSE OF:
  — INCREASING EQUIPMENT COMPLEXITY
  — A REALIZATION OF ITS POTENTIAL IMPACT

• THERE IS A NEED TO DETERMINE:
  — CURRENT RESEARCH STATUS
  — DIRECTIONS FOR FURTHER RESEARCH
  — DNA POSTURE
PSYCHOLOGICAL RESPONSE
TO TACTICAL NUCLEAR WARFARE

APPROACH

- INTERVIEW KEY PERSONNEL
- REVIEW THE LITERATURE
- IDENTIFY AND PRIORITIZE ISSUES
- PROPOSE ALTERNATIVE RESEARCH METHODOLOGIES
PSYCHOLOGICAL RESPONSE
TO TACTICAL NUCLEAR WARFARE

STUDY QUESTIONS

- IS THIS A RELEVANT PROBLEM?

- WHAT WORK IS BEING DONE NOW AND WHO IS DOING IT?

- WHAT ARE THE DRIVING ISSUES?

- WHAT COULD BE DONE TO MINIMIZE ANY POTENTIAL PSYCHOLOGICAL IMPACT?

- HOW CAN FURTHER INVESTIGATIONS BE PERFORMED?
PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

THE LITERATURE – AN OVERVIEW

- WHAT WAS REVIEWED:
  - "THE VINEBERG STUDY"
  - INVESTIGATIONS OF THE IMPACT OF STRESS
  - REVIEWS OF PSYCHOLOGICAL CASUALTIES IN CONVENTIONAL WARFARE

- GENERAL OBSERVATIONS:
  - RESEARCH HAS BEEN EXTREMELY LIMITED
  - CURRENT DOCTRINE AND IDEAS REPRESENT AN EXTRAPOLATION FROM CONVENTIONAL WARFARE RESULTS AND "APPROXIMATING" LABORATORY INVESTIGATIONS
  - THE IMPACT OF PSYCHOLOGICAL RESPONSE "IN THE LARGE" HAS NOT BEEN CONSIDERED
PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

THE LITERATURE — SPECIFIC OBSERVATIONS

- IN GENERAL COMBAT ENVIRONMENTS:
  - LEADERS ARE UNDER MORE STRESS THAN FOLLOWERS
  - NEAR HITS ENHANCE ANXIETY
  - PSYCHIATRIC CASUALTIES ARE RELATED TO MOS, UNIT TYPE, AND NUMBER OF PHYSICAL CASUALTIES

- IN NUCLEAR COMBAT ENVIRONMENTS, ONE EXPECTS:
  - QUALITATIVE SIMILARITY TO CONVENTIONAL WARFARE
  - INCREASED ISOLATION
  - GREATER PRE-BURST APPREHENSION
# Psychological Response to Tactical Nuclear Warfare

## The Community

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PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

SUMMARY OF KEY ISSUES

FIRST ORDER THEMES

- THE PROBLEM IS QUITE RELEVANT
- THERE IS NO DIRECT ON-GOING RESEARCH
- DATA ARE INSUFFICIENT AND DIFFICULT TO COMPILE
- APPROPRIATE CBR RESPONSE DOES NOT EXIST IN THE CURRENT BEHAVIORAL REPERTOIRE OF COMBAT PERSONNEL
SECOND ORDER THEMES

- A SIGNIFICANT PREMIUM WILL BE PLACED ON INDIVIDUAL SURVIVAL
- LEADERS WILL BE AFFECTED MORE THAN FOLLOWERS
- ALL PERSONNEL WILL SUFFER SOME FORM OF PSYCHOLOGICAL CASUALTY
- THE RESPONSE WILL BE AGENT-PROXIMITY SENSITIVE
- GAS IS MORE FRIGHTENING
- OTHER RELEVANT FACTORS INCLUDE:
  - UNIT COHESION
  - INTENSITY OF BATTLE
  - KNOWLEDGE OF SITUATION
  - ISOLATION
  - MISTRUST OF AUTHORITY
  - COMMUNICATION
  - POSITIVE LEADERSHIP
  - DANGER PAST
PSYCHOLOGICAL RESPONSE
TO TACTICAL NUCLEAR WARFARE

