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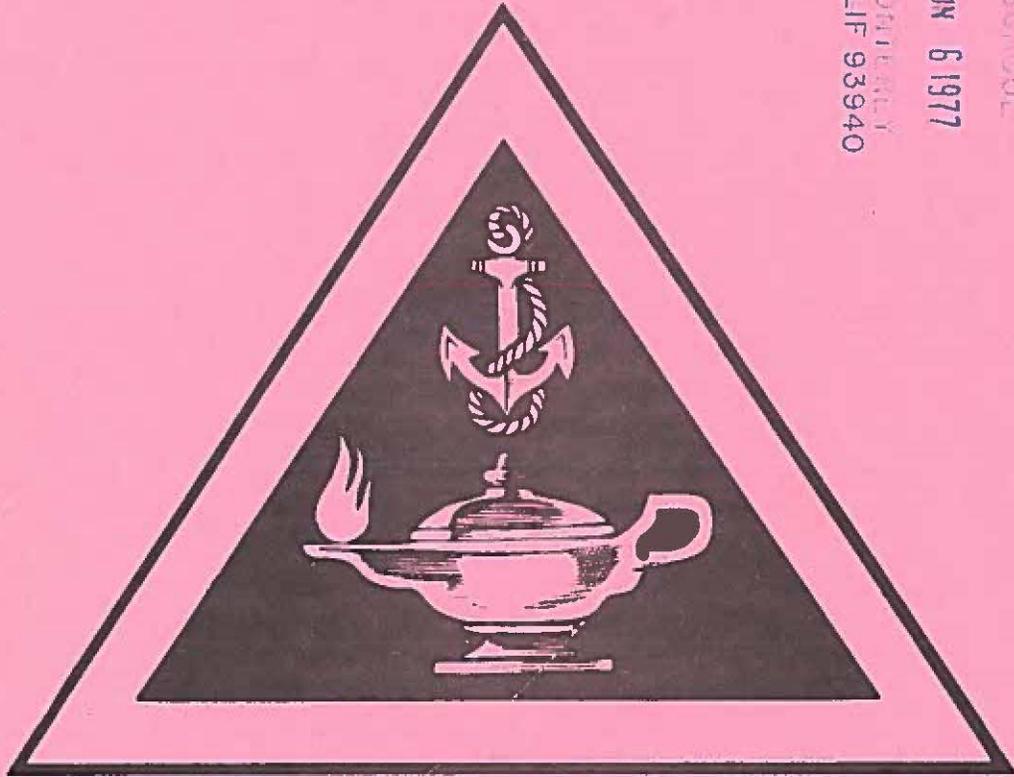
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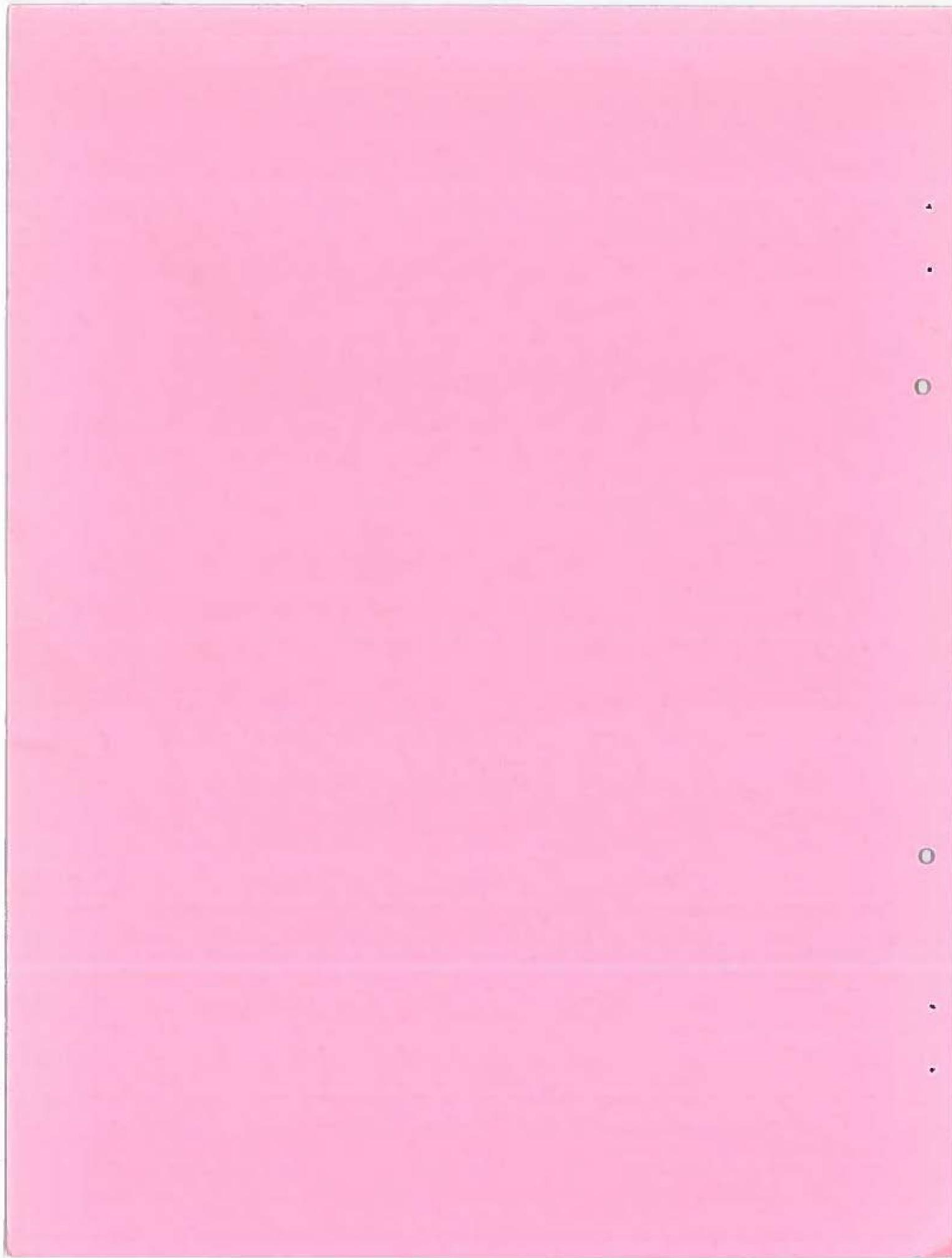


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MANAGEMENT QUARTERLY

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DEPARTMENT OF

ADMINISTRATIVE SCIENCES

MANAGEMENT QUARTERLY

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(Prepared at the Naval Postgraduate School. Issuance of this periodical approved in accordance with Department of the Navy Publication and Printing Regulations P-35)

EDITORIAL

In continuation of a student project initiated in the last quarter of academic year 1968-1969, the editorial staff of the Management Quarterly is pleased to present to its readers four course work papers written by students at the Naval Postgraduate School. The papers were selected for their excellence in terms of broad-based appeal, readability, and informative value.

Succeeding editorial staffs will continue to consider for publication all student papers submitted from every education and research department of the Naval Postgraduate School. It is the editors' opinion that a continuation of this expanded approach to the Management Quarterly will benefit the readers by providing a broad spectrum of interesting topics within or related to the general field of military management and/or operations.

In order to ensure a continuous input of student papers to the editorial staff, a Student Mail Center box (SMC 1499) has been designated for Management Quarterly use on a permanent basis. Submission by faculty members of suitable midterm papers, research work, and term projects reports will be accepted at any time. We also believe that the Quarterly offers students the unique opportunity to have their research efforts recognized, and we invite those students who feel that their recent academic efforts might be of interest to others to provide the editorial staff with a copy of the work involved.

The views expressed in the Management Quarterly are those of the authors exclusively, and in no way reflect the attitude or endorsement of the Department of Defense, Navy Department, or the Naval Postgraduate School.

We are particularly grateful to Professor Edward J. Laurance, Commander Jon C. Tibbetts, CEC, USN and Professor John D. Senger for their cooperation and assistance in identifying papers for inclusion in the Management Quarterly. Our appreciation is extended in acknowledgement of the guidance and help provided by our advisor, Lieutenant Commander Robert W. Sagehorn, USN.

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IMPACT OF COMPUTERS ON THINKING

by

Paul S. Lewis

The stress on humans to reorganize their perceptions of reality in order to deal with various factual revelations in our enormously expanding society has forced mankind to seek more advanced and less human means of keeping pace with the changes. The computer has burst so rapidly on today's scene to help fill mankind's insatiable needs for speed, versatility and capacity in the reorganization process that many may now argue that the "computer revolution" that is taking place, which was originally perceived to serve mankind, may eventually "shape" the thoughts of men's minds as well.

The author approaches the subject of computer impact on thinking primarily from the viewpoint of those people who must consciously apply themselves to the use and understanding of the computer - mankind in general. The author concludes with a discussion on mankind keeping the computer in its proper perspective, one that he considers as a "useful tool" and not "as an end in itself."

This paper was submitted to Professor John D. Senger in partial fulfillment of the course requirements for Individual and Group Behavior (MN 2106).

The Editors

Lieutenant Paul S. Lewis received his B.S. from the U.S. Naval Academy in 1972. He is presently a candidate for an M.S. in Computer Systems Management at the Naval Postgraduate School.

INTRODUCTION

Philosophers throughout the ages have delved into the question of how man thinks and what conditions shape his thinking. In every new era of advancement and discovery many humans have tried to reorganize their perceptions of reality in order to deal with various factual revelations. Today, the stress for this reorganization process has accelerated to such an extent that many are unable to keep pace with the changes.

At times new modes of thinking have been simply experimental or transient. At other times a change in the environment has helped to shape man's thinking. Now, in the twentieth century, the computer has arrived. The computer has the speed to process in less than one day the whole of recorded history, and can calculate in microseconds what it took some men years to calculate by hand. Man's mind shaped the computer, and now the computer has the ability not only to serve, but to shape the thoughts in man's mind as well.

This paper will concern itself primarily with those people who must consciously apply themselves to the use and understanding of the computer. It is recognized that although hardly anyone can escape the impact of computer technology entirely, many can dissociate themselves from the least involvement or understanding of it. Therefore, the computer may not directly affect all peoples' thinking process. However, the importance lies in the fact that people who are involved in computer technology are a significant segment of the population in a very wide range of occupations.

THE COMPUTER AND STRUCTURED THOUGHT

Thinking is still an undefined process. I once saw a poster with the word "Think!" for a caption with a picture of a cup of steaming black coffee. These two symbols together gave me a certain image. But what mental process transpired? Was only a cerebral cortex at work? No, there were subtle emotions involved in my image. To pose another example, such as in calculus, one learns to solve certain integrals "by inspection," that is, by simply knowing a rule and applying it through recognition of a type of problem. In both cases, a fairly undefined process occurs in the mind. Whatever it is, it is very natural. There are an infinite number of situations which evoke thought patterns and as

many attending nuances of thought for each situation. However, one can say that thinking occurs on both the conscious and subconscious levels and includes both concrete symbols and abstractions.

