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Technical Memorandum 20-75

STANDARD SCENARIOS FOR THE LESS-LETHAL WEAPONS
EVALUATION MODEL

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Donald O. Egner
Larry W. Williams

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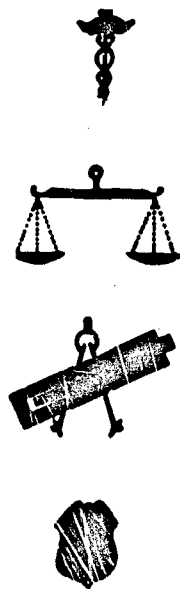
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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Technical Memorandum 20-75	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) STANDARD SCENARIOS FOR THE LESS-LETHAL WEAPONS EVALUATION MODEL	5. TYPE OF REPORT & PERIOD COVERED Final rept. March 1974 - March 1975	6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Donald O. Egner Larry W. Williams	8. CONTRACT OR GRANT NUMBER(s)	
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Human Engineering Laboratory Aberdeen Proving Ground, Maryland 21005	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS	
11. CONTROLLING OFFICE NAME AND ADDRESS HFI-TM-54-75	12. REPORT DATE August 1975	13. NUMBER OF PAGES 39
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)	15. SECURITY CLASS. (of this report) Unclassified	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Scenarios Nonlethal Weapons Law Enforcement Riot Control Less-Lethal Weapons Prison		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report presents work done in developing standard scenarios of law-enforcement situations for utilization in a previously developed model for the evaluation of less-lethal weapons. Particular emphasis in this report is on prison-type scenarios. This work was performed for the Law Enforcement Assistance Administration, Department of Justice.		

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Donald O. Egner
Larry W. Williams

August 1975

This project was supported by Interagency Agreement No. LEAA-J-IAA-014-2 between the Law Enforcement Assistance Administration and the U. S. Army Human Engineering Laboratory and awarded under the Omnibus Crime Control and Safe Streets Act of 1968, as amended. Points of view or opinions stated in this document are those of the authors and do not necessarily represent the official position or policies of the Department of the Army or the U. S. Department of Justice.

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Acknowledgments

This document was prepared by the Military and Civilian Law Enforcement Technology Team of the U. S. Army Human Engineering Laboratory. Technical research was performed by the authors of this report.

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FOREWORD

The work described in this report was performed under Task Plan VI (Scenario Development and Analysis) of the Law Enforcement Assistance Administration/U. S. Army Human Engineering Laboratory Interagency Agreement No. LEAA-J-IAA-014-2. Mr. Lester Shubin was the Law Enforcement Assistance Administration Program Monitor for this task. The work done under this task was performed by the Military and Civilian Law Enforcement Technology Team of the U. S. Army Human Engineering Laboratory. The work was supported through contracts with AAI Corporation and Battelle Memorial Institute.

ACKNOWLEDGMENT

The authors wish to acknowledge all data and technical contributions provided by members of the Scenario Group, The Behavior Analysis Group and the Medical Group, as well as the following organizations which assisted at no cost to the project:

Los Angeles County, California, District Attorney's Office

Los Angeles, California, Police Department

Los Angeles County, California, Sheriff's Department

Washington, D. C., Police Department

New Jersey Bureau of Prisons

Maryland Penitentiary

Baltimore City Jail

EXECUTIVE SUMMARY

The objective of this task was to provide a data base for four previously developed scenarios and to examine new meaningful scenarios. A considerable amount of pictorial data was gathered and analyzed, and some refinement of the four previously established scenarios was made. In addition, several variations of a new scenario were developed depicting prison situations which appear suitable for the employment of less-lethal weapons. Further testing of the adequacy of these scenarios was performed by utilizing them to exercise the relevant portions of the Evaluation Model. A general analysis was performed to determine which less-lethal weapons were applicable to each scenario and to indicate areas of improvement in terms of the development of new less-lethal weapons.

To date, five standard civil scenarios have been developed for use in the evaluation of less-lethal weapons. Some criteria and parameters of interest have been established for future work in this area.

STANDARD SCENARIOS FOR THE LESS-LETHAL WEAPONS EVALUATION MODEL

INTRODUCTION

Objectives

The objective of the task on Scenario Development and Analysis was twofold:

- a. Substantiating and refining existing scenarios, and
- b. Discovering whether efforts to develop other scenarios might be fruitful.

Purpose of Scenarios

a. Before proceeding with a discourse on the work performed under this task, it would be beneficial to provide some background information and indicate the utility of the scenarios in the evaluation process.

b. First, let us answer the question: Why do we need scenarios? The scenarios allow one to isolate criteria and variables which will have a direct bearing on evaluating the effectiveness of the items under consideration. The scenario forms a standard basis for evaluation. It sets the criteria for estimating the probabilities of occurrence of both the "desirable" and "undesirable" effects of less-lethal weaponry. The scenario gives detailed information such as time to incapacitation, the definition of incapacitation, acceptable undesirable effects, etc. It also establishes physical conditions and restraints such as type of target, distance to target, and other environmental factors. Most of all, a given scenario provides a standard basis for comparing weapons, since it prevents the common error of redefinition of the problem midway through an evaluation or analysis.

c. The importance of scenarios is recognized by those responsible for doctrine (such as U. S. Army doctrine for civil disturbance), as well as by those engaged in evaluating various weapons systems. For example, 16 general Army scenarios/situations have been developed, in addition to the 3 basic Army scenarios developed for evaluating less-lethal weapons and have been presented in the Annex to Appendix C of the basic volume¹ on the evaluation of less-lethal weapons. The four basic civil scenarios developed previously have been updated and are included in Appendix A of this report.

¹"A Multidisciplinary Technique for the Evaluation of Less-Lethal Weapons." Vol. 1, Draft Report, July 1973.

General Evaluation Model

a. For those unfamiliar with the overall evaluation scheme for less-lethal weapons, as presented in the above referenced volume, the steps in the evaluation procedure essentially consist of:

- (1) Choosing a standard scenario.
- (2) Establishing a data base on weapon/munition characteristics for conditions of the scenario.
- (3) Establishing a data base on target effects, in terms of physiological-damage levels, for weapon/munition utilization.
- (4) Using data bases established in steps (2) and (3) above to estimate probabilities for both "desirable" and "undesirable" effects for the chosen scenario.

b. The following criterion has been used to data for determining the "undesirable" effects for all civil scenarios: "Undesirable effect is that anatomical and/or functional effect which persists longer than 24 hours and prevents an individual from performing routine daily tasks and/or produces permanent impairment as defined by the American Medical Association (AMA) ratings." It is readily apparent that more stringent or less stringent criteria could be established, dependent, of course, on the effort available for evaluation purposes. However, until more emphasis is given to the area of evaluating less-lethal weapons, it is suggested that the above criterion be utilized for consistency. Using this criterion also makes the results obtained under this program directly comparable to those obtained under the military civil-disturbance programs.

c. The work performed under this task thus generally follows the evaluation procedure and scenario work done under the original task and reported in the above-cited reference.

DISCUSSION

Update of Four Standard Scenarios

a. A first objective of this task was to update the four previously established scenarios. The best test of a system is its performance in the role for which it was designed. Thus the adequacies of the previously developed scenarios were tested by using them in the device evaluations listed in Table 1 below. This table lists the number of effects estimates made by the Medical Group for the indicated devices in these four scenarios. In the course of using these scenarios, it was necessary to refine their definitions. The Medical Group noted that effect and/or response times should be added to the scenarios. Some of the scenarios contained these time references, but others did not. The Medical Group had been using stated times in order to facilitate the rendering of effects estimates. Where times were not stated in the scenarios, the Medical Group devised their own times while rendering effects estimates. These refinements were then approved at a subsequent meeting of the Scenario Group. Table 2 summarizes the original scenarios changed.

