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# THE DETEX-EXDET POLITICAL-MILITARY EXERCISES ON NAVAL WEAPONS SYSTEMS DURING CRISES

FINAL REPORT

CENTER FOR INTERNATIONAL STUDIES
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
CAMBRIDGE • MASSACHUSETTS

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# THE DETEX-EXDET
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Center for International Studies
Massachusetts Institute of Technology
Cambridge, Massachusetts

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CONTENTS

## Preface

This paper constitutes the final report for the contractor of studies of deterrence, naval weapons, and communications systems, using the political-military gaming technique employed at the Center for International Studies at M.I.T., and also of studies of the gaming technique itself. This project was conducted during late 1963 through early 1965 under the direction of the undersigned with the assistance of Mr. Barton Whaley, under a contract with Project Michelson of the U.S. Naval Ordnance Test Station, China Lake, California.

The project comprised three types of activities. The major effort was in the design and conduct of three formal exercises using senior experts. In addition, three gaming experiments using students as players were run concurrently and in direct support of the design of the three formal policy exercises. Two graduate students, Mr. Leslie Roos, Jr., and Mr. Aaron Seidman, contributed to the design, management, and analyses of these experiments. Following the gaming exercises and experiments, a survey study was conducted by mail questionnaire and personal interviews of the participants of the recently concluded senior exercises and also the participants in all previous senior political-military exercises conducted by the Center. This survey was made with the assistance of Mr. Richard E. Barringer.

Each of the seven portions of this project--the three exercises, the three experiments, and the survey study--have already been separately reported on. This final report includes conclusions of a general nature derived from all aspects of the project. It was initially drafted by Mr. Whaley with the assistance of Mr. Seidman.

Lincoln P. Bloomfield
Director, Arms Control Project

# I. SUMMARY

Since 1958 the M.I.T. Center for International Studies has conducted several exercises with a particular technique of political-military gaming that uses senior professionals and experts to simulate the interactions of the highest policy-making echelons in each of several national states or international organizations in periods of intense international crisis.

The most recent series, undertaken between late 1963 and early 1965, examined the deterrence effectiveness of specified naval weapons and communications systems under several types of hypothetical strategic crises. The series comprised three games. In addition to the usual acquisition of serendipitous insights concerning some plausible decisions and unexpected relationships among the negotiating positions of teams, the series provided the opportunity to test certain modifications in both game techniques and data collection. More effective administrative procedures were developed, more systematic techniques for data collection were introduced, new types of political-military problems were explored, and slight modifications in format were introduced to provide a more economical use of available time. While some progress in the development of this technique in all these categories was apparent, this technique of gaming remains rather unstandardized both in its format and its data collection procedures. Consequently, while its utility as an adjunct to policy planning or as a teaching device has been improved, its value as a research tool is still largely untested.

In addition to the exercises--each of which used some twenty professionally qualified political, military, and academic specialists--

three experiments with the same game format and posing similar political-military problems to the players were conducted with graduate and undergraduate students. These experiments were used with some success to pretest the proposed crisis problems, innovations in game rules, new administrative practices, and data collection instruments to be introduced in the games using specialists.

At the conclusion of the present series of political-military exercises and experiments, a survey was made of the previous participants in all nine exercises conducted with senior experts since 1958. Of the 148 former participants, 80 responded to a mail questionnaire and, of these, 25 were also personally interviewed. In addition to providing a wide range and considerable volume of evaluative commentary, analysis of these responses produced one interesting conclusion: that the present or potential applications of this technique to student teaching, professional training, policy planning, or laboratory research, was almost unanimously thought by those most closely experienced in each of these four fields to have its greatest utility in their own field. Nearly all negative evaluations from these same persons were applied to uses of the technique outside their immediate professional experience. The survey study also demonstrated that exposure to this technique had stimulated a greater use of this technique or adaptations of it by former participants than previously had been recognized: 20 respondents stated that they had conducted or sponsored such games, and 53 stated that they had recommended its use to others.

The many uses to which gaming is now being put attest to the breadth of its applicability as a heuristic, pedagogical, and testing

tool. Among the current or recent uses to which it has been put are in communications research to examine organizational decision-making; in defense planning to test and determine force structures, weapons systems, and command and control communication systems; in the training of professionals to illustrate escalation potential in conflict areas and the local commander's role in combatting and containing such situations; and in teaching students to dramatize the roles of risk, uncertainty, and indeterminancy in international relations.

In sum, political-military gaming has thus proven its relevance and value in several areas of contemporary practical and intellectual concern. It would seem that the next task is to examine closely the variables and factors of which it is composed, and systematically to construct at least a partially reproducible technique.

## II. THE PROJECT

The most recently concluded Center project on political-military gaming was begun in mid-1963 and concluded in February 1965. The project was designated DETEX, a contrived acronym for "deterrence exercises," a term reflecting the substantive problems examined in the games themselves.