Perhaps the easiest mode of thinking to describe, and one upon which the computer is based, is reasoning, or problem solving. Reasoning is a highly conscious form of thought, which is, "...directed, controlled, active, intentional, forward looking, and goal oriented."¹ But thinking invariably leaves the realm of highly conscious reasoning for the realm of abstraction and generalization, a realm which is the antithesis of defining computer operations. Defining computer operations, or programming the computer, forces the individual to think along the highly conscious lines of logic and reasoning, skills which are not easily developed in thinking. Dr. R. W. Hamming illustrates the problem the computer presents to the thinking process:

As an example of oversight, years ago in a calculus class I taught a certain process called "integration by parts," yet, when I now try to give a description to a machine I find that there are many details I do not understand well enough to write out a program for the machine. The students had the impression, along with me, that they understood the process....²

The computer duplicates some very laborious thought processes at blinding speeds and often in a more accurate manner. The computer performs a process which must be completely defined by programming. Such definition requires thought of a very highly conscious nature and such minute definition has forced man to a closer look at a gross breakdown of conscious thought processes.

Most people view the computer as an extremely complex piece of equipment when they confront it and try to make it work. It is complex, but this is due to a dissimilar complexity in human thinking. To illustrate this, one can consider the three concepts of integration, differentiation, and logic and see that these are functions of the human mind and of the computer's repertoire of machine skills. A curiosity arises here. For the machine, logical step-by-step analyses and solution of problems are most straightforward and requires less computer effort. The processes of integrating inputs for modeling or differentiating inputs through decision making processes require

complex application. Every process must also be quantified with numbers.

For man, on the other hand, the integration and differentiation occur on an abstract level without requirements to define all the input stimuli. A human becomes more enmeshed in the rudiments of step-by-step logic which, for him, becomes more laborious than integrating and differentiating multiple complex inputs. So as man, the natural integrator and differentiator, confronts the machine, he is forced to organize his mind with the laws of logic and explicit detail. When working with the computer, humans find themselves in an extremely structured and logical mental environment. Men cannot work successfully in this atmosphere without proper training.

COMPUTER EDUCATION AND THINKING

In approaching the problem of how man thinks, one might accept the idea that man thinks the way his education shapes him to think. So it is important that exposure to computer technology be introduced into the academic routine at an early age, even in elementary schools. Since computer technology is here to stay, education must prepare the minds of people to cope reasonably well in a computerized society. Proper application of computers in the education system will avert much of the confusion which results from sudden bombardment by computer technology.

John Henry Martin, Superintendent of Schools in Mt. Vernon, New York, told a congressional committee: "Public education is the last great stronghold of the manual trades... In education, the industrial revolution has scarcely begun."³ This indictment of the school system suggests that the computer is not a part of education as it should be. The key to familiarity with the computer is interaction with it. Hopefully, such exposure would spare individuals depersonalization and estrangement as they perceive a hostile computerized environment. For those who will find their professions in the computer field, early exposure to computers and knowledge of their diverse applications would hopefully evoke individual creativity. Those who will work with the computer should develop a broad awareness in order to avoid "functional fixedness," that is, mental enslavement to one functional application of computer technology.

To achieve this broadened education, computers should

be involved in more than purely scientific courses. George E. Forsythe discusses a second type of course in the universities which he calls computer appreciation. Such a course deals more with the cultural level and the meaning of computers in today's world.⁴ He states:

I wish mainly to note that every university-educated person must become informed of these contemporary problems. These topics might be included in courses surveying contemporary civilization... But it will take considerable discussion and writing to keep humanistically oriented faculty aware of such fast-moving technical developments. It may be noted, in passing, that large automatic digital computers make ideal teaching machines, and teachers of factual subject matter should be aware of these possibilities.⁵

Teaching computer appreciation, technology, and its application is one facet of influencing thought, but use of computer methods for teaching itself can also affect thinking, specifically when one gets into the area of programmed instructions. B. F. Skinner and his associates developed the technique of "programmed instructions" in the 1950's.⁶ Probably most college students have had contact with programmed instruction or know someone who has. The technique has value for specific applications, such as teaching job related skills in the military or industry. However, since the purpose of the programmed text is to teach by rewarding right answers and specifying a certain behavior, it is much more difficult to apply the technique to academic courses in the humanities.⁷ Charles E. Silberman relates how programmed texts can affect thought:

If programming is used too extensively, moreover, it may prevent the development of intuitive and creative thinking or destroy such thinking when it appears. For one thing, programming instruction seems to force a student into a relatively passive role, whereas most learning theorists agree that no one can really master a concept unless he is forced to express it in his own words or actions and to construct his own applications and examples.⁸

Nevertheless, it is fair to say that programmed instructions are valuable for numerous rote skills as long as

one realizes it is not the panacea for every teaching problem. The total human learning experience must allow for philosophical thinking and exchange. In this, the computer is limited because it works ultimately according to the laws of logic and logic is a closed system. If a person dedicates himself solely to computer usage he dedicates himself to a finite system of reasoning. Human thinking is capable of abstraction, perception, intuition, and values beyond the realm of computer technology.

One of the key points in educating people to think with the computer is to prevent the computer from becoming a substitute for thought. Neophytes may be duly impressed with the capabilities of the computer, but educators must ensure that students maintain a proper perspective of it's role. George E. Forsythe comments on what this role should be: "Technical students and faculty must become aware of the power of computers as extensions of the human mind."⁹ Mr. Forsythe goes further to stress the importance of university students realizing the sociological and intellectual implications of a computer world, and to consider what computers mean for man's thinking, employment, and social organization.¹⁰ He then says:

...it is essential that the technical student become thoroughly conversant with computers during his university period. His reason for studying computing is the same as that for studying mathematics, English, or other basic analytical subjects, to acquire a fundamental background for application to whatever problems he will later encounter.¹¹

Perhaps the ultimate objective of computer education then is to learn to communicate with the computer in order to use it more effectively.

Education must not substitute studies in computer technology for other subject matter, but educators should incorporate computer technology as an added dimension wherever possible, especially in the courses not related specifically to technology. Involvement with the computer forces people to think more logically and George E. Forsythe comments on its possible impact in a math class:

Besides introducing concepts and structure, mathematics courses are expected to teach how to actually solve important classes of algorithms whereby the mathematical statement of a problem is transformed into some representation of its solution.¹²

Though math requires logic skills without the computer, the added dimension of computer information in regular math classes is serving the purpose of teaching students how to communicate with the computer. Students must remain prepared in the basic learning tools of reading, writing, and arithmetic, but in today's world, computer education needs to be a part of these basics.

THE COMPUTER AND QUANTITATIVE THINKING

One major impact of the computer has been in the attempt to quantify much of the rational thinking in various fields of endeavor. To use an example, one of the areas in which this has become extremely evident is in the field of management. In discussing the long range effects of the computer, Fred G. Withington discussed the changes of thinking in management:

Management faces a harder job than before. Instead of sitting back and relying on experience and judgement...it will be forced to look at quantitative relationships between the organization and environment in a degree of detail that has never been previously required.... It is already clear that the younger candidates for management, and recent graduates of business schools, are thinking in terms of quantitative relationships, models, and statistical information far more than their predecessors did.¹³

Quantitative thinking exists in the decision-making process due to the computer requirement that every input and output be quantified in some fashion. Men are thus defining the use of the computer in one sense to model their own thought process and to relieve themselves of occupying some of the traditional roles, such as middle management. But the role of the computer as middle manager almost becomes a practical necessity. It is nearly impossible for the human mind to organize and judge the over-abundance of data the computer produces. Only the computer can do it quickly and accurately.

Though quantitative analyses can allow for more informed decision-making in the management environment, there may be negative side effects. Again Mr. Withington states:

Once decision rules have been established which optimize the elementary decisions of the organization, there will be a natural tendency to rely totally on these decisions--to assume that the superior wisdom of those who established the rules, and the superior capacity of the computer system in administering them, leaves no room for judgement or interpretation on the part of the agent on the spot.¹⁴

It is evident that despite the computer's tremendous potential to support human thinking and intelligence, it can most certainly narrow one's vision.

The question then arises as to whether the computer stifles creativity since using it requires such highly structured thinking. The computer can hamper creative thought; but this need not be so. One way a manager can "lose sight of the forest because of the trees" is his total dependence on a computerized decision-making model. Or, he may totally adhere to computerized information from a data base management system. Another example where one's thinking is locked into the computer's way of accomplishing a task is the case where a subordinate suggests an alternative and the boss says, "The computer can't handle that." The boss appears to be functionally fixed to the already established operating system.

Some computer addicts are oblivious to the creative process. If one becomes a strict proponent of "facts and figures only" decision-making, which computer technology makes very attractive, the capacities for judgement and intuition are completely wasted. If creative thought can, in reality, be reduced to facts and figures, it is usually only in the final analysis. If top management tells the person with an original idea that it "sounds good" but to present the facts and figures first to justify it, they may have missed the golden egg. This is not to say that such a situation exists in every business that relies on computer information. It just means that proper judgement and intuition have as much of a place in thinking in the computer environment as they did prior to the computer age. Part of the problem exists because of the expense of incorporating a computer management information system and the reluctance to use extra dollars for flexibility in the system. Thus, the business finds the computer driving almost everything.

Despite the structured environment imposed on users

of the computer, creativity is feasible. Edward Venache discusses the problem of creativity in the organization.

Important is promoting the disciplined gearing of expression to desired outcomes, that is, the mastery of appropriate skills and their direction toward creative products. Spontaneity is not solely opposed to conformity but may also be inchoate without guidance toward significant goals. Thus we face two problems, not solely the release of spontaneity, but also its effective utilization. Development entails both release and direction of creative potential.¹⁵

One cannot blame the computer or the organizational structure for a lack of creativity, but one can blame the obtuse management depicted in the prior examples. While creativity among computer personnel and management will exist within some framework, this is not as restraining as it may seem.

Popular concepts of creativity often deny that creative thinking can occur in a structured environment. Popular belief that divergent thinking, with freedom of impulse and absence of restraints, results in creativity. John G. Nicholls refutes this, saying research does not bear this out, that just because something is original does not mean it is creative. He says that true creativity is characterized by task commitment and guided primarily by the materials with which one is working.¹⁶ There is truth to this when one considers the refinement of computer technology itself. So it seems that it is not computer technology which would stifle creativity, but those who would control the use of the computer.