TABLE 1

Number* of Test Data Evaluated Utilizing Civil Scenarios

Device	Undesirable Effects				
	All Scenarios	Scenario 1	Scenario 2	Scenario 3	Scenario 4
<u>Commercial Items</u>					
Stun Bag	50	-	-	49	49
Ricochet Round	51	-	-	-	-
.38 Caliber Special (158 grain round-nose lead)	18	-	-	18	-
<u>Experimental Items</u>					
1-1/4 Inch High-Q Sphere	74	-	-	25	-
3 Inch Water Ball	47	-	-	-	-
Water-Filled Ping Pong Ball	54	-	-	-	-
Paint Ball	52	-	-	-	-
RTV - 1-1/4 Inch Ball	56	-	-	-	-
Special Multipurpose Round	46	-	-	-	-

*The number of data corresponds to the number of cases of physiological damage examined by the Medical Group for that particular Scenario and condition.

TABLE 2

Changes Made In Original Scenarios

Scenario	Changes
LEAA I: The "One-on-One Situation"	The Medical Group agreed that onset time was a crucial parameter. This is because the first priority in this scenario is to protect the officer from the threat. The desirable effect must then be measured by the ability of the mechanism to produce rapid incapacitation onset times. Due to the proximity of the offender, one second onset times or less are highly desirable. Realistic onset times were estimated as shown in Table 3.
LEAA II: Barricade & Hostage Situation	No changes.
LEAA III: Suspect Fleeing on Foot	The following change was made: Desirable effect is that physiological effect which will reduce the suspect's flight speed to a value which would permit a law enforcement officer to pursue, overtake, and apprehend him within a reasonable distance (20 to 100 meters) or time (20 to 30 seconds).
LEAA IV: Dispersal of a Crowd	No changes.

TABLE 3

Estimated Times To Incapacitation For Severe
Wounding To Indicated Target Areas

Impacted Area	Onset Time (Sec.)	Remarks
Head or Cervical Reticular Cord	< 1	Stop suspect essentially immediately.
Heart, Lung, Kidney, etc.	> 5	Would not stop suspect from using knife on police within 1 second and probably not within 5 seconds.
(Thigh) Femur	-	Breaking the bone in the thigh would cause mechanical collapse of the suspect; depend- ing upon orientation of fall, suspect could still use knife on police officer.
Extremity Handling Weapon (Clean up to shoulder)	< 1	Must hit bone or major nerve. Same effect as head shot.
Solar Plexus	-	A possibility - Similar to head shot. The onset time would depend on how much energy is transferred to suspect. More data is needed here as it is inferred from the swine shots ^a that this might not be true for the .38 caliber in that they did not displace very much on bullet impact.

^aReference refers to experimental work reported in Volume II of the Task I report.

b. In addition to the Medical Group input, an attempt was made to provide a quantitized basis for the scenarios through the use of actual film and video tape recordings. Two avenues were followed in attempts to gather factual data, viz., requests were submitted directly to:

(1) Police Departments, and

(2) News Services

Police Departments generally were somewhat reluctant to share their film (if indeed they had any which could be used in a meaningful manner to quantify these scenarios). However, the Los Angeles District Attorney's Task Force on Less-Lethal Weapons established a subcommittee to review films of law-enforcement actions. Through the participation of the U. S. Army Human Engineering Laboratory (USAHEL) team on this Task Force, and through the cooperation of the Los Angeles Police Department and the Los Angeles Sheriff's Department, nearly two dozen films were reviewed and some useful data were extracted from them. Attempts to obtain film from News Services were generally futile. The coverage which would have been most useful apparently ends up on the editing floor, since it does not provide the excitement, color, or whatever is required for a successful news story.

c. Several documentary films were obtained which, although edited to selectively present a certain aspect of some cause, did provide some basic scene-by-scene sequences which could be analyzed.

d. An example of the quantity of data obtained for scene identification, together with the source of film from which the data were obtained is given in Table 4 below.

TABLE 4
Number of Scenes Available For Quantitative Analysis

Film	Number of Scenes
Ohio State Protest	3
Cicero March	42
Reporters versus Police — Democratic Convention	33
Law and Order versus Dissent — Convention	37
Battle of Michigan Avenue — Convention	43
Gregory March—Convention	35
American Civil Liberties Union	42

e. Additionally, attempts were made to secure more "hard" data from other countries, such as Ireland. Although numerous talks were held with personnel involved in civil-disturbance control in that area, and two USAHEL team members attended a related symposium² in Great Britain, no statistical evidence was gathered to support the scenario development. Most of the information from these sources was general and in a form similar to a New York Times article describing student riots in Venezuela. Although most of this information is helpful in establishing a qualitative expertise in this area of study, it falls far short of the goal of producing factual statistical evidence to substantiate the scenarios. Since it is desirable that further efforts obtain this information, and the groundwork for such a task has been laid, it would appear beneficial to keep this in mind as new incidents are documented on film and/or video tape.

f. One final effort was made to collect operational data with the cooperation of the Los Angeles District Attorney's Task Force on Non-Lethal Weapons. Law Enforcement Agencies in Southern California assisted in collecting data on 193 incidents where both lethal and less-lethal items were used. These items included guns and knives used in other than their conventional roles (hand guns used to induce blunt trauma, etc.). Altogether, 26 categories were examined. A law clerk from the Los Angeles District Attorney's Office reduced the data for analysis by the USAHEL team. Although the data provided good background material, these data were not suitable for a meaningful statistical analysis. A more extensive and comprehensive program will be required to obtain the necessary data.

g. As previously mentioned, the revised scenarios resulting from all of the above efforts are given in Appendix A.

New Prison Scenarios

a. The second objective of this task, viz., examining new and meaningful scenarios, was readily fulfilled with little investigation into the actual use of less-lethal weapons. It immediately became apparent that a useful scenario would concern prison situations, since less-lethal weapons have been and most likely will continue to be used in these situations. Furthermore, the environmental controls associated with the prison scenarios provide a sound basis for collecting fairly accurate data and, in essence, provide controlled-type experiences.

b. With this in mind, the Scenario Group was restructured to make it "Prison" oriented. The restructured group consisted of the following:

- (1) Mr. Donald O. Egner, U. S. Army Human Engineering Laboratory
- (2) Mr. Ellsworth B. Shank, U. S. Army Human Engineering Laboratory
- (3) Mrs. Brenda Thein, U. S. Army Human Engineering Laboratory

Messrs. Egner and Shank and Mrs. Thein provided analysis capability and continuity from the previous Military and Police Scenario Groups.

²The symposium was sponsored by the Army, but dealt with specifics directly applicable to the Law Enforcement Assistance Administration tasks.

(4) Mr. Larry Williams, Battelle's Columbus Laboratory

Mr. Williams was a principal investigator of this task and previous similar tasks, and he was also a member of the previous scenario groups.

(5) Lieutenant Robert L. Graham, Tactical Unit, District of Columbia Police Department, provided the point-of-view of police officers who are called into the prison riot situation.

(6) Mr. Michael Greene, New Jersey Bureau of Prisons, represented the viewpoint of prison administration.

(7) Captain Stanley Rossman, Maryland Penitentiary, represented the operational aspect of penitentiaries.

(8) Captain Kirkwood Wyatt, Baltimore City Jail, represented the operational aspect of jails.

(9) Mr. Arnold Sagalyn, Security Planning Corporation, has long experience in riot control and law enforcement and was a prior member of both the Military and Police Scenario Groups.

c. This group sought to identify and describe several of the more troublesome episodes which occur at correctional institutions and to which less-lethal weapons might provide an appropriate response, or at least part of such a response. Within the time available, to the participants, the types of events depicted in the scenarios were selected as meriting consideration in this program. Had additional time been available to the group, other problems might have been addressed (e.g., the yard riot or inmates assaulting other inmates).

d. The scenarios reported in Appendix B represent an acceptable consensus of the participants' views, but responsibility for these scenarios rests with the authors of this report.

e. Films of the Attica Prison Riot were studied as a basis for the Prison Scenarios. Forty-two separate scenes were available for detailed study. In addition, several documented investigations of prison disturbances were obtained, but this material was made available on a confidential basis and is not available for reproduction. However, a study performed by the University of Oklahoma for the Justice Department³ does give a good statistical basis for a descriptive profile of general assault incidents which can be used.