### A. OBJECTIVES

Briefly, the main research objectives of the DETEX project were two-fold. First, to investigate through further use of the role-playing simulation technique developed at the Center for International Studies some of the constraints or opportunities that the existence of certain naval weapons systems might present to top policy-makers at the national level in times of intense crisis. Second, to examine this particular device to obtain both better understanding of it as a research tool and to experiment with certain potentially improving modifications.

### B. ACTIVITIES

To carry out the project objectives three basic types of activities were developed and pursued. These were a series of three professional exercises, a series of three student experiments, and an interview study.

#### 1. Professional Exercises

This particular non-computerized, multi-team, role-playing type of political-military gaming technique was originally developed

in 1954 and used in the study of limited war situations by the Social Science Division of The RAND Corporation.[1] Beginning in 1958 Professor Lincoln P. Bloomfield and his colleagues at the Center for International Studies at M.I.T. began to adapt this technique for both policy research and teaching purposes.[2]

The main effort in the recently completed project was directed toward mounting three political-military exercises using professionally qualified experts, following the general format of the six previous POLEX and POLEX-DAIS games. These exercises were conducted with two objectives in mind: to provide policy insights on problems of naval deterrent weapons or communications systems; and to explore some possibly innovative improvements in this game technique. DETEX (for "deterrence exercises") I, II, and III were conducted on 29 November 1963, 7-8 February 1964, and 27-28 November, 1964, respectively. Each of these exercises was reported on separately to the contractor.[3]

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[1]For a detailed description of this RAND "SIERRA" game see M. G. Weiner, War Gaming Methodology (Santa Monica: The RAND Corporation, 1960, published as Research Memorandum 2413). For a statement of how the RAND game fits into the general field of gaming, see Herbert Goldhamer and Hans Speier, "Some Observations on Political Gaming," World Politics, October 1959, pp. 71-83.

[2]This technique and its uses and limitations is briefly discussed in Lincoln P. Bloomfield and Barton Whaley, "The Political-Military Exercise: A Progress Report," Orbis, Vol. 8, No. 4 (Winter 1965), pp. 854-870.

[3]For DETEX I, see Center for International Studies paper D/64-31 dated August 1964; for DETEX II, paper D/64-2 dated February 1964; and for DETEX III, D/64-4 of June 1965.

2. Student Experiments

The six initial political-military exercises--the POLEX and POLEX-DAIS series conducted between 1958 and 1963--had brought into sharp focus a number of questions concerning the political gaming technique, its relation to reality, and appropriate research methods for improving our general understanding of this relatively new form of social science investigation.

In order to make a preliminary attack on these questions, a modest portion of the recent DETEX gaming project was devoted to a series of small-group gaming experiments using university students--mainly from M.I.T.--as subjects. The purpose of these experiments was two-fold: systematically to pre-test innovations in the technique before employing them in the senior exercises; and to inquire into questions of method that were believed to have value of their own. We looked also for any additional insights these games might yield regarding the central substantive concern of the DETEX project, namely strategic deterrence.

The EXDET (for "experiments in deterrence") series was conducted at the M.I.T. Center for International Studies in 1963-1964 at intervals spaced between the three senior, policy-type simulations cited in the last section. Instead of the experts characteristic of the senior games, these used university students--both graduate and undergraduate--with at least some academic exposure to international relations problems. Previous adaptation of the political-military gaming technique for use with students at M.I.T. between 1959 and 1963 had already established the general feasibility of such an

approach.[1]

In all, three EXDET experimental student-level exercises were conducted at M.I.T. in offices of the Center for International Studies and in rooms provided by the Sloan School of Management. EXDET I was held on 16 November 1963 with Leslie Roos as its principal designer, director, and analyst. The EXDET II experiment took place on 18 and 19 April 1964. The main effort in the design, conduct and analysis of that game was by Aaron Seidman. The EXDET III experiment took place on 27 and 28 May 1964 and was designed and directed by Barton Whaley, who supervised the entire series.[2]

a. The Research Problem

The student-level experiments comprising the EXDET series were intended primarily to support the more elaborate professional exercises in the concurrent DETEX series. They had the additional purpose of enabling the M.I.T. Center game designers to conduct secondary experiments bearing on the simulation technique itself,

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[1]For an account of the first two games at M.I.T. in 1959 using undergraduates in political science see Lincoln P. Bloomfield and Norman J. Padelford, "Three Experiments in Political Gaming," American Political Science Review, Vol. 53, No. 4 (December 1959), pp. 1105-1115. This article also includes an account of the initial professional game held in 1958.