MAN AND MACHINE COMBINATION

One of the measures of intelligence is the amount of knowledge a person has at his command. Likewise, one of the measures of the computer is its ability to retrieve information. This information may be obtained from data stored within the computer, or result from calculations the programmer feeds to it. If computers are applied properly, they can serve to escalate the productivity of the over-all thinking process by making vast reservoirs of information available at the right time. In fact, they are being used for that today in a very effective manner. Chris Mader and Robert Hagin supplement this idea in discussing the importance of computer information systems:

...packaged programs can act as a form of canned expertise, so that the expert specialist's knowledge may be captured, in part, in a decision-aiding program or model.¹⁸

As stressed in the previous section, man is not being relieved of his responsibility to think on his own. However, with the computer he can now process much more information and in a fraction of the time it previously took.

J. C. R. Licklider discusses a "man-computer symbiosis," or partnership of man and machine with the purpose of drawing out the best possible thinker. The ultimate purpose of such a symbiosis is not to work on pre-formulated problems with pre-determined sequences, but to be able to meet the unknown and to solve problems.¹⁹ Mr. Licklider goes on to state his idea of the work of such a partnership:

...operations that fill most of the time allegedly devoted to technical thinking are operations that can be performed more effectively by machines than by men. Severe problems are posed by the fact that these operations have to be performed on diverse variables and in unforeseen and continually changing sequences. If these problems can be solved in such a way as to create a symbiotic relationship between a man and a fast information-retrieval and data-processing machine... it seems evident that the cooperative interaction would greatly improve the thinking process.²⁰

Martin and Norman, in The Computerized Society,²¹ discuss man-machine capabilities further. Despite the extension of human thinking capabilities with the computer, there are still many types of thinking that the human does best. But the best way to carry out certain difficult operations and processing is through the man-machine combination. For example, language translation is a task where human processing is very slow, but computer processing is fast, however inexact. The human is needed to correct machine imperfections.

As mentioned earlier in the paper, humans think most naturally on the integrated level. To apply complex logic requires extreme conscious concentration. Unfortunately at times human inhibitions and distractions hinder the

process. Therefore, the symbiosis of man and computer can also be viewed as providing man with an artificial yet powerful adjunct in memory and concentration. The computer completes the problem solving process without inhibitions in micro-seconds. Such symbiosis does not necessarily cause a change in thinking, but it can expand the capacity for intellectual productivity, primarily through speeding up many traditional thought processes.

Human communication with the computer is central to the man-machine symbiosis concept. Thinking precedes meaningful communication. Thoughts may be verbalized or symbolized for communication with another human. However, one thrust in today's world is to learn how to translate the phenomenon of human communication processes into quantitative terms in order to use the computer more effectively. The computer is in nearly every field of society since it is such a great facilitator of information flow. Since so much of the communicating with the computer must be of a quantitative nature, applied thinking in these fields is developing along quantitative lines.

Engineering psychologist, Alphonse Chapanis of Johns Hopkins University, worked on human communications and the computer. He says:

If we could specify in precise quantitative terms exactly how we hear and recognize speech, engineers would have no difficulty in building a speech recognition machine... It is our inability to describe our behavior fully in exact mathematical terms that is the chief obstacle standing in the way of our attempts to design conversational computers.²²

It seems, then, that Mr. Chapanis views such a mathematical model as the break-through that could truly adapt the computer to the human way of thinking and communicating. He comments further on the present failure to match the computer to the needs of the people who must use it:

However apt it may be to say that the interaction between man and the computer is a conversation, we have to add, in all fairness, that most of these conversations are stilted, esoteric, and frustrating. Perhaps even more important, communication with computers requires thought patterns and processes that are, at best, unfamiliar for most people and, at worst, unnatural.²³

Thus, if one can describe communication in quantitative terms it would appear to be a major step towards combining man and machine into a viable and productive unit. Furthermore, such a definition of human communication may develop a deeper insight into thinking than at the highly conscious level. Man seems to be thinking more and more about "thinking" itself as he evolves his interactive process with the computer.

CONCLUSIONS

Computer technology has opened up a new world to the mind. This has occurred with respect to access and collection of information, calculation of complex problems, decision-making, simulation models, plots, graphics, and in stressing detailed logical analysis, to highlight a few areas. Without the computer, man would not have reached the moon, nor could he venture into areas where some of the answers to man's future needs may lie. But what will the philosophers and historians say of this age? They may speak of it as an age when man defined everything in quantifiable terms and had to adapt his thinking towards finite and formulated systems of thought in order to communicate with the computer. Dr. R. W. Hamming said the following:

The Computer Revolution is often compared with the famous Industrial Revolution in importance and scope. The Industrial Revolution effectively released man from being a beast of burden; the Computer Revolution, will similarly release him from slavery to dull, repetitive routine. The Computer Revolution, however, is perhaps better compared with the Copernican Revolution or the Darwinian Revolution, both of which greatly changed man's idea of himself and the world in which he lives.²⁴

The important question which arises is whether man will keep the computer in proper perspective.

Will men use the computer as a beneficial assistant? Or will the computer become an insidious institutional monolith which drives an impenetrable bureaucracy? In the latter case, man would be only a subservient, peripheral device, and his thinking would be non-productive. Hopefully, this would not occur. The reason is that economics and high cost are what often enslave people to an unchanging system. Now, computer

production is continually decreasing in expense. In addition, the modular concept; i.e., a greater distribution of data bases and variable access to these from different systems and places allow man to be more flexible in his use of the computer.

In the final analysis, the thrust of the computer age for thinking is to find the optimum combination of man and machine for mental productivity. During this search, it is paramount that man views the computer as a useful tool and not as an end in itself. Man must maintain and further develop his powers to think on the abstract and intuitive levels. Man must remember the arts and the spirit. To do so is to remain human.

FOOTNOTES

1. Gardner Lindzey, Calvin S. Hall, and Richard F. Thompson, Psychology, (New York, 1975), p. 272.
2. R. W. Hamming, "Intellectual Implications of the Computer Revolution" in Perspectives of the Computer Revolution, (New Jersey, 1970), p. 376.
3. Charles E. Silberman, "Technology is Knocking at the Schoolhouse Door" in The World of the Computer, (New York, 1973), p. 204.
4. George E. Forsythe, "Educational Implications of the Computer Revolution" in Perspectives of the Computer Revolution, (New Jersey, 1970), p. 379
5. Ibid., p. 385.
6. Silberman, pp. 214-215.
7. Ibid.
8. Ibid., p. 215.
9. Forsythe, p. 380.
10. Ibid., p. 381.
11. Ibid.
12. Ibid., p. 384.
13. Fred G. Withington, "The Long Range Effects of the Computer" in The World of the Computer, (New York, 1973), p. 102.
14. Ibid., p. 114.
15. W. Edgar Vinacke, The Psychology of Thinking, (New York, 1974), p. 374.
16. John G. Nicholls, "Creativity in the Person Who Will Never Create Anything Original or Useful" in American Psychologist, Vol. 27, No. 8, Aug. 1972, pp. 721-724.
17. Chris Mader and Robert Hagin, Information Systems: Technology, Economics, Applications, (Chicago, 1974), p. 369.

18. J. C. R. Licklider, "Man-Computer Symbiosis" in Perspectives of the Computer Revolution, (New Jersey, 1970), p. 310.

19. Ibid.

20. Ibid.

21. James T. Martin and Adrian R. Norman, The Computerized Society, (New Jersey, 1970), pp. 47-48.

22. Alphonse Chapanis, "Exploration in Human Communications" in American Psychologist, Vol. 26, No. 11, Nov. 1971, p. 950.

23. Ibid., p. 955.

24. Hamming, p. 370.

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U. S. ARMS SALES AND THE LONG TERM NATIONAL INTERESTS

by

Alvah L. Rogers

U.S. arms sales have been the subject of continuing debate over the years. The author examines the reasons - past and present - which have been offered in support of U.S. arms sales and as an academic exercise offers opposing views of why "hard, cold national interests" demand cessation of arms sales to foreign governments.

The potential of preventing nuclear proliferation by providing nations with conventional arms is discussed followed by a counterpoint argument concerning self-sufficiency of nations against their opponents. The author poses the question: "Does...self-sufficiency serve as an acceptable justification for providing arms...?" and then moves into the issues of internal security and human rights as strong U.S. arguments for providing arms to dictatorships and various repressive leaders in the name of preventing the spread of communism. The paper concludes with a list of policy considerations representing radical departure from past U.S. arms transfer policies.

This paper was submitted to Professor Edward J. Laurance in partial fulfillment of the course requirements for Problems of Security Assistance and Arms Transfers (GV 4140).

The Editors

Major Alvah L. Rogers, USAF, received his B.S. in Political Science from the University of Washington in 1961. He is presently a candidate for a Master of Arts in National Security Affairs at the Naval Postgraduate School.

U.S. ARMS SALES AND THE LONG TERM NATIONAL INTEREST

"When I was turning over in my mind what I might say that would be helpful, and I have to be very careful because of my past responsibilities in connection with this matter - I arrived at what may seem to you a half-baked conclusion, that the best way would be to decide what is the idealistic solution.

Now, what is the idealistic solution to this business? After you have decided on that, we will mold that, trim it down and put it on a practical basis; there would be many amendments, many modifications, and some introductions. You have got to keep the idealistic in mind, there is the spiritual involved in this thing."

- General George Marshall, speaking to a group of distinguished "China Hands" called together on 6, 7, and 8 October, 1949 by Secretary of State Acheson to propose an American foreign policy toward the new China of Mao Tse-tung.

INTRODUCTION

The time is near when it will be necessary to halt all sales of American-made weapons of war. The arms transfer process has evolved to a point at which every national interest argument in support of arms sales has been effectively disproven. Present arms sales continue, based upon outworn "national interest" pronouncements which no one is actively, publicly examining in terms of currency and validity. This paper examines the reasons - past and present - which have been offered in support of U.S. arms sales and offers opposing explanations of why hard, cold national interest demands cessation of arms sales.

The history of arms traffic is at least subliminally known by most people. The detail of attempts at arms control, such as the Nye Commission of the mid-1930s and the recent, often conflicting, Congressional attempts to limit arms transfers, is not generally known, nor is such knowledge necessary to the following exposition. What one must know, in general, is that for over forty years American governmental decision-makers have consistently acted in response to an inner knowledge that American

participation was not desirable, but, for an enormous variety of reasons, those same decision-makers have stopped well short of any action which would have been effective in removing the U.S.A. from the arms trade process. Some of our reasons for spreading lethal arms were good ones at the time. Providing American arms to our post-World War II allies - on a grant-aid basis - can be seen as a logical service to American interests.

However, far more often our decision-makers looked at arms traffic as an unavoidable phenomenon and they limited their action to placing constraints upon only the more flagrant and notorious of arms deals. During this forty years, Congress has shown an ever-increasing interest in restraining our involvement in arms traffic, but even this increased interest has produced no landmark legislation to definitively address the issue. Instead, Congress has produced eyewash restraints such as the Nelson Amendment, by which it granted itself authority over arms sales. To date it apparently has not yet chosen to exercise that authority. The Arms Control and Disarmament Agency, in which one would expect to find an anti-arms traffic institutional bias, has been legislatively tasked with commenting impartially on the impact of arms sales, but it has responded with favorable recommendations in 95% of the cases to come before it for consideration. The basic issue of today - whether arms sales serve the national interest - is simply not addressed.