³Chapman, S. G., & Swanson, C. G. A descriptive profile of the assault incident. University of Oklahoma, U. S. Department of Justice, April 30, 1974 (Grant Numbers 73-TA-08-0004 and 73-DF-06-0053).

Analysis of Scenarios

a. The development of standard scenarios, although sufficient to provide a basis for weapons evaluation, is not complete without some analysis of the significant factors related to these scenarios. As a consequence, the following discussion should at least prompt further consideration and thought on responses to law-enforcement control techniques.

b. The approach taken here has a mechanistic stimulus-response bias. This was an appropriate way to proceed, because we are trying at this point to predict the behavior of a crowd by assuming it to be homogeneous—that is, to behave as an individual would. Thus, by assuming a crowd is homogeneous, we are attempting to predict the responses of large numbers of people to particular situations and stimuli. In short, we are trying to make probabilistic statements, not to discover incontrovertible laws.

c. The thought process involves a cognitive (rational) component and an affective (emotional) component. For present purposes, the cognitive component entails a crowd member perceiving and balancing the rewards (e.g., peer approval, self-satisfaction) and risks (e.g., injury, apprehension, arrest) for a projected course of action. When the rewards appear greater than the risks, the rational behavior is to pursue the projected course. On the other hand, if the risks seem greater than the rewards, the rational behavior is abstention. These judgments can be confounded by the subject's emotional state. Especially important for our purposes are the effects of anger and fear. Both anger and fear might vary in their intensity and in their specificity. The intensity of either emotion might range from the mild to the very intense. Similarly, either emotion might be rather generalized (not being elicited by or directed toward any particular object) or quite specific (involving particular objects). Thus "anxiety" is a generalized or "vague" fear reaction to an uncertain situation, while outright fear involves specific objects, persons, symbols, or anticipated outcomes. Anger can be thought of in a similar fashion.

d. It might be supposed that the more intense and specific either of these emotions becomes, the more likely a subject is to engage in behavior to reduce the emotional level. The more intense an emotion, the more likely a subject is to seek to reduce the tension; and the more specific the external object(s) associated with the emotion, the more easily a subject might identify and pursue a promising course of action. Figure 1 summarizes these assertions.

INTENSITY
OF EMOTION

Mild ————— Intense

SPECIFICITY
OF REFERENT

Generalized ————— Specific

————— Propensity to Action —————>

Fig. 1. Summary of basic assertions.

e. Generally, anger is associated with aggressive behavior ("fighting") and fear with running away ("fleeing"). In several of the scenarios employed by this study, our intent is to minimize fighting and maximize fleeing by the subjects. "Fighting" can be taken to include the array of undesired, noncompliant behaviors ranging from passive disobedience to physical violence. "Fleeing" can include the array of desired, compliant behaviors ranging from reluctant obedience of lawful orders to headlong flight to escape. There is a third class of behaviors which we might term irrelevant for law-enforcement purposes. These are behaviors which in a particular circumstance do not command the attention of, or merit a response from, law-enforcement personnel. These behaviors are acceptable in the particular context, though they might be unacceptable in another set of circumstances. Disobedience to certain laws may be of little consequence in certain situations.

f. Figure 2 relates the perceived level of risk and the perceived level of reward to the decision to fight or flee. The accompanying hypotheses summarize the anticipated effects of anger and fear on these decisions.

		<u>Perceived Risks</u>	
		High	Low
<u>Perceived Rewards</u>	High	Fight/Flee (?)	Fight
	Low	Flee	Flee/Fight (?)

H₁: The emotional state of a subject will be most significant for his behavior when
 A. both rewards and risks are perceived to be high, or
 B. both rewards and risks are perceived to be low.

H₂: The emotional state of a subject will be less significant in determining his behavior when
 A. perceived rewards are low and perceived risks are high, or
 B. perceived rewards are high and perceived risks are low.

H_{1A}: In the High Risk/High Reward situation, an otherwise modest level of Anger can be expected to produce Fight behavior, while a similar level of Fear might motivate a subject to Flee.

H_{1B}: In the Low Risk/Low Reward situation, an otherwise modest level of Fear would motivate a subject to Flee, while a similar level of Anger might motivate him to Fight.

H_{2A}: In the High Risk/Low Reward situation, the rational behavior is to Flee. A state of Fear will reinforce this tendency. However, a state of Anger might override the rational component and motivate a subject to Fight.

H_{2B}: In the Low Risk/High Reward situation, the rational behavior is to Fight. A state of Anger will exacerbate this tendency. However, a state of Fear might motivate a subject to Flee.

Fig. 2. Risk/reward relationship to decision.

g. While it is well to realize that the prevalence of either rational or emotional reactions on the part of a subject determines his behavior, it is not necessary to see into the "black box" of the individual mind to attempt to maximize preferred behavior. To maximize flight or compliant behavior, we would seek to maximize fear and minimize anger. To do this we would seek to operate on both the rational and emotional components of psychological processes. In operating on the rational component, we should seek to make obvious the inevitability of losses and punishments that will result from engaging in fighting or noncompliant behavior--while making equally obvious that such losses and punishment can be avoided through fleeing or compliant behavior. In short, we should attempt to maximize the perceived risks accompanying undesired behavior, while maximizing perceived rewards for preferred behavior. (Clearly, the latter perception includes a negative reward situation--not experiencing consequences which are not desired.) The user of a riot-control weapon should be capable of assuring the inevitability of undesired consequences to subjects meriting such consequences, and he should stringently avoid administering such consequences to subjects who behave in desired or acceptable ways.

h. In operating on the affective component, fear might be induced by at least three mechanisms:

(1) Preliminary Uncertainty as to the outcome or consequences of projected behavior (i.e., induced anxiety).

(2) Surprise, as when anticipated desired outcomes or consequences are not forthcoming, unanticipated undesired consequences occur, or other participants in the scenario behave in unexpected ways (making their future responses somewhat less predictable). This involves both anxiety and fear of particular objects or events.

(3) Physical danger. The research on this program has assumed that pain is an appropriate deterrent mechanism. To elicit fear rather than anger, the pain must be unavoidable and sufficiently severe that the subject considers it intolerable.

i. Figure 3 is an attempt to summarize the possible interfaces between the emotional states of individuals and their behavioral responses to law-enforcement measures. Some of the questions which merit consideration include:

(1) What overt behavioral cues indicate the emotional state and focus of attention of subjects in a crowd?

(2) What levels of emotion are exhibited by persons whose behavior is considered relevant for various reasons?

(3) How do persons who exhibit fear or anger react to various stimuli from the control forces?

(4) What stimuli effect transitions from "inactive" to "active" status, and from "unemotional" to "emotional" status on the part of a subject?

(5) What stimuli effect transitions from anger/fight states to fear/flight states, and vice versa?

j. Detailed analysis of pictorial data may provide a basis for answering some of these questions; however, such an analysis was beyond the scope of this task.