[2]The three separate reports, each bearing the subtitle A Student-Level Experimental Simulation on Problems of Deterrence, are:

EXDET I (C.I.S./M.I.T.: November 1964, Publ. No. C/64-40)

EXDET II by Aaron Seidman and Barton Whaley (C.I.S./M.I.T.: November 1964, Publ. No. C/64-39)

EXDET III by Barton Whaley with Peter C. Ordeshook and Robert H. Scott (C.I.S./M.I.T.: October 1964, Publ. No. C/64-33)

with the aim of moving toward more scientific applications of a device whose values and payoffs are still somewhat impressionistic.

In designing the student experiments in support of the professional exercises, several options were considered: 1) to replicate the professional exercises; 2) to control certain experimental variables identified or thought to be associated with the professional exercises; 3) to pre-test various data-collection instruments to be used in the professional exercises; 4) to pre-test one or more of the techniques used in the professional exercises such as communications procedures or scenario design, or 5) a combination of these. This last option was selected, fully recognizing that to do so would jeopardize certain of the other possible options and make others unachievable.

The basic decision which set the controlling limits was that the student games would hew fairly closely to the role-playing, multiple-team format of the professional exercises. The reason for this decision was that by preserving this format it would be possible to use the student games to pre-test techniques and procedures then being considered for introduction in forthcoming professional exercises. Furthermore, by adhering to the general format of the DETEX series it was possible to employ either a previously used scenario, or one under consideration for future use in a DETEX exercise.

EXDET I concentrated on increasing the reproducibility and methodological rigor associated with the crisis simulation technique. This game also was intended as a pre-test of the specific political-

military crisis problem to be presented in the subsequent DETEX I game. This experiment proceeded through two phases, a research and development (R&D) phase in one move period, and a crisis gaming phase in three moves. Each move period lasted approximately 1½ hours.

EXDET II was designed as a variant of the DETEX II senior exercise which preceded it, isolating and simplifying the major types of problems present in that earlier exercise. Both games involved: 1) a naval problem, 2) a deterrent weapon system, and 3) communications problems in 4) a crisis, together with 5) an initial situation which would tend to make the participants consider arms control measures.

The specific objectives of the EXDET III game were to develop more systematic techniques appropriate to both student experiments and professional exercises as well as to replicate with students a crisis problem previously used with professionals to see what, if any, marked differences occurred. In view of the adherence to the general DETEX format it was decided to employ the scenario previously used in the DETEX II. Consequently, this EXDET III game was, in effect, a partial replication of the DETEX II exercise.

b. Innovations in Technique

In the EXDET I game, several departures were made from the methods followed in the previous senior professional political-military exercises. The first innovation consisted of introducing multiple U.S. teams (five in all) in the game, each playing simultaneously against the Control Team, instead of the usual single U.S. team. This procedure served to provide a marked degree of replication, permitting some judgments about the reproducibility of

results.

The second innovation was an attempt to have Control provide all its responses to team moves during the same part of the move period rather than, as in previous games, alternate with the teams (i.e. Control inputs following team moves at times when teams were in "time out.").

The third innovation was the introduction of a "research and development" (R&D) move period at the outset of the game. This innovation was aimed at forcing the participant teams to choose between the development of various candidate weapon systems on the basis of their estimates of weaponry needed to meet a hypothetical Southeast Asian crisis several years in the future. Following these initial decisions, the game clock was advanced to the future point in time, and the participants instructed to play out the crisis specified in the "Scenario." Thus each separate U.S. team was forced to live with the course of weapons systems development it had chosen earlier.

A fourth innovation was to have participants fill in various types of questionnaires during the course of play, in addition to the conventional post-game questionnaire.

EXDET II attempted a number of further innovations. First, the scenario consisted entirely of a series of separate messages issued to the participants on Standard Message Forms only after play had begun rather than prior to play as in all previous games, whether of the DETEX or EXDET types.

A second major departure in EXDET II from the previous games

was that all or nearly all essential messages from Control were pre-programmed for the first two move periods, that is, those from the U.S. decision-makers to U.S. Navy communications, and from the Presidium to Soviet Fleet communications, as well as a fair amount of traffic between the teams and the "UN", "China," "NATO," and other political entities simulated by Control.[1] The scheme used was for Control to play against two pairs of U.S.-Soviet teams on the first day, and to repeat this the following day against two other pairs of U.S.-Soviet teams. One of a series of questionnaires administered to all participants in an effort to obtain data on various social-psychological variables[2] was used to assign members to the various teams. The participants were then scaled on the basis of their responses and assigned to teams in such a way as to make each team as homogeneous as possible. The pairs of teams were matched one day and on the second day they were cross-matched.

EXDET III used a programmed version of the DETEX II scenario. Documents that were generated by Control during the course of play of DETEX II were fed into EXDET III wherever plausible, thus enhancing its replication aspects.

As in EXDET I and II, this third experimental game had Control functioning in the same real-world time as the teams (in contrast to the DETEX series in which Control's portion of any given

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[1] This pre-programming technique was used again in the subsequent DETEX III exercise.