SUMMARY OF
KEY ISSUES

THIRD ORDER THEMES

• SIGNIFICANCE OF EQUIPMENT BREAKDOWN UNDER STRESS

• MEANING OF "PSYCHOLOGICAL CASUALTY"

• EXPECTED PERFORMANCE OF THE CURRENT ARMY AND INCLUSION OF CULTURAL EFFECTS

• APPROPRIATENESS OF ORGANIZATIONAL DEVELOPMENT

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PSYCHOLOGICAL RESPONSE
TO TACTICAL NUCLEAR WARFARE

• PERFORMANCE
  - NO DIFFERENCE FROM WW II
  - 100% PSYCHOLOGICAL CASUALTIES
  - SIGNIFICANT UNCERTAINTIES IN CURRENT PERFORMANCE

• DATA
  - NATURAL DISASTER DATA ARE NON-ANALOGOUS
  - MANY-GROUP ISOLATION PHENOMENA ARE RELEVANT
  - DATA ADMIT ANY CONCLUSION
PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

RECOMMENDATIONS

WHAT SHOULD BE DONE

• TRAINING
  — GENERAL AS WELL AS SPECIFIC
  — PSYCHOLOGICAL FIRST-AID
  — DE-SENSITIZATION

• BETTER EQUIPMENT AND REPLACEMENT POLICIES

• INCREASED UNDERSTANDING OF STRESS ON THE TACTICAL BATTLEFIELD

• PSYCHOLOGICAL RESEARCH IN CURRENT EXERCISES
PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

RECOMMENDATIONS

DIFFICULTIES

- RELATIVE IMPORTANCE OF ISSUES
- QUANTIFICATION REQUIREMENTS
- EXTRAPOLATION ASSUMPTIONS
- DATA COLLECTION AND DATA BASE DEVELOPMENT
WHAT OUGHT TO BE DONE

- QUANTIFY THE IMPACT OF A TACTICAL NUCLEAR ENVIRONMENT ON THE PERFORMANCE OF COMBAT PERSONNEL

- DETERMINE THE IMPACT OF THIS RESPONSE ON SIMULATED BATTLE OUTCOME

- DEVELOP APPROPRIATE TRAINING/OPERATIONAL/ORGANIZATIONAL RECOMMENDATIONS
PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

RECOMMENDATIONS

SOME CONSIDERATIONS

- THERE ARE NO "REAL" ANSWERS

- THERE IS NO SYSTEMATIC WAY TO STUDY ACTUAL INDIVIDUAL PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

- THE MOST USEFUL APPROACH IS TO PROVIDE PLANNERS AND COMMANDERS WITH A RANGE OF ALTERNATIVES
PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

A KEY OPERATIONAL IDENTIFICATION

PSYCHOLOGICAL RESPONSE = HUMAN PERFORMANCE
EXEMPLARY RESEARCH PROGRAMS
(OR, FIRST STEPS TOWARD QUANTIFICATION)

- **SIMULATION**
  - **EMPLOY A DNA-SPONSORED COMBAT SIMULATION TO INVESTIGATE THE SENSITIVITY OF KEY MOEs TO A RANGE OF VARIATION IN HUMAN PERFORMANCE**

- **ANALYSIS**
  - **EMPLOYING CURRENT TACTICAL HARDWARE SYSTEMS, INVESTIGATE THE DYNAMICS OF THE MAN-MACHINE INTERFACE IN STRESSFUL ENVIRONMENTS**
PSYCHOLOGICAL RESPONSE
TO TACTICAL NUCLEAR WARFARE

AN EXAMPLE

T-COR

- A THEATER LEVEL MODEL WITH TWO LEVELS OF DETAIL
  - DIVISION LEVEL (AGGREGATE CORPS)
  - COMPANY LEVEL (DETAILED CORPS)

- REALISTICALLY PORTRAYS COMBAT TO ANALYZE
  - BREAKTHROUGHS, PENETRATIONS, ENVELOPMENTS, ETC.
  - USE OF TACTICAL NUCLEAR WEAPONS
  - IMPACT OF C³
  - ALTERNATIVE ROLES AND MISSIONS FOR TACTICAL AIR RESOURCES
WHY T-COR?