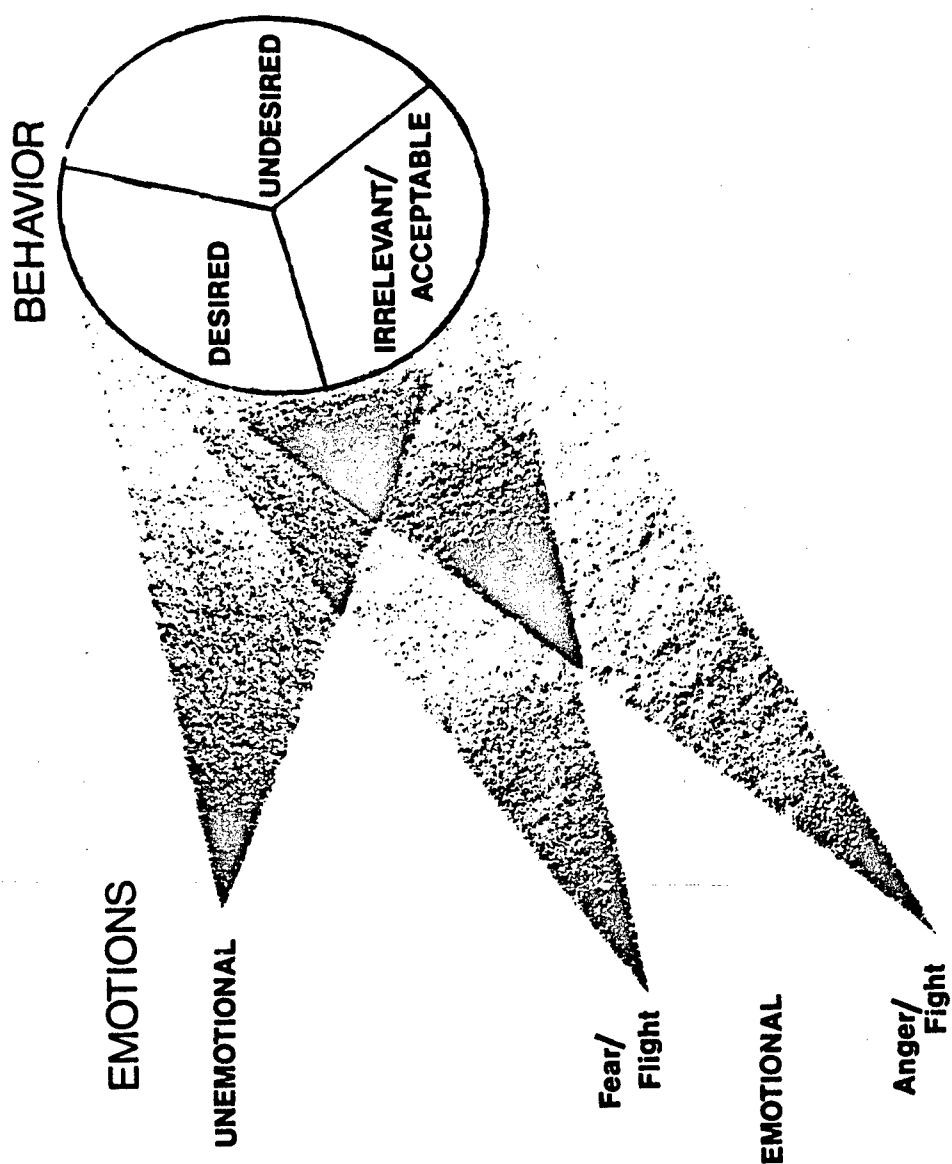


Fig. 3. Interfaces between emotional states and behavior.

Utilization of the Scenarios

a. As stated previously in all the work on the evaluation of less-lethal weapons, we believe that exercising or utilizing the models and techniques provides the best means for the development and verification of them. Thus, several of the scenarios were examined by considering data gathered under other tasks of the basic Law Enforcement Assistance Administration/U. S. Army Human Engineering Laboratory agreement.

b. As a starting point, the base line work done on the .38-caliber weapon system (police revolver and ammunition) was used to generate desirable-effects probability estimates for three of the scenarios. Probabilities were established for the "Fleeing-Suspect" and "Crowd-Dispersal" scenarios based on the previously mentioned .38-caliber weapon system data base. These probabilities are directly applicable to use in the generalized less-lethal weapons evaluation model. These estimates and the rationale used for their establishment are given in the minutes of the Third Behavior Analysis Group Meeting (Volume II Report of Taks I⁴). The Minutes of the Fourth Behavior Analysis Group Meeting⁵ contains effects estimates for utilization of the stun bag in a crowd-dispersal scenario, as well as a further discussion on emotional states. Two different emotional states were considered for the crowd-dispersal scenario. Finally, further consideration of the emotional states and associated crowd behavior was given at the Fifth Behavior Analysis Group Meeting (Appendix C). However, to date the work on the emotional states considered in the above referenced minutes of the Behavior Analysis Group has not been incorporated into the scenario descriptions.

Applications of Scenario Work Findings

Table 5 summarizes the various scenarios in terms of basic characteristics, and lists some of the items available or under consideration for use in these situations. Although most items mentioned in Table 5 are self-explanatory, Table 6 defines the terms as used in the context of Table 5. This summary is not intended to be all-inclusive but, rather, a starting point; it shows how the scenarios lead logically to a reasonable research and development program for new less-lethal weapons. Furthermore, it should be pointed out that Table 5 presents device applications in a purely simplistic manner--not considering, of course, the emotional levels of individuals in these scenarios at some particular time.

Proposed Work

Although this task is basic to utilization of the general model for the Evaluation of Less-Lethal Weapons, it has not been pursued with great intensity due to its limited utility. It has become apparent, nevertheless, that much of the data collected would be useful in analyzing operational tactics and establishing doctrine and training. However, if this work were expanded for such purposes, a more extensive effort would be required to establish a comprehensive quantitative data base.

⁴"A Multidisciplinary Technique for the Evaluation of Less-Lethal Weapons," Vol. II, Draft Report, April 1974.

⁵"Analysis of a Bean-Bag-Type Projectile as a Less-Lethal Weapon", Draft Report, May 1974.

TABLE 5

Scenario Applications Summary

Scenario (Use Concept)	Scenario Characteristics Function Loss Requirements	Range (Meters)	Present Device	Improve- ments and New Concepts	Advantages of New Concepts Over Present Device
<u>Scenario I</u> <u>One-on-One</u>					
Apprehension	Nonambulatory	1-7	.38 cal. Revolver, Baton, Aerosol Projector, MODI-PAC.	Bola, Heavy Slug, Net, Electrical Device.	Direct Immobilization
Self- Protection	Nonmanipula- tion	1-7	.38 cal. Revolver, Baton, Aerosol Projector, MODI-PAC.	Heavy Slug, Electrical Device, Aim Point Change.	Quicker Onset Times
<u>Scenario II</u> <u>Barricaded Person</u>					
With Hostage	Nonmanipula- tion	10-50	Rifle Marksman, Tear Gas.	Irritant and Smoke, Barrage KE Projectiles, Soft Rag.	Immediate Disorientation and Eventual Incapacitation
Without Hostage	Nonmanipula- tion	10-50	Rifle Marksman, Tear Gas, Shotgun.		Higher Irritant With Less Fire and Projectile Hazard
<u>Scenario III</u> <u>Suspect Fleeing on Foot</u>					
	Nonambulatory	5-70	.38 cal. Revolver, Bean Bag, MODI-PAC.	Bola, Heavy Slug, Net, Electrical Device.	Direct Immobilization
<u>Scenario IV</u> <u>Crowd Control</u>					
Low Violence	Discomfort	10-75	Tear Gas, Electri- cal Prod.	Barrage KE Projectiles, Irritant and Smoke.	Enhanced Threat Signature
High Violence	Nonmanipula- tion	1-50	Tear Gas, Shotguns, Water Hoses, Baton, MODI-PAC, Bean Bag, Dogs.	Water Cannon, Barrage KE Projectiles.	High Disorientation

TABLE 5 - Scenario Applications Summary (Cont'd)

Scenario (Use Concept)	Scenario Characteristics		Present Device	Improve- ments and New Concepts	Advantages of New Concepts Over Present Device
	Function Loss Requirements	Range (Meters)			
Scenario IV <u>Crowd Control</u> (Cont'd)					
Agitator	Discomfort or Nonambulatory	10-75	Bean Bag, "Snatch Teams", MODI-PAC.	Soft and Sting Bag.	Increased Accuracy
Scenario V <u>Prison</u>					
Assault of an Officer	Nonmanipula- tion	1-7	Baton, Aerosol Projector.	Electrical Device.	Direct Immobilization
Dining Area Riot	Discomfort or Nonmanipula- tion	1-30	Tear Gas, Electri- cal Prod, MODI-PAC, Shotgun, Baton, Water Hoses.	Water Cannon, Barrage KL Projectiles.	Disorientation
Riot With Hostages	Nonmanipula- tion	1-70	Rifle Marksman, Tear Gas.	Irritant and Smoke, Barrage KL Projectiles.	Immediate Disorientation and Eventual Incapacitation

TABLE 6

Definitions of Terms Used in TABLE 5

Aerosol Projector — Aerosol spray cans containing irritants such as CN, CS, CR, etc.