[2] These questionnaires were adapted from one developed by Philip A. Beach for the Inter-Nation Simulation at Northwestern University.

move period preceded that of the teams). This approach was possible in the EXDET series because the pre-programming of much of Control's decisions and messages freed Control sufficiently to supply immediate responses to the teams. This technique of simultaneous team-Control interaction also permitted the use of continuous play from one move period to the next, as it eliminated the necessity of having the teams take time-out breaks between moves while Control digested the team decisions from the previous move period and planned and drafted its inputs for the next move period. Those breaks that did occur were therefore no longer a constraint of the game design but merely an option exercised by Control both to provide relaxation for the participants and--where move periods involved a Control-specified jump in clock-time--to permit the players to adjust psychologically to the announced change in time.

The final innovation in EXDET III also concerned another use of time in gaming. This consisted in specifying in the ground rules that during move periods the game clock would run at a normal rate of speed, ticking off real minutes and hours. Previous games had not made this point explicit and players had made varying personal judgments as to the nature of time during a move period; for example, some presumed that time was stopped while others presumed that a move period was played in an accelerated time.

3. Interview Study[1]

In the series of nine political-military exercises or "games" conducted since 1958 at the M.I.T. Center, one hundred and forty-eight individuals had served as senior participants. In the fall of 1964, shortly before the last of these exercises, a letter was sent to all one hundred and thirty participants in the first eight of them, announcing the Center's intention to review this program in terms of its impact upon the participants themselves, and inviting their cooperation in this effort. Each participant was asked to indicate his willingness to answer and return a mail questionnaire, as well as his availability for a personal interview. One hundred and six (81.5%) replies were received. Of these, one hundred and three (79.2%) expressed their willingness to participate in the program, and ninety-three (71.5%) indicated their availability for a personal interview.

Due to the tight schedule of the project, the geographic dispersion of the available participants, and the high degree of their stated willingness to subject themselves to mail questionnaires, it was decided that twenty-five personal interviews, conducted both for substantive information and as a pre-test for the mail questionnaire, would suffice for our purposes. Of the one hundred and thirty

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[1]For the final report of this study see Richard E. Barringer with Barton Whaley, "A Survey Study of the M.I.T. Political-Military Gaming Experience," Orbis, Vol. 9, No. 2 (Summer 1965).

participants in the first eight exercises, fifty-six (43%) were found to be located presently in Washington; forty-five (35%) in the Boston-Cambridge area; and ten (8%) in the Greater New York area. Thus, of the twenty-five personal interviews completed, ten were conducted in Washington, eleven in the Boston-Cambridge area, and four in New York. Persons chosen for personal interviews were selected, within the constraints mentioned, for their diverse professional viewpoints and their representativeness of the entire gaming population in terms of the social background characteristics discussed below, or for their known interest and experience in gaming techniques. Prior to each interview, its informality and the anonymity of response were stressed.

The questionnaires used in personal interviews consisted of twenty open-ended and closed multiple-choice questions on the substantive nature of the participant's gaming experience and his reactions to it. Upon completion of the personal interviews, a mail questionnaire was devised containing all of the questions asked of the personal interviewees plus several other questions raised by the interviewees themselves or by their comments. Also appended to the mail questionnaire were thirteen questions in which the respondent was asked to rate the technique of political-military gaming for various proposed uses, in comparison to other techniques with which he was familiar. Lastly, a section on "hypothesized international events" was included, in which the respondent was asked to indicate the more or most likely U.S. policy in such a situation and its eventual outcome.

In all, eighty-two persons responded to the study prior to its deadline, constituting 55.4% of the population of senior game participants. Seven additional questionnaires had been received too late to incorporate in the quantitative analysis. However, these were used for their qualitative insights, as were, of course, all questionnaires received earlier.

## III. SUMMARY AND CONCLUSIONS

This section highlights some of the findings and conclusions of the separate activities in the project and concludes with some general and miscellaneous remarks. Detailed conclusions are found in the cited reports.

### A. PROFESSIONAL EXERCISES

The earlier reports on the DETEX exercises have already outlined the policy implications and results of innovations in gaming technique specific to each. This section summarizes some implications and innovations that seem common to all or that appear to have particularly wide or topical applicability.

#### 1. Policy Implications

A consistent factor pervading all of the M.I.T. political-military exercises--POLEX, POLEX-DAIS, DETEX as well as the student games--has been the remarkable degree to which teams misinterpret one another's messages and actions. Much of the military escalation, and many instances of collision courses, have resulted more from such failures in communication rather than deliberate intent, not only in the U.S.-Soviet but also in the U.S.-Chinese "confrontations." The fact that most of the professional participants accept these outcomes as plausible suggests that this persistent communication problem is not some mere artifact of the game situation, but may well represent an important way in which the political-military exercise accurately reproduces international crisis policy-making. This is particularly

sobering when one reflects that, compared with real nations, the teams are biased in favor of effective communications, in terms of not only the homogeneity of players drawn from the same culture, but also of the fact that many of the opposing players have been both professional colleagues and personal friends.