As this increasing legislative concern and restraint have developed, the liberal legislators, i.e., those in the forefront of action to curtail arms sales, have hoisted themselves upon their own moralistic petard. Having fought their way through many legislative skirmishes they now find themselves faced by petrodollar giants who (1) can afford arms and economic/social programs, and (2) have several things America both needs and has come to rely upon. The liberals instinctively know the oil-rich prospective purchasers simply present a modern variant of the historic arms sale conundrum, but they find that their conventional moralistic attack is stopped cold by the equally conventional argument, backed by forceful balance of payment, defense cost reduction, and defense industry maintenance considerations, that trade and profit, in the absence of a clear and unmistakable, strongly objectionable aspect, also serve the national interest.

When specific arms sales questions arise, defense

industrialists flex their political muscle, employment considerations are weighed - along with re-election thoughts - and finally the clinching argument wins the day, to wit: If America doesn't sell arms, then someone else will. In short, the moralistic argument fails. Seasoned Foreign Service officers are sometimes known by cold observation that "if your only reason for a foreign policy decision is a moral one, you probably have no valid reason at all." Liberal legislators, who tend to shy away from such a callous and politically unproductive conception, would do well to ponder its implications for the arms sales question. If moralism fails, as it clearly has, and the strong suspicion lingers that arms traffic is not a "proper business," then why not look for (and propose) solid reasons why the arms merchants should finally be pensioned off, and dispense with the endless, ineffectual piece-meal restrictions on arms sales?

For example, Leslie Gelb¹ has recently offered "some very modest proposals" to further restrict arms sales in which he reviews and criticizes nine of the most common justifications for arms sales. Mr. Gelb's critique and his proposals are perceptive and cogent, but they suffer a fatal failure of will to attack the problem head-on. He pleads inability to make useful generalizations about large, recent arms sales to Saudi Arabia and Iran "because there are too many exceptions,"² but he does zero in on what should be our central concern.

Decisions to sell or not to sell will be no better than the policies that embrace them. These policies should look to long-term effects and should not be at the service of momentary "needs."³

Given the multiplicity of "reasons" why we should sell arms, Mr. Gelb's nine points, which were taken with acknowledged conceptual liberty from the list of considerations Secretary Kissinger offered to the House Committee on International Relations hearings on the International Security Assistance Act of 1976, provide as good a springboard as any other for reconsidering the long-term American national interest. They are, in no logically discernible order:

1. Preventing Nuclear Proliferation
2. Self-Sufficiency
3. Internal Security and Human Rights

4. Alliance Relationship with Industrialized States
5. The Strategic Balance of Power
6. Regional Balances of Power
7. Conflict Resolution
8. Base and Transit Rights
9. General Political Influence

PREVENTING NUCLEAR PROLIFERATION

The thrust of this argument is that we can prevent sovereign nations such as Pakistan and Iran from acquiring a nuclear capability by supplying them with conventional arms sales. France offered to sell to South Korea, Pakistan and Iran nuclear reprocessing plants which produce weapons-grade plutonium from the spent fuel from nuclear reactors. Secretary Kissinger used conventional arms sales as a manipulative tool to forestall purchase of the reprocessing plants. Mr. Gelb faults Kissinger's agreement to sell A-7s to Pakistan as a precedent-setting example of bribery to avoid blackmail and conjures up visions of many developing countries threatening to buy reprocessing plants in order to secure conventional arms which would otherwise be denied them. Mr. Gelb's criticism is valid, but stops short.

The goal of preventing nuclear proliferation is logically valid. Certainly, at least delaying acquisition of nuclear weapons by politically unstable developing countries would serve the American national interest. However, the trade-off of conventional weapons sales in the hope of accomplishing either of those goals is justifiable only to the extent that a predictably certain long term impact can be made upon the nuclear potentiality of the recipient countries. Although it should be obvious that neither Pakistan nor Iran surrendered their sovereignty or their future nuclear policy prerogatives in exchange for A-7 or F-16/F-14 aircraft, we have chosen to believe such to be the case. Pakistan has mastered the art of playing off the U.S.S.R., the U.S.A. and China (PRC) against each other to forward her own goals and can be expected to continue exercising the art.

The Shah of Iran has increased purchases of Soviet nuclear power technology, and he is allowing Soviet ships to visit Iranian ports and Soviet photo-reconnaissance flights over his country.⁴ The Shah's determination to act with sovereign independence is an undisguised fact.

And yet, we expect to hamstring his acquisition of a nuclear capability. It should be patently obvious that any assurances of nuclear forbearance we receive must of necessity be highly problematical of fulfillment.

Another question implicit in the "blackmail" aspect of this argument is whether the presumed purchaser seriously intends to acquire a nuclear capacity. For example, the Shah, whose veracity and sincerity is the presumed basis for our apparent open-ended commitment to sell him conventional arms, denied in a Newsweek interview any intention of ultimately acquiring a nuclear arsenal.

Q. Many people are suspicious that you ultimately hope to build a nuclear arsenal.

A. It is just the opposite, as a matter of fact. Some people might (think) that maybe a safety device for a small country is to have atomic weapons, as the best guarantee not to be attacked. But I have adopted just the opposite (position). If you want to defend your country, defend it by conventional means. If there is somebody wishing you ill, he will have to use atomic weapons. And it won't be so easy in this world.... I don't consider myself so weak as only to depend on a few silly atomic bombs, but on the contrary, on a strong, modern hard-fighting conventional force.⁵

Now, we can't have it both ways. There either is or is not a serious intent to acquire nuclear capability, and if there is no such intent the nuclear nonproliferation argument is not germane to the sale of conventional arms.

The insufficiency of the argument that conventional arms sales will prevent or materially delay nuclear proliferation is more apparent if one projects the presumed dread consequence of our not allowing the sales. Just suppose, for purposes of argument, that either Pakistan or Iran had opted to buy the nuclear reprocessing plants. How long would it be before either country could produce a threatening quantity of nuclear weapons and an effective delivery system which would pose a credible threat to the United States national security?

Paul Erdman has postulated in The Crash of '79⁶ a power-mad Shah holding the world at ransom with a handful of nuclear bombs. It is good fiction, and a popular theme given the recent "nuclear terrorist" concerns. It does not, however, reflect the real world of international nuclear politics. A sovereign country can not act with the same impunity a terrorist enjoys. The People's Republic of China exploded its first nuclear weapon in 1964 and has actively emphasized its nuclear program since that date. Nonetheless, her nuclear capability continues, thirteen years later, to be little more than a minor annoyance to its "preferred enemy," the U.S.S.R. Given the discrepant sizes of the two forces, China has no option but to base her nuclear strategy on the comparatively passive concept of ultimate national defense. China, like the superpowers, must face the likelihood of national suicide as the logical outcome of first use of nuclear weapons in war. As would be the case with Iran and Pakistan, China would face overwhelming odds in any nuclear exchange.

The drawback to employment of nuclear weapons, as the superpowers have learned, is that one must first be certain of one's own national survival, and to date no country has acquired a sufficiently reassuring defensive and first strike capability. If the Shah were to "go nuclear" it would require many years and massive external technological cooperation and assistance before he had anything approaching a useable weapons capability. And if Iran, with all her wealth, would face a formidable problem, Pakistan's potential for nuclear force development is simply ludicrous. In either case, the goal of delaying the spread of nuclear weapons will be met by the industrial and economic imperatives inherent in development of the weapons.

The foregoing should have made it clear that the nuclear nonproliferation argument is a sham. It is only the most recent example of sophistry in justifying arms sales. The true underlying argument is the same one which will be seen to appear time and again. Sales = profit. Profit in trade = national good.

SELF-SUFFICIENCY

Countering the self-sufficiency argument for arms sales provides one of the most, if not the most, nettlesome philosophical challenges to opponents of American arms sales. Mr. Gelb's selection of Taiwan, Israel and

South Korea offers pointed illustrations of the problem. He notes that true military self-sufficiency against all opponents is a rhetorical rather than real goal of policy, and focuses upon the actual goal of self-sufficiency against each recipient country's regional enemies. The ironic nub of the self-sufficiency argument is that arms sales proponents offer moralistic reasons for the arms sales. Liberal legislators find themselves cornered by their own brand of moral precepts: a nation should have the right to secure weapons it needs to defend itself against aggression; America, by its past action, has a moral responsibility to help these nations defend themselves.

Pragmatic arguments follow close behind: it is better to arm these nations for their own defense than to send American troops for their defense; the world looks to us to support our allies, and our national credibility hinges upon our continued support of client nations identified with America; Communist expansion must be contained for the good of humanity. These arguments have been convincing reasons for support of Israel, Taiwan and South Korea, and they are unquestioned articles of faith as regards our NATO allies and Japan. Arms sale proponents do not overlook industrial considerations for such sales, but find no need to employ them because of the common acceptance of the logical and historic basis for continuing the sales.

Mr. Gelb recognizes this situation and his critique of the self-sufficiency argument is restrained. He does note the anomalies which require us to tether our allies so as to preclude their making first and aggressive use of arms we have provided. He also points to American efforts to encourage co-production of F-5Es as an advantageous factor if a future administration were to abrogate the defense treaty with Taiwan, and acknowledges the difficulty which would support for Taiwan creates when we seek to advance our relations with the People's Republic of China.

Despite all the foregoing quibbles and qualifications, the present writer sees the heart of the self-sufficiency argument for arms sales as a question of whether support for our free world allies necessarily includes the sale of arms and concludes that it does not. Taking the most difficult of the examples first - our NATO allies and Japan - it can be seen that sale of American arms is a questionable benefit to the recipients.

NATO ALLIES: Two of the major weapons issues, the F-16 and the NATO tank, illustrate the point. In both instances, European defense industries have developed effective competing weapons systems. NATO-wide purchase of the European designed weapons would have stimulated both European defense industries and the European economies. However, America pulled out all the stops to push the final decisions in favor of American industries. Our NATO friends finally and resentfully have succumbed to colossal "Buy American" pressure in the case of the F-16. Obviously, our concern was not self-sufficiency for Europe. We sought to achieve substantial profits at the expense of long term regional self-sufficiency and perhaps at the greater cost of shamelessly exposing our real motivations.

JAPAN: In the aftermath of the Nixon Doctrine, the possible rearming of Japan to fill the power vacuum created by American withdrawal became a major concern of Asian nations. The Shanghai communique produced an added sense of urgency which reached panic proportions when South Vietnam and Cambodia fell to the communists. Fortunately, the "Nixon shocks" alerted Japan to her potential vulnerability and she responded, not with the feared resurgence of militarism, but with an immediate step-up in her diplomatic and economic relations with her neighbors. The push for Japanese rearmament has been far more American-inspired than Japanese-inspired. The economic advantage of having to support only a miniscule self-defense force has not escaped Japanese notice.