Aim-Point Change — The concept of changing the point of aim to the head for faster incapacitation of very-close-range targets.

Barrage KE Projectiles — Use of multiple "soft" projectiles with 15 to 30 foot-pounds of kinetic energy (Superballs).

Baton — Night stick.

Bean Bag — A relatively heavy cloth-inclosed bag of shot, fired from items such as the MBA Stun Gun.

Bola — An experimental round based on the bola principle.

Electrical Device — Any one of several new concepts for transmitting electrical energy (e.g., TASER).

Electrical Prod — A device to transmit electrical shock to the target.

Heavy Slug — Experimental special rod fired from a .38-caliber revolver and having the same kinetic energy as a standard 158 grain bullet.

Irritant and Smoke — Combined use of smoke (for obscuration) with chemical irritant.

"MODIPAC" — 12-gauge plastic shotgun shell loaded with polyethylene shot.

Net — A net for entrapment.

Rifle Marksman — A trained law-enforcement sharpshooter used to pick off the target.

Shotgun — The use of any shotgun shells, such as Number 4 buckshot.

Soft RAG — A military concept for soft delivery of tear gas agent directly on target by use of a Ring Airfoil Grenade.

Sting RAG — Use of the Ring Airfoil Grenade to "sting" through the application of kinetic energy.

Tear Gas — Tear gases disseminated by grenades or other means with the exception of aerosol projectors.

.38-Caliber Revolver — Any standard hand gun used by law enforcement personnel as described in these scenarios.

Water Cannon — New experimental "slugs" of water.

CONCLUSIONS AND RECOMMENDATIONS

1. Five scenarios have now been developed for use with the general model for the Evaluation of Less-Lethal Weapons. These scenarios are:

- a. The "One-On-One" Situation (two variations).
- b. The Barricade-and-Hostage Situation (two variations).
- c. The Suspect Fleeing on Foot.
- d. The Dispersal of a Crowd (five emotional levels).
- e. The Prison Scenario (three variations).

2. It appears feasible to build a quantitative data base by analyzing pictorial (film and video tapes) data; however, access to such data is difficult, and the analysis is both tedious and time consuming.

3. It is not recommended that further effort be pursued to establish and refine scenarios for use with the general evaluation model; however, such effort may be worthwhile to upgrade doctrines and training.

APPENDIX A

DRAFT SCENARIOS OF POLICE TACTICAL SITUATIONS FOR EVALUATION OF LESS-LETHAL WEAPONS

SCENARIO I

The most common tactical situation in which less-lethal weaponry might be employed by a police officer is in the arrest of an individual for some type of misdemeanor. While in many such cases the offender offers no resistance, occasionally the officer must use force in making the arrest. The degree of resistance, of course, poses a varying level of threat to the officer:

1. An unarmed offender might push or shove the officer, attempt to jerk away from him, or strike him.
2. An offender might arm himself by seizing some object at hand:
 - a. A blunt, nonpenetrating object such as a board or stick.
 - b. A sharp, penetrating object such as a knife, broken bottle, etc.

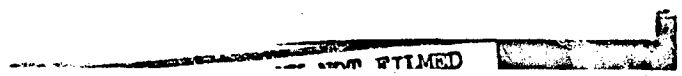
While in the second case the officer might have to resort to deadly force to protect himself, it is generally preferred to avoid excessive force. In this regard, it is assumed that, when confronted with a clearly lethal threat from a firearm, the officer will respond with the use of his own firearm.

The priority of the officer's concern in such situations is:

1. Protecting himself from the threat.
2. Alleviating the threat.
3. Taking the suspect into custody.
4. Moving the offender to the call box, cruiser or patrol wagon.

These encounters most often involve adult males, including the physically mature teenager. A small proportion of cases involve women. It is assumed that young children and older persons can be handled by the average officer without resort to weaponry.

While most of these incidents occur on the street and, hence, out in the open, many take place inside buildings—homes, places of business, bars, etc.



Given the levels of threat to the officer with which this scenario is concerned, the distance between the offender and the officer might extend from arm's length, with the unarmed individual, to the length of a room, when the suspect is armed. Thus, the maximum distance to the offender can be assumed to be comparable to the six or seven meters average range at which most gun battles involving police occur.

In most of these situations, it can be assumed that there will be bystanders. The distances of these bystanders from the officer might vary from arm's length to several meters. It is desired to avoid affecting bystanders in any way, but minimal effect is preferred if a bystander is inadvertently affected by the officer's actions.

These offenders represent a cross-section of society in their mental and physical conditions. In many instances, belligerence is accompanied by a state of intoxication or a "high" brought on by certain drugs. Many offenders are in an excited condition which is other than drug-induced, ranging up to the berserk, and will exhibit increased blood pressure, heart rate and adrenalin flow.

Optimum effectiveness with less-than-lethal weapons would be achieved in this scenario if the officer were able to keep the offender from becoming aggressive, or to dissuade him from continued aggressive action, while at the same time permitting him sufficient mobility to walk to the call box or cruiser. If the offender persists in physical violence, immobilizing his arms does not provide adequate restraint. Likewise, lachrymators in common use induce considerable pain and temporary blindness, but the offender bent on violence can still kick or swing blindly. Due to the proximity of the offender, one second onset times or less are highly desirable.

The minimal duration of the effect of a less-than-lethal weapon for this application should be 30 seconds to allow enough time to apply handcuffs to the offender. A desirable secondary effect would be minimizing the combativeness of the offender while still allowing him to retain his ability to walk a short distance. In all such situations, it is desirable to minimize the apparent as well as the real damage to the offender in order to avoid alienating observers. Open wounds and blood are absolutely unallowable effects of less-than-lethal weaponry.

EFFECTS ON SUSPECT

Desirable Effects (Short Term)

Minimize aggressive behavior

Immobilize for 30 seconds or somewhat longer

Permit the suspect to walk a short distance after the initial immobilization

Reduce states of psychological excitement

Undesirable Effects (Short- and Long-Term)

Be lethal

Inflict aggression-inducing pain

Inflict serious or irreversible damage requiring medical treatment

Produce bleeding

Exacerbate existing psychological and physical excitement

EFFECTS OF BYSTANDERS

Desirable Effects

Minimal effects on bystanders

Undesirable Effects

Produce any effects not desired on the suspect

SCENARIO II

The Barricade-and-Hostage Situation

A recurring problem which confronts police forces is provided by those offenders who have committed a serious crime and who barricade themselves inside a building. This situation probably most frequently involves one offender, but sometimes two or more are involved. In many such situations the police can clear the immediate area, seal possible escape routes, and wait out the criminal. This is possible only in cases where delay in apprehending the offender does not jeopardize innocent persons, i.e., the offender is not holding a hostage with the intention of possibly harming him. In this latter circumstance the police generally feel it is mandatory to subdue the offender(s) before a hostage is harmed.