AS A THEATER-LEVEL COMBAT SIMULATION, T-COR IS
SENSITIVE TO VARIATIONS IN HUMAN PERFORMANCE
WITH VARIATIONS IN HUMAN PERFORMANCE

T-COR IS A STATE-OF-THE-ART CAPABILITY

T-COR IS A DNA-SPONSORED EFFORT

T-COR CAN BE USED IN ITS PRESENT FORM
PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

T-COR CHARACTERISTICS

MULTIPLE LEVELS OF DETAIL

- HIGH RESOLUTION COMPONENT IN THEATER LEVEL CONTEXT
- DETAILED CORPS PROVIDES "FINE STRUCTURE"; AGGREGATE CORPS PROVIDE BOUNDARY CONDITIONS
- IMPLEMENTS "HIERARCHY OF MODELS" CONCEPT WITHIN A CONSISTENT MODELING FRAMEWORK
- ITERATIVE "TUNING" OF WHOLE MODEL
- POTENTIAL EXTENSION TO VARIABLE, MODEL-SELECTED LEVELS OF DETAILS
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**PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE**

**PROCESSES MODELED IN T-COR**
PSYCHOLOGICAL RESPONSES
TO TACTICAL NUCLEAR WARFARE

EXAMPLE T-COR OUTPUT

BREAKTHROUGH — PENETRATION OF BLUE POSITIONS

OUTPUT SUMMARY

- REALISTIC MOVEMENT OF COMBAT FORCES
  - RED PENETRATION
  - BLUE PINCHING
  - OFF PENETRATION

OUTPUT DISPLAY

H + 4  25 KM
PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

MODELING HUMAN BEHAVIOR IN T-COR

- **THE HUMAN PERFORMANCE PARAMETERS**
  - **BREAKPOINTS**: THRESHOLDS OF ATTRITION
  - **PERFORMANCE**: RATES OF ADVANCE; RATES OF AMMO EXPENDITURE; C3 DELAYS...

- **METHODOLOGY**
  - **ESTABLISH BASE CASE SCENARIOS AND MOEs**
  - **VARY HUMAN PERFORMANCE PARAMETERS BASED ON EXISTING AND EXTRAPOLATED DATA**
  - **SUMMARIZE AND ANALYZE MOE VARIATIONS**

- **RESULTS**
  - **A QUANTITATIVE SUMMARY OF THE IMPACT OF VARIATIONS IN HUMAN PERFORMANCE ON KEY COMBAT MOEs**
PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

- A FIRST STEP IN QUANTIFICATION
- AN IDENTIFICATION OF THE MAGNITUDE OF THE PROBLEM
- AN UNDERSTANDING OF AGGREGATE IMPACT, RATHER THAN INDIVIDUAL RESPONSE
- A FOCUSING ON AREAS FOR DETAILED INVESTIGATION
PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE

• PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE IS NOT WELL UNDERSTOOD, YET COULD BE SIGNIFICANT IN TERMS OF COMBAT EFFECTIVENESS

• PSYCHOLOGICAL RESPONSE TO TACTICAL NUCLEAR WARFARE SHOULD BE INTERPRETED IN TERMS OF HUMAN PERFORMANCE

• IT IS GENERALLY BELIEVED THAT APPROPRIATE TRAINING WILL MINIMIZE POTENTIAL DEGRADATIONS IN PERFORMANCE

• EFFECTIVE INVESTIGATION OF THIS ISSUE REQUIRES A QUANTITATIVE APPROACH

• HUMAN PERFORMANCE MODELING IN COMBAT SIMULATION COULD PROVIDE A FIRST STEP IN REQUIRED QUANTIFICATION
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