Self-sufficiency for Japan - against either the U.S.S.R. or China - is a Chimera. Providing pain-exacting island defense against conventional invasion is possible, but Japanese industry is fully capable of providing the necessary armaments for such a defensive posture.

The large-scale purchase of American arms must be recognized as a highly destabilizing factor politically. It threatens China and Japan's Second World War victims psychologically, and at the same time it impedes the advance of Japanese-inspired and directed industrial development throughout Asia. America's long-term interest, vis-a-vis Japan, lies in maximizing Asian economic development through Japan's good offices. Attempting to establish, through American arms sales, an impossible defensive self-sufficiency for Japan can only impede the Southeast Asian nation's acceptance of close economic relations with Japan.

TAIWAN and SOUTH KOREA: These two countries offer unmatched examples of the philosophical complexity of arms sales. A host of considerations arise: human rights; propping up dictators; communist containment; past actions - both right and wrong - and their implications for future American policy. Our eventual course in South Korea is beginning to appear with increasing clarity. Human rights issues are slowly forcing a reduction in American support. America's future policy toward Taiwan is less clear, but the zest for normalizing relations with the PRC has pushed the possibility of our abandoning Taiwan entirely out of the realm of the philosophical/theoretical and into the world of real possibility and active consideration. Senator Mansfield closed his legislative career with a thoughtful, considered, and forthright call for the recognition of Peking in compliance with the Shanghai Communiqué.⁷

Conventional policy formulations for South Korea and Taiwan proceed on the assumption that both countries will fall to communist aggression if America does not provide them with arms. Further discussion tends to cease at that point, and the formulations may well be correct. However, other arms suppliers are available to fill the gap. And, it should be noted that in both cases we are already moving to abrogate our open-ended commitment to the countries. Given that both possess substantially developed industrial capacities, how long is American obligated to provide special support for these regimes? North Vietnam, from 1945 to 1954, demonstrated what a determined populace can achieve with basic weaponry in throwing off unwanted and overwhelming external military force. It surely is obvious that America has been adequately generous with both countries.

American national interest can be most easily perceived if one views the prospect of either of these nation's internal subversion or external attack. There can be little doubt that if their governments were brought down it would be a strong indication that they lacked the wholehearted support and dedication of their people. Is it in America's national interest to prop up governments which lack popular support, simply because they are "anti-communist"? We answered that question affirmatively for ten years in Vietnam. That our answer was the wrong one is one of the most unchallengeable lessons we have learned from the devastating Indochina experience. We must apply this hard-won knowledge to the remaining areas of Asia and the world in which we

are continuing to operate on the dubious notion that any noncommunist government is good and any communist government is bad.

The national interest of America, in the long term, will be better served by our not supporting those governments which, for whatever reason, are unable to retain a willing, patriotic participation by their citizenry. That same citizenry will eventually turn to a more acceptable government, and it can safely be assumed that their attitude toward the nation (America) that propped up their oppressors will be less than favorable. In sum, regional self-sufficiency in South Korea and Taiwan is a passe argument for arms sales by America. If their present governments succeed, we can take pride in our contribution. If they fail, we can be spared the opprobrium of having, as in South Vietnam, carried a government long beyond the needs or wishes of its citizenry.

ISRAEL: But why not, one asks, approve arms sales to Israel? Surely, Israel is a government which is supported by its people and steeped in the liberal Western tradition. Our policies toward Israel, like those toward South Korea and Taiwan, are beginning to reflect their probable future trend. Congress has approved the Foreign Military Assistance package for Israel and, in a time of prospective termination of military assistance/grant-aid, has waived Israeli payment on 50% of the approved credit sale. This procedure, viewed askance by certain Congressmen, does reflect a genuine feeling of moral/national interest, kinship and responsibility. It is not free from the confusing taint of "profit" or industrial motivation, but it does provide a beacon for less complex future considerations of when the national interest will best be served by arms transfers. If the American Congress, in a time of fiscal constraint, feels strongly enough about an arms transfer serving the national interest to pay for the transfer, we can more safely assume that extraneous private and industrial interests are not the primary motivators behind the transfer. Does regional self-sufficiency serve as an acceptable justification for providing arms to Israel? For sale - no. By gift for self-defense - yes. But then, one asks, why not sell the arms? The answer lies in the forthright legitimacy of the closely-structured grant-aid concept. If our interest is genuinely

involved with Israeli survival, then we must act upon the plain knowledge that Israel's economy is strained to the limit by her existing defense requirements. The money she pays for our weapons can more productively be spent on other actions to strengthen both her military forces and her international and domestic economic posture. Selling arms to Israel in fact can be seen to contravene the United States' best interests.

INTERNAL SECURITY AND HUMAN RIGHTS

The Internal Security argument has served for a good number of years as a justification for providing arms to dictatorships and various repressive leaders in the name of preventing the spread of communism. Congress has now mandated an end to military aid to regimes that demonstrate consistent gross violations of human rights. The evolving application of this rule suggests an increasing stringency of application for the future. Early in the Carter administration, Secretary Vance told a Senate committee that the administration had decided to reduce foreign aid to Argentina, Uruguay, and Ethiopia.

This was the first time in memory that any administration had publicly announced a reduction in foreign aid because of human rights considerations. Vance said the issue of balancing foreign assistance with human rights considerations was "a very difficult task." He said it had to be carried out on a country-by-country basis. The United States, he said, runs the risk of appearing hypocritical in cutting aid to one friendly nation and maintaining it with another even though both nations might be equal violators of internationally recognized human rights.⁸

By March 17, 1977, five Latin American countries, Argentina, Brazil, Uruguay, Guatemala, and El Salvador, incensed at the U.S. Department of State investigation of how indigenous political prisoners are treated and other human rights matters for all countries receiving U.S. aid, had announced rejection of further U.S. aid. Brazil had earlier given "a one-year notice for ending its 25 year-old aid agreement with the United States, saying the human rights report represented an intolerable interference in its internal affairs."⁹ "The five countries refused to accept a total of nearly \$74 million in military sales credits in response to

publication of the department's human rights survey."¹⁰

In summary, concern for human rights, as a motivator of arms transfers (to prevent communist expansion,) has been transformed into a deterrent to arms aid/foreign military assistance to noncommunist countries which violate human rights. In a major speech to the United Nations, President Carter acknowledged that:

The United States has become one of the major arms suppliers of the world. Carter also pledged initiatives to reduce the spread of conventional arms throughout the world, and said he will press for agreements among producer and consumer nations on that issue.¹¹

His comments, coupled with the foregoing constraints on aid and foreign military assistance, carry strong implications for the weight which human rights considerations can be expected to carry for future arms sales. Concern for human rights, once actively incorporated into American foreign policy, will not easily be overridden by defense industrialists seeking continued profits. Iran's turn to endure the human rights spotlight will provide a crucial test of Carter's determination. As Charles W. Yost succinctly said in an article on human and sovereign rights, "Violations are violations wherever they occur."¹²

ALLIANCE RELATIONSHIPS WITH INDUSTRIALIZED STATES

Mr. Gelb makes the point that "the policy toward NATO allies and Japan is and should be virtually open-ended, the need is for standardization of arms and equipment ... The \$2 billion sale of F-16s to four NATO countries provides a good model (emphasis added) to go further. Belgium, the Netherlands, Denmark, and Norway will produce 40 per cent of the 348 F-16s they have ordered for themselves, plus 10 per cent of the 650 ordered by the United States Air Force, and 15 per cent of all F-16s made for export. At the same time, however, each component produced in the four will also be made in the United States."¹³

Herein lies a concept which, with forward planning and intra-alliance agreement, could meet economically both the critical need for standardization and more directly contribute to regional self-sufficiency,

industrial independence, and economic stimulation of each participating country. The multinational research and development of competing designs is not only economically wasteful, but also it generates intro-alliance divisiveness and over-reaching. As was the case with the Main Battle Tank, the procedure offers strong temptations for each nation to opt for its own design, with a resulting failure of standardization and total lack of economic efficiency.

American leadership could far better be manifested by the harnessing of R&D technology in the design stage, with proration of R&D costs and pre-planned co-production/licensing agreements to encourage local production. The purpose of weapons and new weapons systems within an alliance is the projection of an affordable maximum of military force. To treat weapons as mere objects in an international competition for national economic advantage defeats the alliance's best interest. America's economic gain will be France or Germany's economic loss, and to that extent the alliance is weakened.

THE STRATEGIC BALANCE OF POWER

This justification pertains to the potential impact of an arms sale upon the Soviet-American world balance. Mr. Gelb notes that most sales do not fit into this category, and selects proposed sales to Yugoslavia and the PRC as prime examples while looking askance at any long term benefit from sales to Kenya and Zaire. In the latter cases he observes "these arms sales would only have the effect of putting the United States in a position of having to make decisions about the future of these countries that it did not have to make before."¹⁴ Four months after Mr. Gelb wrote his prophetic warning, one opens the newspaper to read:

Zaire Seeking More Military Aid From U.S. The Carter administration faces a tough foreign policy decision in dealing with a new request from Zaire for military aid, including ammunition from U.S.-made weapons supplied to the African country in years past... the Carter administration is reluctant to meet Zaire's military needs and is looking for another way to provide the material.¹⁵

David Broder, after having reviewed the arguments for an American intervention in Africa, definitively

commented in an article on the Risks of an African Crusade:

That's the argument--as appealing now in Southern Africa as it was 16 years ago in Indochina. And once again, it rests on a fateful assumption--so easy for officials of a new administration to accept. It is that America can manage the world better than any other nation, and that the administration now in power can achieve what its predecessor did not even dare attempt. It was that same fatal hubris--the sin of pride which David Halberstam described in The Best and the Brightest-- One has the sense of having lived through this before, and of paying in blood and treasure and political bitterness for that misdirected, moralistic urge to determine the future of the whole globe.¹⁶

It seems anomalous that one need even discuss why arms sales to the PRC or Yugoslavia contravene the long term American national interest. Playing some Machiavellian arms game with either country with a goal of enhancing our relative position vis-a-vis Moscow is a gambit fraught with surprises. Mr. Gelb noted administration vacillation on sale of two Cyber 172 computers to Peking. Such vacillation is indicative of how unclear our goals were and how uncertain of fulfillment. No long term gain is likely to accrue from such uncertainty. Edmund Taylor notes that, "The classic excuse of the merchant of his own countrymen's death is the one Krupp gave the kaiser: How could he know that today's friendly customer would be tomorrow's enemy?"¹⁷ How much more obvious it should be that today's ideological opponent is a prime candidate to be tomorrow's opponent as well. The logic is so plain that one need not even mention the illogic of denying arms to repressive non-communist governments and selling them to repressive communist governments. That the issue must be addressed at all highlights the lengths to which we have gone to justify arms sales.