Normally in these circumstances the police will have a fairly good idea where the offender is located in a building. Sometimes it is possible to isolate the offender on a particular floor, in a single apartment, or even in a specific room. The latter case, where the offender is known to be barricaded in a specific room, is probably the ideal tactical situation for the police. At least, the hazards attendant with entering the building are fewer than when the offender is able to move around inside.

While a distance of 10 to 50 meters might typically separate the barricaded man from the police officers outside, there is no line-of-sight technique for attacking the offender. He is careful not to expose himself at windows and doors for fear of being shot. He will only risk exposure with a hostage as a shield. Consequently, ballistic weapons aimed at the offender are essentially useless in this scenario.

In these circumstances, less-lethal weapons must either penetrate or circumvent the obstacles (windows, walls, doors, ceilings, floors) which protect the offender from line-of-sight attacks. At the same time, various structural features may offer opportunities to circumvent these obstacles or to get closer to the offender. Consideration should be given here to heating and cooling systems, hallways, attics, basements, crawlspaces and the like.

Some of the persons who barricade themselves with hostages are desperate enough to harm these hostages if it appears the police are moving in. Consequently, it would be desirable to develop less-than-lethal weapons which:

1. Could be introduced without alerting the offender.
2. Would be innocuous in the sense of being colorless, tasteless and odorless.
3. Would have a relatively short onset time so as to minimize the likelihood of the offender harming the hostage.
4. Would have a high level of reliability so that police personnel could be sure it has worked before they attempt to break into the room.
5. Would have a duration of effect such as to allow the officers two to five minutes to defeat the barricade, secure the offender and rescue the hostage.

¹This is not critical if the offender is unaware of any weapon signature, viz., body symptoms, etc.

These criteria are set forth because the safety of the hostage is the primary concern of the police, and they desire to subdue the offender before he is able to harm the hostage. By the same token, the less-than-lethal weapon employed against the criminal must not have any undesirable enduring effects on the hostage. Such less-than-lethal weaponry might also be employed in other situations, such as when the criminal's family is in the building with him and he intends them no harm, or in cases where a person is threatening suicide.

EFFECTS ON SUSPECT(S)

Desirable Effects (Short Term)

Instantaneous or undetectable onset of principal effect

Total physical incapacitation for two to five minutes

Undesirable Effects (Short-Term)

Be lethal

Inflict serious or irreversible damage

Excite or alarm the suspect prior to complete onset of the principal effect

Undesirable Effects (Long-Term)

Be lethal

Inflict serious damage or irreversible damage

EFFECTS ON HOSTAGE(S)

Desirable Effects

Minimal short- and long-term effects

Undesirable Effects (Short- and Long-Term)

Be lethal

Inflict serious or irreversible damage

Inflict excessive pain or discomfort

Induce psychological or physical excitement

SCENARIO III

The Suspect Fleeing on Foot

A typical tactical problem for policemen is the apprehension of an unarmed suspect who is trying to escape on foot. Frequently it is impossible for the officer to catch such a suspect—the suspect is often young and unencumbered; the officer may be quite a bit older and wearing a Sam Browne belt loaded with equipment. In many instances the officer is not sure what crime the suspect has committed, or even if he has committed any crime. This, plus the possible proximity of bystanders, precludes reliance on any form of lethal force to stop the suspect.

The most usual setting for this scenario is a public street, in which case it is assumed that the suspect might be up to 70 meters from the officer. It is conceivable that similar situations might occur in hallways and stairways of buildings, in which case the range might be estimated at 5 to 20 meters. Since the suspect is running away, the officer will see only his back.

The minimal desired effect of a less-lethal weapon in this situation is to slow the suspect sufficiently to apprehend him. It is not necessary to stop the suspect instantaneously. He might continue for 20 to 100 meters, but this is of no consequence so long as the officer is able to catch up to him. However, for legal purposes it is not desirable for the suspect to be able to escape the scene, even if he can be identified and apprehended at some later time. In order to maximize the likelihood of successful prosecution, it is best to apprehend a suspect within the context of the crime and in view of the witnesses who saw him commit the offense and attempt to escape. Thus, the suspect's flight speed must be reduced to permit the officer to overtake and apprehend him within 20 to 100 meters or within 20 to 30 seconds. At the same time, consideration must be given to the apparent effect of the weapon used. Generally, the officer must avoid the appearance of using excessive force, especially against young offenders. Any weapon which causes a flow of blood or otherwise appears brutal cannot be used, considering the emotional reactions of onlookers and the general public and the possibility of bystanders being affected by the weapon.

EFFECTS ON SUSPECT

Desirable Effects (Short Term)

Slow or stop the suspect from running

Relatively fast, but not necessarily instantaneous, onset of effect

Produce constant effect over ranges of 5 to 70 meters

Undesirable Effects (Short- and Long-Term)

Be lethal

Produce bleeding

Inflict serious or irreversible damage

Inflict pain appearing excessive to bystanders

EFFECTS ON BYSTANDERS

Desirable Effects

Produce no obvious degrading physical effect

Undesirable Effects

Be lethal

Produce obvious physical effect

Inflict serious or irreversible damage

Motivate to aggression against the officer

Motivate to take legal action against the officer

SCENARIO IV

The Dispersal of a Crowd

It is frequently necessary for police forces of various sizes to cope with crowds of people intent on blocking a public road, street or park. In order to keep such public facilities open, it is desirable to disperse such a crowd or to move it out of the area. Ideally, it is desirable that the means employed to disperse the crowd also prevent them from returning to the area a short time later, and yet leave the area in a suitable condition for routine use by the general public, i.e., the weapon or means employed should not contaminate the area for very long and it should be relatively easy to clean up the after-effects.

The size of such a crowd might vary from 100 to 1,000 or more. Typically there are bystanders near the periphery of the crowd and it is desired to have minimal or negligible effect on these onlookers. There will be both men and women in the crowd and among the bystanders. Normally the distance between the crowd and the police officers would be about 75 meters, but structural features and the tactics of the crowd might shorten this distance to as little as 10 to 15 meters.

The desired effect of a less-lethal weapon for this application would be for it to motivate the crowd to move of its own accord. The police do not care to arrest most members of such a crowd. Nor do they desire to immobilize the members of the crowd because of the logistic problems in caring for such persons. The route for dispersal is a tactical consideration.

The time between utilizing such a weapon and the onset of its effect should be relatively brief, though the effect does not have to be instantaneous.

As in other situations where less-lethal weapons might be useful, it is preferred that onlookers not get the impression that the police are using excessive force or that the weapon has an especially injurious effect on the target individuals. Here again, a flow of blood and similar dramatic effects are to be avoided.

In using this scenario, one must establish an "emotional level" of the crowd (assuming a homogeneous level for application purposes). The following is a general guide for establishment of such "levels" or "states":

<u>Emotional Level of "Mob Member"</u>	<u>Type of Mob Associated With Emotional State</u>
1	Picket line for wage increase
2	Crossing picket line
3	Street gangs
4	Political extremists
5	Lynch mobs

EFFECTS ON MEMBERS OF THE CROWD

Desirable Effects (Short-Term)

Motivate to leave the scene

Desirable Effects (Long-Term)

Discourage a return to the scene
or reforming at another point

Undesirable Effects (Short- and Long-Term)

Be lethal

Produce bleeding or obviously excessive pain

Inflict serious or irreversible damage

Provoke retaliation.