One striking insight worth mentioning was the felt need for rapid and continuous two-way communications between national leaders and their strategic weapons systems in situations other than an ordered strike, an emphasis that surprised more than one participant professionally involved in the strategic weapons programs. The question of two-way communications arose in the exercises in politically dominant circumstances involving such things as the need to reassure one's opponent that a nuclear missile had not been fired from submarines or surface ships; the need to inform the UN that missile-armed vessels have been checked out and their missiles accounted for; the need for the navy to take a roll-call in order to satisfy the Commander-in-Chief that his command and control system was not being compromised or betrayed; and the need to have an accurate count of the fleet when some vessels may be disappearing under mysterious or ambiguous circumstances.

Another striking event in several of the exercises has been the tendency for escalation to occur only along a spectrum of conventional arms, with massive commitment of conventional force invariably considered before the use of even a single tactical nuclear weapon. For example, DETEX I (and EXDET I) saw increasingly committed ground troops, air strikes which expanded geographically

from the initial ground-support operations to include strategic strikes against targets in North Vietnam, and, finally, initiation of a partial naval blockade of Communist China to prevent oil replenishment. But at no point did the U.S. "policy-makers" see how nuclear bombing could effectively deter further attack, despite the fact that the game had been designed to maximize the attractiveness and minimize the risk of employing small tactical nuclear weapons.

Indeed, U.S. teams have occasionally explicitly viewed massive, conventional action on the ground to be itself a deterrent. They have faced certain situations where they did not believe that actual use of U.S. strategic nuclear weapons could "deter", and although they did threaten their use to this end, they had little hope that this would be effective. For example, in DETEX I they viewed any detonation of nuclear weapons in North Vietnam or in China itself only as a desperate final means to achieve defeat of Chinese forces already committed to the battle. But even in this sense they were quite confident that their massive application of conventional arms in Southeast Asia would quickly serve to repel the Chinese.

In view of the fact that UN typically tends to be discounted by those who concentrate on the U.S.-Soviet confrontation, it has proved surprising to some game participants that when things get bad enough or complex enough, or when a political out, or neutral observation, or a face-saving device is wished for, the teams frequently turn to the United Nations.

2. Innovations in Gaming Technique

Several quite useful innovations in gaming technique were successfully introduced in the DETEX games and have been tentatively accepted into the standard format of these games. In addition, some promising innovations were tentatively and partially attempted during the DETEX games with sufficient success to warrant close consideration in any future exercises of this type.

All of these innovations had been informally tried out or formally pre-tested with students in the preceding EXDET games and are described in detail in the separate EXDET reports and fully summarized in the DETEX III report. In sum, they cover improvements in a) administrative procedures that permit somewhat faster play, b) communications procedures that speed the pace of the game, c) pre-programming of key Control Team decisions that reduce random bias of outcomes, render replication more feasible and also contribute to faster play and d) data collection instruments for more systematic post-game analyses.

B. STUDENT EXPERIMENTS

The findings of the three EXDET experimental games may be divided into several classes. As spelled out below, the general types of innovations in technique and data collection were found particularly promising. EXDET I provided some suggestive insights regarding the nature of the scenario-problem to be presented the professional players in DETEX I on the basis of which certain modifications were made in the design of that subsequent exercise.

The pre-programming technique developed in EXDET II was more-or-less successfully adapted to the subsequent DETEX III problem.

EXDET III represented the first attempt to replicate one of the previous games in the literal sense of a replay starting with the same scenario and background papers. This attempt proved fairly successful.

In general, this type of gaming seems particularly useful for certain purposes: as an educational experience it makes a strong impact on the participants, who seem to identify quite closely with their assigned roles. It is valuable in the design of games to be used in policy research, for even if their own policy contributions are negligible, students can help to pre-test the scenarios and questionnaires intended for use in professional exercises. Finally, it appears to have at least one research value: the fact that the responses of all three U.S. student teams in EXDET III rather closely paralleled those of the single U.S. professional teams in the replicated DETEX II and DETEX-M exercises suggests that there may well be certain factors operating systematically in both types of games, such as uniform responses by Americans to certain types of military challenges. Extensive replications using participants drawn from selected occupational, national, or psychological types would be required to pinpoint such factors.