REGIONAL BALANCE OF POWER

The Regional Balance of Power argument has seen increasing popularity in justifying sales to the oil-rich countries. Mr. Gelb makes the point that the real

justification for these sales is access to resources - oil, in particular. He turns then to criticize the "de facto treaty" aspect of the sales, based upon the continuing need for a sizeable contingent of American civilian contractors in-country to maintain hyper-sophisticated military equipment, and posits the Shah's holding the contractors as hostages to insure American support for whatever policy position he might decide to adopt.

Paul Erdman, in The Crash of '79,¹⁸ has adopted an even less charitable view of the Shah's power potential and possible goals. Mr. Gelb also notes the hazard inherent in the oil-rich nations' use of their enormous weapons acquisitions as a storehouse for massive transfers to other states - which might then employ them against Israel. The Regional Balance of Power rationale also is vulnerable to the same telling argument which David Broder raised concerning the strategic power balance in southern Africa, with the added moral complication addressed earlier with regard to Israel, South Korea, and Taiwan.

Each of these cases requires individual analysis, but, as a general rule, it would appear that our long-term interests would be better served by what Ambassador Moynihan called a "benign neglect" of many regional conflict situations. Change is inevitable, and pitting American strength against all the forces of change throughout the world is both vain and beyond our military capabilities.

CONFLICT RESOLUTION

Mr. Gelb accurately notes that the notion of "arming to parley" is honored most often in the breach, and points out the two recent examples of Turkey, in which a cut-off of American arms did not induce the desired policy result, and Israel, where massive arms transfers did contribute to a lessening of tension.

If the argument that we can reduce or eliminate conflicts by providing arms to one or both of the contenders is to stand, we must believe that the newly-supplied arms will not be used in a future conflict of equal or greater intensity. In other words, the resolution achieved must be a long term one. The history of the Arab-Israeli confrontation does not suggest a promising prospect for peace in the long term, and yet it is used by Mr. Gelb and others as a prime example of why we should provide arms to

belligerent nations. Once again, we can observe at work the American vanity that we have an historical and moral responsibility to manage the world's affairs.

Suppose, for example, that we had allowed the Israelis to wrap up their Sinai campaign against the Egyptian Army. Would future conflict have been any more likely? Would Russia have blinked or would she have carried out the threatened intervention? The point is that we do not have answers to those questions now, nor did we at the time of our earlier decisions. Furthermore, we did not have any assurances that providing arms would induce a more amicable settlement. Despite the uncertainties, we took a positive action to usurp Israeli prerogatives. For once, since the Second World War, we find ourselves with a client state capable of defending its own interests, supported by its populace, concerned with human rights, and we treat the client as if we know more about how its external threat can be reduced than does the client!

Our ingrained bias in favor of "keeping our options open" once again results in ad hoc decisions with minimal concern for the longer view. In the case of the Egyptian arms sales, we can expect, should history repeat itself, that in the next Middle East War we will be forced to choose between rearming and resupplying Israel or Egypt, Israel will undoubtedly be to some degree disadvantaged by the arms which we supplied to Egypt, and Egypt will have been able to renew combat sooner because America forced an earlier termination of the Yom Kippur War. To put it more succinctly: Our arms sales to Egypt provide a logical stimulus for a repetition of an historically recurring conflict; they help permit earlier rejoining of conflict, they disadvantage our client, and they set up a situation in which we quite probably will be required to offend the new client we had hoped to influence positively.

BASE AND TRANSIT RIGHTS

This consideration as a justification for arms sales offers a classic illustration of how changing world circumstances invalidate "accepted" rationales, yet the "reasons" persist through convention and administrative bureaucratic momentum. Mr. Gelb's criticism goes to the heart of the change: "The principal base-rights countries now place so many restrictions on American use that the whole policy of 'bases for aid' requires review."¹⁹ For example, Greece, Turkey, and Spain have denied our aircraft the use of bases in their countries in Middle East

contingencies. Thus, we have base and transit rights except in cases of genuine military need. In exchange for this "privilege" we have been allowed to enhance their military strength and potential for independent action.

President Marcos, with characteristic lack of restraint, has now driven the base-rights issue out into the open. He wants \$1 billion in grants and credit arms sales which he will employ against internal dissidents in return for our continued use of Subic Bay and Clark Air Base. Marcos is taking the public position that it is disadvantageous to the Philippines to be protected by America because Philippine soil could once again become vulnerable to attack. Therefore, the Philippine government is justified in extorting the maximum possible quid pro quo from the United States. The Philippine position is so blatantly obvious that Ambassador Francis T. Underhill, Jr., U.S. Ambassador to Malaysia and former political counselor at the U.S. Embassy in Manila, has produced a classified report urging closing of the two U.S. bases in the Philippines.

Among other things, the report argues that:

---Southeast Asia hasn't any longer any critical military and political importance to the U.S., despite the U.S. economic presence in the region.

---Countries belonging to the Association of Southeast Asian Nations aren't willing to support the American military commitment in the Philippines.

---The bases are at best of limited utility because in many cases they couldn't be effectively used without the approval of the Philippine government and the U.S. Congress.

---The effort and cost associated with maintaining the bases aren't necessarily commensurate with their potential military benefits.

---The presence of the bases has caused problems for the Philippines in dealing with Third World nations and with its Communist neighbors and are (sic) a source of irritation within the Philippines.

---The bases aren't necessarily an effective deterrent to Soviet and Chinese moves in the region.²⁰

The counterarguments, which conveniently overlook the Congressionally mandated concern for human rights, are that the loss of the bases will cost the U.S. much more than it is currently spending to maintain its military posture in Asia, and the resultant dilution of American Pacific strength will create apprehensions about Russian expansion in both Japan and China. The counterarguments are true as far as they go, but they fail to address the basic issue of whether we are getting what we need - military bases which are useable in times of politico-military crisis - in exchange for the price we are paying.

A corollary to the evolution of the world situation with regard to base-rights is that we are eventually going to be required to operate from American soil in the projection of our military force. The question should be whether we will begin now to develop the needed new airlift and naval capabilities or whether we will continue to arm the world and defer facing the upcoming realities of the 21st century.

GENERAL POLITICAL INFLUENCE

The thrust of this argument is obvious in its title, and it has long been considered to be a bedrock partner of the notion that "trade is good unless..." Only recently has it become apparent that the increased availability of suppliers on both sides of the ideological curtain provide recipients with options which effectively limit the influence which the supplier gains over a recipient. Mr. Gelb's placement of this consideration as last among the nine is suggestive. As noted above, Turkey has made it very clear to the U.S. that she will not trade her foreign policy sovereignty for U.S. arms. Reversing the ideological coin, Egypt's pressing perceived need for arms has not been allowed to bind her irrevocably to the Soviet Union. In Latin America we are now seeing nations reject even military assistance when the price tag has included a U.S. privilege of overseeing human rights' issues within the recipient nation.

The very notion of "political influence" is a highly subjective and ephemeral concept. Secretary

Kissinger spoke of its "intangible quality."²¹ Proof of influence lies in action and, as in Turkey's case, achievement of the supplier's political goals once or twice is no assurance of long term success. SIPRI notes the transition away from hegemonic motivation for arms transfers and the growing ascendancy of industrial motivation.²² Similarly, there is declining concern from the receiver's standpoint about political obligations and an increasing focus upon maintaining both independence of action and a continuing logistic support from the supplier. This latter consideration is most popularly offered as proof that the Shah of Iran can be trusted with the vast arsenal which America is selling to him.

Rarely does one read an analysis of that argument which is skeptical, despite the recent evidence to the contrary provided by the Turkish and Egyptian experiences. Both were basic, straightforward actions by independent, sovereign governments which contravened the desire of the supplier despite logistic tail leverage. Iran also has that same capability (greater logistic dependence notwithstanding), and Iran also possesses formidable economic weapons which can be employed in threat or retaliation to minimize the probability of a weapons embargo by America.

Paul Erdman's economic scenario in The Crash of '79 requires very little modification to make it startlingly clear that an America faced by an oil embargo, withdrawal of short term petrodollar deposits, a massive Iranian "sell" order on Wall Street, the prospective loss of a huge industrial market, and the loss of a supposedly moderate oil supplying ally, would be hard-pressed to shut off the Iranian logistic tail with the same confident nonchalance we exhibited in Israel and Turkey. If we in fact had the courage of our convictions today, we would easily find human rights reasons for halting all sales to Iran. That we have not illustrates unmistakably our growing industrial vice political motivation and the inconsistency of our arms sales policies when confronted by domestic political pressures to go forward with large arms sales.

If we can not anticipate a long term political influence over Iranian policies, then one may as well acknowledge that "general political influence" is not the real basis for the sales. It is rather a time-honored, though shop-worn, justification, one which is

convenient because it is believed to be self-evident, and one which is irrelevant to the central dynamics of profit and keeping open factory lines.

OTHER FACTORS

Mr. Gelb's nine factors are most revealing for their omission of the industrial or profit motive as a major consideration motivating arms sales. Even Secretary Kissinger, justifying the International Security Assistance Act of 1976 to the Congress, paid scant obeisance to this factor, saying only, in comparison with five closely-printed pages of testimony devoted to the other nine rationales:

And there are gains to our domestic position as well. Security assistance programs contribute needed jobs to several sectors of our labor force. They help us to maintain a more favorable balance of payments. And they permit our defense industries to achieve significant economies through scale of production - economies that are passed along through lower prices to our armed forces.²³

Content analysis would lead one to believe that the domestic economic factor was a minor one. However, given a level of arms sales prospectively reaching \$10 billion annually, one cannot but wonder why the Secretary gave it so little mention. The explanation is to be found in our reluctance to face publicly the seamier side of the arms business. When we sell arms we want to believe that it serves the cause of justice, democracy, human rights, and world peace - all perfectly proper American foreign policy goals. Such arguments had more merit when we were giving arms away, but as that transfer mode became burdensome economically and sales replaced gifts, we continued to assuage our puritan conscience with the notion that arms sales were the lineal descendants of earlier foreign policy antecedents.

In other words, we did not look to see if the rationale was still valid because we were afraid of what we would find. We knew, somehow, that although the simplistic notions of the 1930s - that arms sales caused wars - were in fact simplistic, nonetheless we also knew that arms export for profit was not in the

best American tradition. If our national security interests genuinely depended upon providing arms to the world, we would have continued grant aid! We did not, and thereby hangs the tale.

In order to make any reliable judgment on the efficacy of arms sale as a foreign policy tool we must consider the long term effects of the sales upon the people of the recipient nations. Arms purchased to suppress dissidents seeking to overthrow repressive regimes may temporarily delay a liberating change in the status quo, but our best interest lies in adopting policies which reflect the highest principles of American concern for freedom and justice. Such policies will stand the test of time and will align us with those forces within the developing nations which most nearly represent the American ideal. In our intense pursuit of ad hoc stability in the world we have allowed the communist nations to usurp the role of people's liberator in the Third World.