Immobilize

EFFECTS ON BYSTANDERS

Desirable Effects

No effects desired

Undesirable Effects

Any physical effect

Provoke to join or defend members of the
crowd

APPENDIX B

PRISON SCENARIOS

SCENARIO V-A

Assault on a Prison Officer

One of the most common and serious prison disturbances is an assault on a prison guard by an inmate. This situation is similar to the police one-to-one scenario in some respects. On the usual occurrence, an officer orders an inmate to do something, such as move away from an area, and the inmate retaliates with a physical attack on the officer. Normally the officer is facing the inmate, separated from him by a distance varying between arm's length and perhaps 10 feet. In approximately 75 percent of such attacks, the inmate will use only his feet and hands in attempting to strike the officer or shove him away. In about 25 percent of these incidents the inmate will use a makeshift club or stabbing weapon to attack the officer. These incidents might occur at any place in a prison where the guards and inmates must interact. Therefore, they take place both outdoors in the yard and indoors in the various facilities at a prison.

While the above description applies to most of the attacks on prison officers, another important subset of such attacks merits description. A number of attacks on guards come without warning. The motivations for these attacks are varied and are not always specific to the immediate circumstances. The reasons for these attacks can often be traced back to frustrations common to prison life, or to the inmate's dislike for a particular officer. These attacks might be termed "unprovoked" in that the officer has usually said or done nothing which might be anticipated to precipitate the incident. These attacks often come from the officer's side or rear without warning, and frequently involve a club or stabbing weapon.

While this second type of incident is more difficult to foresee and cope with, the first type contains the elements of warning or anticipation, distance, and time which might provide an opportunity for the officer to react. It is desirable for the officer to be able to defend himself sufficiently—first, to minimize the effects of the attack and, secondly, to summon assistance from other guards. The officer's ability to actively summon assistance is especially important on those occasions when he is out of sight of other officers.

In approximately 90 percent of these instances, the inmate is not aggressive after the initial attack on the officer. In the other 10 percent, the inmate will continue to be aggressive and will resist the additional officers who come to the assistance of the first one.

Whatever mechanism is used to counter the initial attack on the officer or to subdue an inmate who continues to be aggressive, the following considerations should be taken into account:

- the onset time must be relatively short, with 3 to 5 seconds as a goal to be sought.
- the effect should be to subdue the inmate enough so that one or two officers can place handcuffs on him.
- the duration of the effect should be several minutes to permit removal of the inmate from the immediate scene to lockup.

It is desirable that the effect not be so general that it affects other inmates who may be standing near the belligerent inmate. While no long-term effects are desired and the appearance of excessive force on the part of the officers should be avoided, so as to prevent inciting the other inmates, it is preferred that the agent or mechanism in question effectively aid in subduing an average size man who is in a state of excitement.

SCENARIO V-B

Prison Dining Area Riot

Riots in dining areas take place at meal times when large numbers of inmates are together. Experience indicates that these riots are most likely at the noon meal, followed by the evening meal and then breakfast. These riots might be spontaneous outbursts in reaction to conditions at the mess hall or in the prison generally, or they might be planned as part of a larger protest or escape attempt.

The total number of inmates in the dining facility will usually be several hundred. Of these, anywhere from one to perhaps a dozen individuals might be the hard-core initiators of the incident who resist both inmates and officers who try to stop the trouble. This resistance will involve attacks using such weapons as the hands and feet, trays and other dining utensils which may be thrown or used to strike an officer, and the furniture found in the dining area. In planned riots, the incidence of homemade clubs and knives will be greater. Similarly, in planned riots the inmates' use of water-soaked towels to ward off aerosols and tear gas will be greater.

The dining area is usually a large room, measuring, for example, 100x50 feet. The room will have ceilings which are 10-20 feet high. It will most likely have windows and two or more exits.

The first tactical objective of the guard force is to contain the disturbance in the dining area where it originates. This is accomplished by immediately securing all exits which the inmates might use to escape from the dining area. At the same time, the water supply to the dining area is turned off. This is to deprive the inmates of the opportunity to soak cloths and towels to be used as a defense against the tear gas which they anticipate the guard force will employ.

The second objective of the prison officials is to dissuade the inmates from continuing the riot with its attendant threat of physical injuries and property destruction. In many instances an effort is made first to talk the inmates into giving up, and this occasionally brings the incident to an end. When the initial effort to talk the inmates out of the dining area fails, or when all but a militant hard core leave the area, it becomes necessary to subdue those who remain locked in the dining area. A standard procedure at this point is to introduce tear gas into the enclosed area. This will usually compel all but perhaps the most dedicated inmates to leave via the controlled exit designated by the prison officials. These men are still mobile enough to get out of the dining area and, since they might still be aggressive, only a few are allowed to exit at a time. This permits the officers to handcuff and search each inmate and then lead him off to lockup.

After all inmates who will leave are processed out, it becomes necessary for the guards to enter the dining area in order to subdue any who are determined to stay and fight. These individuals may have devised makeshift defenses against tear gas, they may have improvised barricades of the available chairs or benches and tables, and they may have clubs and knives. Distances between the officers entering the area and the inmates might vary from arm's length (if inmates are standing by the door as the officers move in) to the full length of the dining room (if the officers enter one end and the inmates are gathered at the opposite end). If it is necessary to subdue aggressive inmates, it is preferred to minimize the risk to the officers entering the room. This implies an agent, device, or technique which would make it unnecessary for the officers to get within striking distance of an inmate who might be wielding a club up to 4 feet in length, though as noted above, thrown dining utensils constitute part of the threat to the officers.

Any agent, device, or technique should render the inmate unwilling to fight or incapable of effectively directing an attack against the officers. At the same time, it is probably not desirable to render the inmate prostrate or to cause unacceptable medical problems. An effect which has an onset time of 3 to 60 seconds and which lasts several minutes is desirable in this circumstance.

SCENARIO V-C

Prison Riot With Hostages

The large riot is the most serious disturbance at a prison, and its seriousness is compounded when the inmates hold hostages. A frequent place for such a riot to occur is in one or more of the wings of cell blocks, and the time is often after the evening meal. The primary tactical objective of control forces is to contain the disturbance to the prison unit where it originates. Assuming the trouble is confined to one of these wings, the physical description is approximately as follows: The wing might be up to 200 feet long, three tiers high (about 50 feet), and the cells face the interior of the building. The entrance to this wing is a sally-port at one end located on the bottom floor. The inmates controlling the cell block will sometimes conceal their hostages by dressing them in inmate uniforms and hiding them in cells. At times, one or more hostages might be put on display in such a manner as to accentuate the threat to all of them.

The weapons of the inmates might include homemade clubs and knives, and they might throw things down from the tiers. They might devise partial body armor and shields from rags and other materials at hand. Similarly, they might erect barricades of furniture to impede an assault force. They might also have makeshift gas masks made from wet towels or cloths.

Those who are most actively involved in the riot will be emotionally excited, with tensions running high. In many instances, homemade alcoholic beverages will be consumed, and this should be taken into account in designing less-lethal techniques and equipment.

The second objective of the prison officials, after confining the disturbance to the particular wing, is to enter that wing and restore order. In order to enter the wing, the officers must go through the sally-port and come in on the bottom floor. This involves the temporary exposure of a limited number of officers to a numerically superior inmate force. There is an added threat from inmates who might throw things from the tiers and duck back out of sight.

The distances between officers and the inmates will vary from arm's length to several yards. The maximum distance will be the length of the wing, such as in the event where the inmates do not resist the officer's initial entry but form at the opposite end of the wing to offer resistance. If officers must respond to a threat from the overhead tiers, the distance could range from about 45 feet directly overhead to perhaps 200 feet for an inmate on an upper tier at the opposite end of the wing.

Any device, agent, or technique designed for use in this situation should have an onset time of 3 to 60 seconds. The effect should be to deprive an individual of either the psychological or physical capability to attack an officer. The signature of any device, including its evident effect on the inmates, might be an aid in discouraging other inmates. For this reason, consideration might be given to exaggerating the apparent threat from such a device. The actual disabling effect should last several minutes. While area weapons, such as tear gas, might be of general utility in reducing organized resistance, it is well to have a capability to single out and bring force to bear on specific individuals who are ringleaders and who might be determined to continue their resistance. Thus a point weapon or one of limited areal concentration might be considered.