1. Simultaneous Games

The EXDET series was only partially successful in providing a situation for experimental replication. The predetermined inputs of Control messages and Hot-Line manipulation were achieved without difficulty. However, Control failed to provide complete replication of its own inputs in two ways. First, coordination within Control was far from complete, because the number of messages from teams requiring individual responses from Control was greater than anticipated and consequently took away from the time available to Control for closer coordination among the separate games necessary to insure full replication. Second, the ubiquitous learning process was working to produce differences in Control responses between separate days of play; that is, the Control members acquired knowledge and experience from the first set of games which produced differences in their approach to the replays.

The use of a special "procurement" (or R&D) move period proved entirely feasible and should be seriously considered in any future student experiments or professional exercises where the game problem requires one or more teams to select among a specified range or array of options in force structure and then be forced to live with the consequences of their decision during a subsequent crisis. The use of questionnaires proved successful in the sense that participants did not seem unduly disturbed by the interjection of such material during play; however, the specific questions employed require considerable modification to elicit better the types of answers for which they were designed.

Similarly successful was the technique of having Control move simultaneously with the teams. The key to the relatively effective performance of Control was the fact that the pre-programmed decisions and messages did, in fact, sufficiently free Control from attending to these otherwise time-consuming duties to enable it to cope with the special events and queries generated by the teams without having either a larger Control Team or requiring the frequent or lengthy time-out periods required to maintain step with the teams that have characterized the previous professional exercises. The primary value of this device is, of course, to make maximum use of the players' time. It should be seriously considered for application to games where long team breaks (during which Control prepares the next move period) represent an undesirable imposition on the volunteered time of busy professionals.

Such a time-saving device depends for its success on Control's being sufficiently freed from the responsibility of having to improvise major policy decisions. This degree of freedom can be achieved only when at least most of the decisive messages can be predicted and prepared in advance. Such pre-programming, of course, severely limits the types of specific scenarios that can be selected for use in games involving simultaneous team-Control play. However, the advantages in time saved warrant careful consideration of the possibilities for pre-programming in any future professional exercise as well as in student experiments.

Consideration should be given to improved briefing of non-professionals; the students were often unfamiliar with aspects of

governmental structure and procedures. As a result, there tended to be confusion over technicalities in language, etc. The provision of devices such as organization charts and glossaries of technical terms should mitigate this problem.

2. Questionnaires

In EXDET I a special questionnaire was given to the participants before the game, at the end of each move period, and following the game. This questionnaire was intended to elicit data from which we could assess some of the preconceptions which individuals brought to the game situation regarding expectations of national success (or failure), responses to the antagonists' initiatives, and perceptions of the antagonists' attitudes toward them--and how these varied over the course of the game.

Somewhat surprisingly, very little change in perceptions of success and failure occurred.

A number of questions were asked in an effort to measure the intensity of the crisis during each move period, noting several indicators of intensity. All seem to exhibit what Paul Lazarsfeld has termed the "interchangeability of indicators": if one of these indicators is missing it can usually be replaced by the remaining ones, and the general level and direction of the underlying social process would still remain clear. In terms of theory of threat perception, escalation, etc., the results of this particular experiment tend to validate each indicator of crisis intensity--behavioral and perceptual. Stability among move periods was demonstrated with

reference to the three main indicator types: escalation, national image, and threat perception. Secondly, results relevant to understanding the components of threat perception were obtained. Thirdly, progress was made toward building a more realistic escalation ladder.

Some primitive attempts were made to analyze message frequency, content, and direction; but as far as gaming research is concerned, it must be conceded that this technique has severe limitations. The most probable returns of any significant value would come from a detailed content analysis, and thought should be given to the possibility of encoding each message's essential characteristics on a punched card and analyzing games in terms of content frequency. The preliminary attempts to date are summarized in the separate game reports, but further efforts would require considerably greater efforts in systematic planning and execution than were available in the present series.[1]

The following suggestions arising specifically from the quantitative analyses may aid in the improvement of the experimental aspect of these games and their systematic analysis:

1) One-man teams should be tried so that a more careful study of the effects of personality can be made.

2) By even further standardizing (by pre-programming) the responses of Control, the analyses of sets of games would be made more statistically meaningful as some of the intervening variables associated with Control's output would be eliminated.

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[1] See Section D for reference to the forthcoming studies by Dr. Ithiel de Sola Pool and Dr. Edward Cushen that have made or plan to make such systematic analyses of the messages generated in the DETEX games.

3) The analysis of the EXDET games must be mostly qualitative as the numbers were too small for effective quantitative treatment. Even performing a meaningful qualitative analysis is difficult because of the necessity for content analysis of each move. This problem can be overcome only by playing more games with the same scenario so that significant statistical analyses can be made. Alternatively, a smaller number of games could be used for statistical analysis but only if much tighter constraints were placed on the number of now obviously significant variables. As indicated, to reduce the number of intervening variables, Control inputs could be standardized or pre-programmed for certain types of scenarios or one-man teams could be used.