As these new nations join the industrialized and educated community of nations there will be violent changes in governments, and emerging new elites will demand liberating concessions from tired and reluctant regimes. America's roles should be to provide an example for peaceful change, to exert pressures on behalf of peaceful, liberating change, and to side publicly though not militarily with the emerging forces. John K. Fairbank described the problem, the solution, and the policy as early as 1949. It is not too late for us to learn the lesson.

...our problem is to ally ourselves with the forces of the future in Asia, which I think we can do. The peasant, for instance, is there to be organized, revolution is there to be led, and our problem is to relate ourselves to these movements in Asia - not to try to do the job alone.²⁴

America, with its abundant resources and unparalleled "advertising" abilities should enter the lists with convincing policies and arguments of how and why the American way to modernization is superior to Marx's prescription.

We have already seen how American arms sales to our NATO allies and Japan conflict with our best interests

through the denigration of indigenous development and encouragement of regional paranoia. We have noted the absurdly long period in which America has sustained the regimes in South Korea, Taiwan and the Philippines. We have observed the fallacy of meddling in regional conflicts to preserve an uncertain status quo. But what of our economic interests? To halt all arms sales would be to impact adversely our currency flow and balance of payments, our defense industrial capacity, our own defense costs, and our ability to recoup petrodollar surpluses. These are weighty considerations, but they are not insuperable providing we act now to avoid the economic dependency upon arms sales which characterizes both Britain and France.

Although (arms) exports are not the only methods of filling surplus capacity, for most European countries they represent the preferred alternative. For the United States and the Soviet Union, exports are too small in relation to total defense production to fill surplus capacity. But these nations can afford expensive alternatives. They can afford to increase their defense spending. They can also devote sufficient research and development (R&D) resources and order weapons in sufficient numbers to reduce the generation gap. They can also afford to employ surplus capacity on prestige projects such as a space program.²⁵

In the absence of arms profits, American industry can turn to production and aggressive marketing of those goods and services most needed by developing countries. Our defense industrial capacity is presently oversized and must be reduced in any eventuality. The bailouts of Lockheed and Grumman have set the clock running for an inevitable scaling down of our capacity. Congressional lack of concern for Grumman laid down the challenge, and it was only Iran's purchase of the F-14 which deferred the day of reckoning.

The most significant long term danger confronting the United States is the accumulation of petrodollar surpluses in foreign hands. Much has been made of this argument to encourage approval of arms sales to the Mid-East. And yet, it should be apparent that the annual sale of \$10 billion in arms as opposed to a \$40 billion annual petroleum purchase is but a very

partial holding action. The solution lies not in militarily arming a potential adversary who is yearly acquiring an ever-greater economic stranglehold on America, but in reducing our oil imports.

POLICY RECOMMENDATIONS

The following policy recommendations clearly represent radical departures from past American arms transfer policies as well as present attitudes toward elimination of grant-aid. However, they are offered not as marvelous new panaceas, but as pre-existent ideas whose time has, if not arrived, at least moved considerably closer with the advent of petrodollars and human rights emphasis. Implementing these recommendations without creating antagonism or repercussions such as the "Nixon shocks" to Japan will require Jovian tact and timing. On the other hand, it is in the long term national interest to move in the proposed new directions, sooner rather than later, and to make America synonymous as it once was with the cause of freedom and the idea of internationally responsible, effective national power.

1. America should unilaterally terminate all future sales of arms.
 - a. The policy should be applied across the board with absolute impartiality.
 - b. The policy should be explained to the world as an American initiative to avoid further complicity in warfare among nations.
 - c. The policy should be coupled with an aggressive sales effort comparing proposed non-military technological and economic benefits which can be achieved at earlier arms sale expenditure levels.
 - d. Other arms suppliers should be encouraged to redirect their profit-making and foreign exchange acquisition efforts away from military sales.
2. All future transfers of American arms should be on a strict grant-aid basis with full case-by-case Congressional scrutiny to insure the transfer accomplishes tangible, long term goals of American foreign policy.

- a. Such grant-aid transfers should be restricted to efforts to resist external aggression.
- b. Such grant-aid should be allowed only to governments which show a positive concern for human rights and enjoy the support of the countries' peoples.

FOOTNOTES

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ECONOMIC ANALYSIS IN THE DEPARTMENT OF DEFENSE

by

William L. Waterman

Every manager wants to make the best decisions for his organization. Economic Analysis is one of the tools used by the decision-maker in arriving at logical conclusions. The author begins this study with an introduction to Economic Analysis and then takes up step-by-step through the key elements of the process. The techniques and tools of Economic Analysis are straightforward and relatively simple with a common sense approach.

This study was submitted to Commander J. C. Tibbitts, CEC, USN in partial fulfillment of the course requirements for Financial Management in the Navy (MN 4154).

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INTRODUCTION

When we use resources (people and things) to accomplish a purpose, we want to be sure we are using them in such a way as to get the most for our money. To achieve this objective we need to know - at least approximately - how costs would be affected by using alternative combination of resources and how costs would be affected by changes in assigned levels of output, either at a single facility or among a group of facilities with different operating levels.¹

The above concise statement summarizes the essence of Economic Analysis, whether it be in industry or within the Department of Defense. Basically, economic analysis involves the determination of the cost, versus benefit, of each future course of action. In industry, cost collection and output measurements are easily quantifiable and are taken for granted. The problem in government is often much more complex. Many times the costs can be calculated accurately; however, the measurement of the output is usually in terms of social benefits, a factor most often impossible to quantify. Although a weak, ineffective Navy may have long-term economic implications for the United States, the actual value of a strong Navy depends on what each individual citizen perceives it to be. Even among our Congressmen, there is strong disagreement over the value of a strong deterrent force.

In spite of these difficulties, the military manager must be able to combine sound economic analysis with the intangible benefits to come up with a proposal that will "sell." Selling a proposal is becoming increasingly difficult. History has shown that when the nation is under direct threat of military aggression, by a commonly perceived enemy, the military has been able to extract large quantities of resources from the private sector. In today's world of detente, the average United States citizen perceives no real, immediate threat to his security. He therefore has adjusted his priorities toward increased social benefits, i.e., quality of life.

Military preparedness programs are being viewed now more than ever before as an integral part of the broader concept of national security. As a result, the expected benefits for specific military programs are being compared with the expected benefits from non-military programs for purposes of making resource allocations.² It is in this arena that the military manager must operate. Unlike his civilian counterpart, whose goal

may be clearly defined as profit maximization, the military manager is faced with maximization of benefits for a given cost, or the achievement of a given performance objective at a minimum cost.

ECONOMIC ANALYSIS/PROGRAM EVALUATION
WITHIN THE DEPARTMENT OF DEFENSE

Economic analysis within the Department of Defense gets its impetus from DOD INST 7041.3 dated 18 October 1972. This instruction spells out the basic guidelines that military departments and defense agencies are to follow in their resource management programs. Two key concepts are delineated in this instruction: (1) Economic Analysis and (2) Program Evaluation.

Economic analysis is formally defined by DOD as:

A systematic approach to the problem of choosing how to employ scarce resources and an investigation of the full implications of achieving a given objective in the most efficient and effective manner.³

The key phrase in this definition is, "...achieving a given objective in the most efficient and effective manner." Efficiency and effectiveness are not necessarily by-products of each other. In other words, being efficient does not necessarily mean that we are effective nor does the reverse hold true. It is quite easy to understand the concept of being effective (that is, accomplishing the states mission) but doing it inefficiently.

However, it is not readily apparent that you can just as easily be efficient but not effective. This aspect is an insidious nature. People become so involved with their little world that they forget the big picture. The real danger for the military manager is losing sight of the overall goals of "National Defense" and engaging in empire building. Dr. Ulrey writes:

Traditionally, managers of government activities have, ...relied heavily on records of expenditures allocated to accomplish some specific objective, not to hire people, buy equipment, and pay for supplies.⁴

To ensure that both efficiency and effectiveness are accomplished in Department of Defense programs, the following guidelines apply:

- A. Systematically identify the benefits, other outputs and costs associated with alternative programs, missions, and functions and/or of alternate ways for accomplishing a given program.
- B. Highlight the sensitivity of a decision to the values of the key variables and assumptions on which decisions are based including technical, operational, schedule or other performance considerations.
- C. Evaluate alternative methods of financing investments, such as lease or buy.
- D. Use benefits and costs to compare the relative merits of alternatives as an aid in:
 1. making trade-offs between alternatives;
 2. recommending the cost-effective alternative; and
 3. establishing or changing priorities.

Program evaluation is defined by DOD as:

Economic analysis of ongoing actions to determine how best to improve an approved program/project based on actual performance. Program evaluation studies entail a comparison of actual performance with with approved program/project.⁵

In essence, program evaluation should tell us how effective and how efficient a current program is operating.

The difference in the two concepts discussed above can be easily seen when classified according to purpose. Economic analysis can be thought to assist a manager in identifying the best new programs/projects to be adopted. Program evaluation focuses on approved programs and projects to insure that established goals and objectives are being attained in the most cost-effective manner. Or even more simply put, economic analysis could be referred to as pre-expenditure analysis with program evaluation called post-expenditure analysis.

It is the Department of Defense's stated policy that economic analysis must be used on all projects whenever a trade-off between two or more options exists. This includes the status quo when that is one of the available options. With regard to periodic program evaluation, a Presidential Memorandum^o stipulated that it will be accomplished, on a high priority basis, in every current program - large and small - to uncover those programs which can and should be modified or eliminated.

By directing that economic analysis and program evaluation be conducted, the Department of Defense did not intend that reports are to be automatically submitted along with proposed projects. But rather, analysis is to be used in arriving at the best proposal, and then insure that the information is available, should the need for in-depth information arise.

A very important aspect of DOD INST 7041.3 is the fact that a program or project justified on the basis of military necessity is not exempt from the requirement to perform economic analysis or program evaluation. This serves two purposes. First, it prevents by-passing the intent of the instruction through classifying questionable projects as military necessity. Second, it should force the military manager to examine all aspects of his objective. Perhaps the B-1 bomber isn't the most effective and efficient solution to that specific problem, but the above requirement at least requires that alternatives be examined.

As indicated in the above paragraphs, DOD INST 7041.3 is very explicit in establishing requirements for economic analysis and program evaluation. This is not to say that analysis will be done for analysis sake, but rather military managers should heed the axiom - analysis should not be conducted when its costs exceed the benefits.