The third objective of the control forces in these situations is to prevent the inmates from injuring or killing the hostages. The specifics of these tactical situations will vary, and in many circumstances the hostages will not be in any immediate jeopardy. However, it is generally desirable to get to the vicinity of the hostages as rapidly as possible to prevent harm to them. Despite this desire to rescue hostages, it is anticipated that frequently they will not escape unharmed if there are inmates who are determined to follow through on their threats once the officers initiate the restoration of control. The physical threats to the hostages are sometimes such that, once the officers have them in direct sight, the most effective deterrent against the threatening inmates has been deadly force (i.e., gunfire).

On the other hand, the deadly force which is directed at the threatening inmates constitutes an undesirable hazard for the hostages. It is preferred to minimize any risk to the hostages which might arise from the officers' use of weapons, agents, or tactics. As with the police scenario, "The Barricade and Hostage Situation," a solution might be an agent which

- could be introduced without the inmates being aware of it.
- would be innocuous in the sense of being colorless, tasteless, and odorless.
- would have a relatively short onset time of 3 to 10 seconds.
- would have a high level of reliability.
- would have a duration of several minutes.

The aftereffects of such an agent should not be excessively severe or of extended duration.

APPENDIX C

FIFTH BEHAVIOR ANALYSIS GROUP MINUTES

The agenda prepared for the meeting was as follows:

- i. Chairman's Remarks
- II. Battelle Memorial Institute (BMI) Videotape Presentation (Crowd Hostility Levels)
- III. Chemical Munitions - Nonphysiological Effects
- IV. Summary

The Chairman made some brief opening remarks which keyed on the primary purpose of the meeting, i.e., to observe the overt actions of people in a crowd and relate these actions to emotional levels. The overt actions were to include reactions to noxious and innocuous elements of the environment. As an instrument to achieving the objective of the meeting, videotape highlights of the Cicero March and the 1968 Democratic Convention were viewed by the group. Initially, no plan of "analysis" of the film was formulated. Instead, it was decided to run the film for first impressions, stopping at any point for clarification or discussion, backstepping for reruns, etc., much in the same manner that film footage is edited. This method of attack was followed because, at the outset, it was not clear that it would be possible to infer emotional levels from viewing these specialized film clips.

Before the films were viewed there was some discussion as to the available sources for films. It was stated that films are obtainable from the Film Library in New York and the West Coast Police Departments. There may be other sources, but they were not mentioned. The experience has been that films from the library in New York are relatively disjointed, and that the film editing involves sensationalism.

The group was given a handout which had captions for scene numbers which were dubbed in on the film. For example, the audio portion of the film would be "scene 5." Viewers could then look at the sheets for the caption "Police in front of railroad bridge." The entire film was viewed in this manner; the film was stopped and rerun on many occasions; comments and discussions were abundant.

The bulk of time was spent in reviewing film clips assembled by BMI. There were two major sequences of film:

1. The Cicero March (Illinois 1968)
2. The Chicago Democratic National Convention (1968)

It was noted by the group that there was a striking contrast between the Cicero March, where the police acted as a third force between two opposing groups, and the Democratic Convention, where the police essentially were in opposition to demonstrators.

One of the problems that was evident in using film data for statistical basis for crowd-police interactions in general is that the films were probably taken to support a point-of-view. It was pointed out that the film could be used as a statistical basis for "micro"-type behavior, e.g., the group discussed the point that whenever an individual was being struck with a nightstick, there was a tendency to assume the crouch or protective position which protected the abdominal regions and/or the head.

Another type of "micro" behavior noted in the Cicero March was a lot of verbal taunting when opposing groups were separated by police lines. This lends credence to the idea that aggressive display behavior is increased where there is a barricade separating the confronting parties. However, there were many instances where the control forces were within a few feet of the crowd, but there appeared to be no taunting (possibly problem of editing) by the different parties.

At the beginning of the meeting, it was noted that the group could serve to identify what types of information would be meaningful to retrieve from the film; that is, the group had been asked previously to classify emotional levels, hence the group could identify what overt indicators of emotional level could be taken from the film. Some of the indicators proposed were facial expression (corners up/corners down), gesticulations, and emphatic body movements. It was noted that many of the facial expressions, especially in the Cicero March, were totally devoid of expression which could be indicative of the problem of quantifying facial expression from film. On the same point, it was mentioned a study had been conducted some years ago where facial expressions were related to the emotional content of the situation. Although these findings related to the portion of the face which dominated in the interpretation of the situation, it appears that this study could have some bearing on the technique of analyzing the film.

One parameter of behavior proposed for consideration, was the object of the individual's visual or audible focus. The group made little comment on this proposal. Another parameter of behavior which received some discussion in the group, however, was the "role" played by individuals; that is, in analyzing the film the judgment could be made as to whether an individual was acting as a group member (chanting, shouting, etc.), was involved in a simple relationship (comforting an injured person), or was acting purely as an individual.

It was proposed that members of the group state hypotheses or conjectures, on behavior, formulated while watching the film. Once the hypotheses are stated, then specific data could be obtained from the film which would either support or deny the hypotheses; the point being that rather than listing simple behavioral parameters, those parameters which could be used to test hypotheses should be isolated and quantified. Once a set of hypotheses of interest is formulated, then a whole group of parameters (for which values need to be recorded) can be identified and thus the basis for a meaningful film reduction is established.

As an example hypothesis, it was proposed that, depending upon the distance between a nightstick-wielding officer and a threatened demonstrator, the demonstrator would either go into a protective stance (short distance) or flee (longer distance). Another proposed hypothesis was that the police may be confused between a subject's tendency to go to a protective crouch and a struggle to resist control. A third hypothesis was that an overwhelming force in restraining an individual would provoke greater crowd (bystander) involvement than would a lesser force. A fourth hypothesis was that a massive movement of a police line tended to move the crowd (without contact).

An observation of the activity of the Behavior Analysis Group during the meeting was that initially there was a tendency to discuss the overall situation. There were expressed desires to know more about the backgrounds of the Cicero March and the Democratic Convention. However, as the meeting progressed, there was a greater tendency to review the "micro-structure" of the confrontations; that is, several scenes were replayed many times in an effort to understand what specifically was occurring. For example, after several replays, it became clearer in at least one scene that the police were generally attempting to restrain demonstrators for the purpose of apprehension whereas, in a first viewing of the scene, it appeared that there was simply an unrestrained harassment of the demonstrators. It is a judgment on the part of the Group that the work done by BMI in titling each of the 222 scenes and dubbing the scene numbers on the sound track (optional sound track without dubbing was also available) was of considerable value in utilizing the film. For example, when someone asked to see another scene showing a person in the crouch position being hit by nightsticks, a simple reference to the list of scene titles followed by a reference to the counter position of the video tape for approximate position, and finally listening to scene number dubbing for exact position allowed access within a minute or less to the appropriate scene.

The several scenes of tear gassing incidents gave some impressive preliminary evidence that the visual signature of the gas was extremely effective in dispersing the demonstrators. This, of course, can be used as another hypothesis and studied more carefully and statistically.

In conclusion, the Group was asked if they felt that a statistical summary of individual and crowd responses to the different types of noxious stimuli would be of any help in making estimates of effects for specific weapons. The response was a definite affirmative. However, it does not appear that this Group (Behavior Analysis Group) should perform the film analysis as a group, but rather that, once behavior identifiers and other parameters have been listed, one or two persons should conduct the extensive task of "reducing" the film. Perhaps the Group at a future meeting could review and/or spot-check the "quantification" of pertinent scenes.

The current members of the Behavior Analysis Group are as follows:

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