## C. INTERVIEW STUDY

Viewed from the perspective of the reactions of the participants to their experiences in the nine exercises conducted by the M.I.T. Center since 1958, political-military gaming emerges as a diffuse learning experience of unique intensity and personal involvement. In its capacity to exert controlled stresses upon various isolated subjects and concepts, this particular technique generally affords the individual participant the unanticipated and vivid insights that arise from increased consciousness and awareness. Often, these insights will form the bases of new and lasting interests and concerns, testifying to the intensity of the live experience.

What is actually learned, however, is primarily a function of the knowledgeability, preoccupations, and imagination of the individual participant himself. Gaming can provide many vivid illustrations of and insights into the manifold aspects of international political and military processes, depending upon the sensitivities of the participant. The extent to which such is the case is reflected in

the fact that each of the major institutional grouping of respondents rated gaming as being of principal value for its own primary purposes. Thus, the academics rated it highest for teaching; the State Department personnel, for policy planning purposes; the Defense Department personnel, for training purposes; and the independent government agencies personnel, for research purposes.

This also illustrates the fact that gaming affords differing values for each of these purposes, necessitating tradeoffs and modifications within the gaming technique to adapt it most effectively to its various heuristic, pedagogical, and testing purposes. Though it is a general-purpose tool, gaming is not maximally effective for all its possible purposes in the same structural format without at least some alterations in format or presentation.

In general, the technique of gaming as presently employed is regarded as having far greater value for generating insights and hypotheses than it has for testing these. A great deal of study and systematization of the myriad variables in the technique, especially the insufficiently understood role of Control, is required before the problems of its non-reproducibility can be resolved. A singularly promising prospect of gaming for basic research, however, is provided by its inherent structure as a laboratory for the study of small-group interaction and communication.

Within the policy planning realm, gaming's capacity for subjecting systems, assumptions, and policies to controlled stresses, as maintained by an alert Control Team, affords a unique testing and heuristic value. It has been demonstrated that, for the policy planner,

the experience of so subjecting himself, his assumptions, his proposals, and his technologies is an enriching experience, pushing back the boundaries of his imagination and preconceptions and leaving him a more flexible and aware individual.

As a learning-by-doing device, gaming is most highly rated by the participants as a supplementary technique both for training professional military and diplomatic officers and for teaching students of international relations. For the professional, gaming affords the special value of exposing him to functional viewpoints and responsibilities different from his own, thus enlarging his understanding of policy problems and facilitating his communications across boundaries of professional specilization. It has also been suggested that, given the revealing stresses to which the participant is subjected, gaming might well be employed as a supplementary "testing tool" for the evaluation of candidates for policy positions.

For the student of international relations, gaming has been found not only to arouse interest in substantive subject matter but to provide vivid illustrations of certain selected theoretical notions and models in that field. It has also been used effectively to demonstrate the problems of policy planning and constraints on decision-making.

One negative comment frequently made by respondents on the use of gaming for teaching and training referred to the disproportionate investment of both time and money, compared with more traditional techniques, required to conduct a game. Given the enthusiasm for

gaming's value in these regards, and the subsequent research values that might be afforded a central evaluating agency in terms of systematizing the technique, it would seem well worth the effort at this juncture to develop a standardized instructional gaming format that would allow game sponsors flexibility in scenario construction and subject stress.

## D. GAMING RESEARCH: SOME OBSERVATIONS

### 1. The Different Uses of Professional and Student Games

Experience with the recent series of both student and professional political-military games suggests that the differences between these two types of games are at least as important as the similarities, and that in order to obtain maximum results and make most efficient use of resources they should be designed in quite different ways to serve different purposes. In effect, this means that while the professional type exercises profitably may continue to evolve along current lines, future student experiments should become substantially more "experimental" in the sense of becoming more formally structured experiments.

The technique of the professional-political-military exercise stands in sharp contrast to that of the student experiment. It can be described as a special form of "brainstorming" where the greatest value arises from eliciting as many new ideas and new insights as possible from participants who are thrust into a highly competitive situation with their counterparts on other teams. There is no need

to hold constant as many factors as possible, unlike a conventional small-group experiment in which one seeks to isolate social and psychological variables. The important thing is to use participants who have as much relevant knowledge and experience as possible and permit and even encourage them to establish as many new relations among the data as their expertise will permit. Thus, an essential characteristic in the design of professional exercises is the introduction of devices to discourage conventional thinking and encourage attempts to break out of conceptual straight-jackets.

The further into the future the scenario is pushed, the greater the opportunity to distort the matrix of present-day reality, which has been the usual starting point for scenario design. Indeed, it might prove beneficial to push these distortions as close to the limits of credibility as possible as a way of creating an environment in which present policies are obviously inadequate. In addition to encouraging new insights, this might have the added benefit of increasing the attention given to the game problem (e.g., the merits and disadvantages of the existence or use of an MLF in a given crisis) by removing conventional distractions. In other words, if the state of the world is presented as considerably different from the present situation, the participants may be forced to concentrate on those problems which the Game Director or Control Chairman chooses to emphasize, because students have insufficient knowledge to go off on tangents.

Student games are primarily for teaching purposes. In addition, but within limits, they may also serve useful research purposes. For

example:

1) Scenarios and communications techniques may be tested on student groups as a "debugging" procedure. In view of the substantially greater effort and expense involved in preparing and conducting a professional exercise, pre-testing with student groups has proven to be a worthwhile procedure; but student games should not be treated as if they had intrinsic research value for policy oriented games, at least not until considerably more detailed research has established which variables are constant among student games, professional exercises, and real-world policy-making situations.

2) Psychological variables involved in small group interactions and in crisis situations might be analyzed by appropriately designed game instruments. In the long run this would presumably lead to a fuller understanding of role-personality and communications behavior in all forms of gaming.

Theoretically, professional games can be used for the same experimental purposes as student games; this would seem to be an inefficient use of valuable talents and resources unless an extremely rigorous design had been developed. Conversely, student exercises do not seem to be useful for the same purposes as the professional games, because the students lack the knowledge or experience to bring to and put into the games. By regarding these two types of games as differing substantially and using them for investigating different types of problems, it should be possible to obtain better results from both types of games, used together or singly. Looking back

at the student EXDET games, it appears that they should have been designed and run in a more experimentally rigorous manner and not compromisedby forcing them to take on the additional function of providing either dry runs or replications of professional exercises.

2. Derivative or Similar Games

It was originally intended that the interview survey study would avail itself of the opportunity to enquire in detail into the subsequent uses to which past participants in the Center's political-military exercises had put this technique in their own professional work. The intention was to make an initial effort toward the preparation of a sort of census list of recent, current, and planned gaming. As this could only constitute a very limited part of the general interview project, it was fortunate that before interviewing began we learned of a large-scale project already underway and specifically devoted to just such a census.[1] Therefore, we limited ourselves to the single screening question: "Have you personally ever conducted or sponsored any political-military games of the M.I.T. type?" Of the 82 respondents, 20 (i.e., 25 per cent) stated that they had made use of games of this type. Their answers distributed as follows:

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[1]This census has been undertaken by Professor Richard C. Snyder of the Department of Political Science at Northwestern University in conjunction with the Northwestern University-Advanced Research Projects Agency Simulated International Processes Project.

| Type of Use | No. |
|---|---|
| Teaching | 11 |
| Research | 6 |
| Policy Planning | 4 |
| Training | 3 |
| | 24 |

Four persons used their games for two purposes. In addition, we know from other sources that at least 10 of the 66 non-respondents (15%) have also conducted or sponsored such games, and that the majority of these were also for teaching or research purposes.

3. Collateral Studies

Four forthcoming studies have been undertaken by other researchers (and outside the framework of the DETEX contract) but making systematic use of data collected during these games.

One set of studies has been undertaken by Dr. W. Edward Cushen of the U.S. National Bureau of Standards in conjunction with the earlier POLEX-DAIS exercises and carried forward in the DETEX series. These studies apply systems analytic techniques directly to the sets of messages generated during the games, yielding "logic chart" and "decision tree" descriptions of the games. So far a number of promising approaches have been developed by Dr. Cushen which appear to provide a rapid and economical means of obtaining standardized analyses to permit the systematic comparison of strategies and decisions among separate games. Furthermore, this technique may prove useful in the design of future scenarios or in the pre-programming

of the hitherto more-or-less free-playing Control Team.

A second study is analyzing the standardized "Post Simulation Questionnaire" developed at Northwestern University and administered to players in the DETEX II, EXDET III, DETEX-M, and DETEX III games. These questionnaires--designed to study crisis decision-making--are currently being analyzed by Professor James A. Robinson of Ohio State University and Dr. Charles F. Hermann of Princeton University.

Thirdly, the Crisis-Communications Project (CRISIS-COM) directed by Professor Ithiel de Sola Pool at M.I.T. is currently engaged in a systematic content analysis of the messages generated by the DETEX II game and a comparison of these messages both with those produced by other (non-M.I.T.) games as well as those available from the actual crisis immediately preceding the 1914-1918 war. If this succeeds in throwing fresh light on the DETEX II exercise, serious consideration should be given to analyzing other political-military exercises by this technique.

Finally, Professor Harold Guetzkow of Northwestern University directs a project on "Comparison of Verbal and Simulate Theories of International Relations" that will compare the simulation models represented by the M.I.T. political-military exercise, the Raytheon TEMPER game, and Guetzkow's own Inter-Nation Simulation, with the verbal models found in international relations theory. This represents a preliminary step toward analyzing and understanding the ways in which simulation models, social science theories, and international political decision-making resemble one another.