One of the premises of economic analyses/program evaluation within DOD is that it is to be accomplished at all levels (including operational), using available talent. However, it was realized that implementation of these concepts requires a level of sophistication in analytical techniques that is not commonly available throughout the military structure. Avoiding the establishment of a new, larger bureaucracy, the Defense Economic Analysis Council (DEAC) was created. The Council is comprised of representatives from the

military departments, defense agencies, and Office of the Secretary of Defense (OSD). Given a charter to encourage application of analysis techniques and strengthen analytical capabilities throughout the Department, they accomplish their objective through the following areas:

- A. Establish policies and procedures for the utilization of analyses techniques.
- B. Assist in the application of economic analysis/programs evaluation in the planning, programming, budgeting process and also in other decision-making processes within the Department of Defense.
- C. Provide advice as to techniques and methodology for justifying and supporting resource consumption decisions.
- D. Establish educational programs to facilitate the use of economic analysis/program evaluation at all levels within the Department of Defense.
- E. Improve the quality and strengthen the analytical capabilities of the Department of Defense.

In 1974, DEAC reported that analysis is being used on major projects but that the thousands of managers at the operational level were not utilizing this valuable tool.⁷ This was exactly opposite of what then Secretary of Defense Schlesinger envisioned economic analysis could accomplish. In a May 9, 1973 memorandum he stated:

I expect to see our thousands of managers who collectively make tens of thousands of daily decisions on consumption of resources, concern themselves with the outputs and benefits derived from each decision made.

This seemingly creates a dilemma at the operating level. The manager is encouraged to use techniques that appear to be beyond his grasp. Colonel Edmund W. Edmonds, Jr., former DEAC Chairman, stated that:

Most of the tools and techniques comprising and supporting Economic Analysis are relatively simple - they are not sophisticated, esoteric, or far-out - and they can be used by people with general as opposed to technical backgrounds and experience.⁸

To dispel the exotic mystique of analysis, DEAC has established training programs aimed at the operator. One product that is readily available is the Department of Defense Economic Analysis Handbook. This document provides a step-by-step process that the uninitiated can easily follow. Section IV of this paper will summarize the contents of this handbook. For managers who have absolutely no analysis background, an excellent supplement to this handbook is a book written by Dr. Ivon W. Ulrey and Dr. Ann P. Ulrey, entitled "Analysis for Managers of People and Things."⁹ This book was developed for the Assistant Secretary of Defense (Comptroller) specifically to assist the military manager in decision making. It is by necessity an elementary approach, written in layman's terms.

ECONOMIC ANALYSIS/PROGRAM EVALUATION WITHIN THE NAVY DEPARTMENT

The economic analysis/program evaluation program within the Navy is contained in SECNAVINST 7000.14 Series and OPNAVINST 7000.18 series. Quite naturally these instructions merely add a few specifics, and responsibility assignments, to the basic DODINST 7041.3 discussed in Section II. OPNAVINST 7000.18 re-emphasizes that economic analysis will be used as an integral part of the Navy programming process, including the overall preparation of the Program Objectives Memorandum (POM); in support of budget justification for selected items and as part of the acquisition for of major weapons via the process used in preparing the Development Concept Papers (DCP) and preparing justification for Defense System Acquisition Review Council (DSARC) reviews.

Primary responsibility for implementation of the economic analysis program has been assigned to the Chief of Naval Material and the Director, Navy Program Planning (OP-090). In particular, (OP-92) is responsible for implementation of the program as it pertains to the annual budget justification. The Systems Analysis Division (OP-96) is responsible for the program as it pertains to the major weapons systems. This includes analyses that support DCP and the DSARC process.

THE PROCESS

As previously quoted in Section II, DOD formally defines economic analysis as, "A systematic approach..." It is readily apparent that analysis of any type, to be successful, must be approached systematically. Hopefully, this systematic approach will accomplish the following:

- A. Focus informal thinking.
- B. Surface hidden assumptions.
- C. Effectively communicate the basic rationale behind the proposal.

The eight elements of the process, as defined by DOD, are depicted in flowchart format in Appendix I, and are summarized below:

A. DEFINE OBJECTIVES - The first and most important step is defining the objectives. The Random House Dictionary defines objective as, "something that one's efforts are intended to attain or accomplish." Therefore, very simply put, defining an objective is to determine what that "something" is. Once this determination is made, and put in writing, it can be used in the future as a standard to measure against. There are four levels of abstraction when describing a Command's mission (objectives).

1. Basic Activity. This is normally easy to quantify. An example might be a Naval Dispensary. Its basic activity could be measured by number of patients seen per unit of time.
2. Organizational Product. Here organizational product is defined as physical output. This form of mission description obviously cannot apply to all Commands. An example might be personnel trained. Again it is a measure easily quantifiable when applicable.
3. Extra-Organizational Value. This is directly related to Organizational Product except in this case the quality of the output or benefits received by other Commands is defined. The example previously cited would take the form of adequacy of persons trained.

4. Social Values. Unfortunately many activities within the Department of Defense fall primarily in this category. It is the most abstract and covers the broad areas of national defense, law enforcement, environmental control, etc. Thus it is almost impossible to define its limits.

Let's look for a minute at an aircraft carrier and see how it fits into the above categories. It is readily apparent that it is easy to describe its basic activity. That activity can be measured by numerous indices such as number of sorties flown, days at sea, etc. But this measurement of activity is at best a surrogate for determining accomplishment of its mission. Since a CV has no physical product, items A.2. and A.3. do not apply. This leaves Social Value. What is the social value of an aircraft carrier? It is impossible to measure quantitatively.

B. CHOOSE ALTERNATIVES - The second step is to determine practical methods of meeting the defined objective. Some alternatives may be eliminated immediately due to resource constraints placed on the proposal. It is the responsibility of the analyst to ensure that all workable alternatives are studied.

C. FORMULATE ASSUMPTIONS - Assumptions are necessary in every analysis in order to limit the scope of the study. An assumption is a "given" and cannot be classified as a "fact." Therefore it does carry with it a certain amount of risk. It is very important that all assumptions be documented. This enhances the study since everyone will know the bases of the study. Two key assumptions that must be made concerning every project study, are economic life and the period of comparison, summarized as follows:

1. Economic life is defined by accountants as the number of years which benefits are expected as a result of making the investment. Economic life is constrained by one of three different factors:
 - a. Physical life is the number of years that the asset is physically useful. For example, a truck has an expected physical life at the end of which it will theoretically stop running.
 - b. Technological life is the period before the asset becomes obsolete due to "progress."

- c. Military and political considerations - this constraint could be compared with product-market life in industry. The classic example of this is the machine making buggy whips. It may physically last for 100 years, and there may be no possibility of making technological improvements in it, yet its economic life came to an end because of the loss of the buggy whip market.
2. The Department of Defense has established maximum economic lives for various categories of investments. They are as follows:
 - a. Automatic data processing equipment - 8 years.
 - b. Buildings - 25 years.
 - c. Operating equipment - 10 years.
 - d. Utilities, plants and utility distribution systems - 25 years.
 - e. Weapon/support systems - maximum economic life will vary by type of weapon or support system.
3. The period of comparison can become quite complicated when two or more alternatives have varying economic lives. Generally you must use as a base year the first year in which any one of the alternatives requires an expenditure. When establishing the length of the comparison you may use either the shortest or longest economic life. However, when you have unequal economic lives, care must be taken to make appropriate adjustments so as to avoid any bias.

D. DETERMINE COSTS - Cost analysis is the most complicated and perhaps the most time consuming step in the entire analysis procedure. Many of the larger projects are so complicated that they require the skill of professional analysts to determine costs. But there are also many applications where the average military manager is capable of determining a reasonably accurate cost estimate. DODINST 7041.3 contains a detailed description of cost estimation procedures. It is not the intent of this paper

to go into detail concerning the procedures, since they are generally similar to estimation techniques in the private sector, but I will point out some of the key guidelines prescribed as follows:

1. Quite naturally, all costs are to be included in the analysis. This is meant to include all those so-called "free" items such as military manpower, existing buildings, equipment, etc. When feasible, and especially in research and development, life-cycle cost estimates (LCCE) will be used. These costs should be listed by the year in which they are expected to occur.
2. Present value techniques are emphasized by the Department of Defense. A discount rate of 10% is prescribed for all projects to be analyzed, and a table of discount factors (at 10%) is provided in DODINST 7041.3. This table reflects an assumption that cost and/or savings flow will occur more or less continuously rather than in a "lumpy" once-per-period fashion. Justification for the use of present value factors is stated in DODINST 7041.3 as follows:

Interest will be treated as a cost which is related to all Government expenditures, regardless of whether there are revenues or income by way of special taxes for a project to be self-supporting. This position is based on the premise that no public investment should be undertaken without considering the alternative use of the funds which it absorbs or displaces.

...One way for DOD to assure this result is to adopt in public investment evaluations an interest rate which reflects the private sector investment opportunities foregone.

This is basically the opportunity cost concept in that it attempts to measure the opportunity which is sacrificed by using resources in the public sector vice the private sector.

3. Inflation is an important aspect of our economy today and therefore will be most often important in the analysis of projects extending into future years. When inflation is to be considered, all estimates will first be made in

terms of constant dollars (value of dollar at time of decision) and then secondly in terms of inflated dollars. The Assistant Secretary of Defense (Comptroller) promulgates indices for use in escalating cost estimates.

4. There are four areas that are specifically exempt from discounting and they are:
 - a. Decisions concerning water resource projects.
 - b. Decisions concerning the acquisition of commercial-type services by Government or contractor operation.
 - c. Proposed programs/projects which if adopted would not extend over three years from inception.
 - d. Program evaluation studies which deal only with historical costs or contain no cost comparisons.

E. DETERMINE BENEFITS - As discussed in the previous section, cost determination can be complicated and often difficult. Its counterpart benefit determination is rarely easy and, usually, virtually impossible to quantify accurately. The reliability of economic analysis is directly proportional to the precision of the cost/output data. This does not mean that we forget about economic analysis when the output is difficult to measure. We merely apply it knowing that the results will be less precise. Decisions based in part on this type of information will most often be better than those based on "gut" feelings. DODINST 7041.3 presents the following four-step procedure to facilitate the measurement of output:

1. Identify all relevant outputs.
2. Establish data sources. Utilize existing data whenever possible.
3. Collect, summarize, evaluate, validate and display output data.
4. Compare output data with resources consumed.

Even with the above steps, the task of benefit measurement remains formidable.

F. COMPARISON OF ALTERNATIVES - The ranking of alternatives is simple when they provide equal benefits at unequal costs. You naturally will select the lowest cost alternative. It becomes more difficult when you are faced with unequal benefits and unequal costs. In many cases the military manager is faced with a resource (money) constraint and he must maximize the benefit. Here the analyst must be careful to fully document the output of each alternative to ensure that the alternative selected yields the maximum benefit. If "special considerations" result in the selection of alternatives that are not the most cost-effective, the reasons must be defensible.

G. UNCERTAINTY ANALYSIS - Almost every decision made involves varying degrees of risk. As a final step in economic analysis, the ranking of alternatives must be examined to see how changes in environment or criteria affect the original analysis. Included in this step is sensitivity analysis. By varying key uncertain parameters it can be determined how sensitive the ranking is to fluctuations. This should then give the analyst an intuitive feeling for the level of confidence in his analysis.

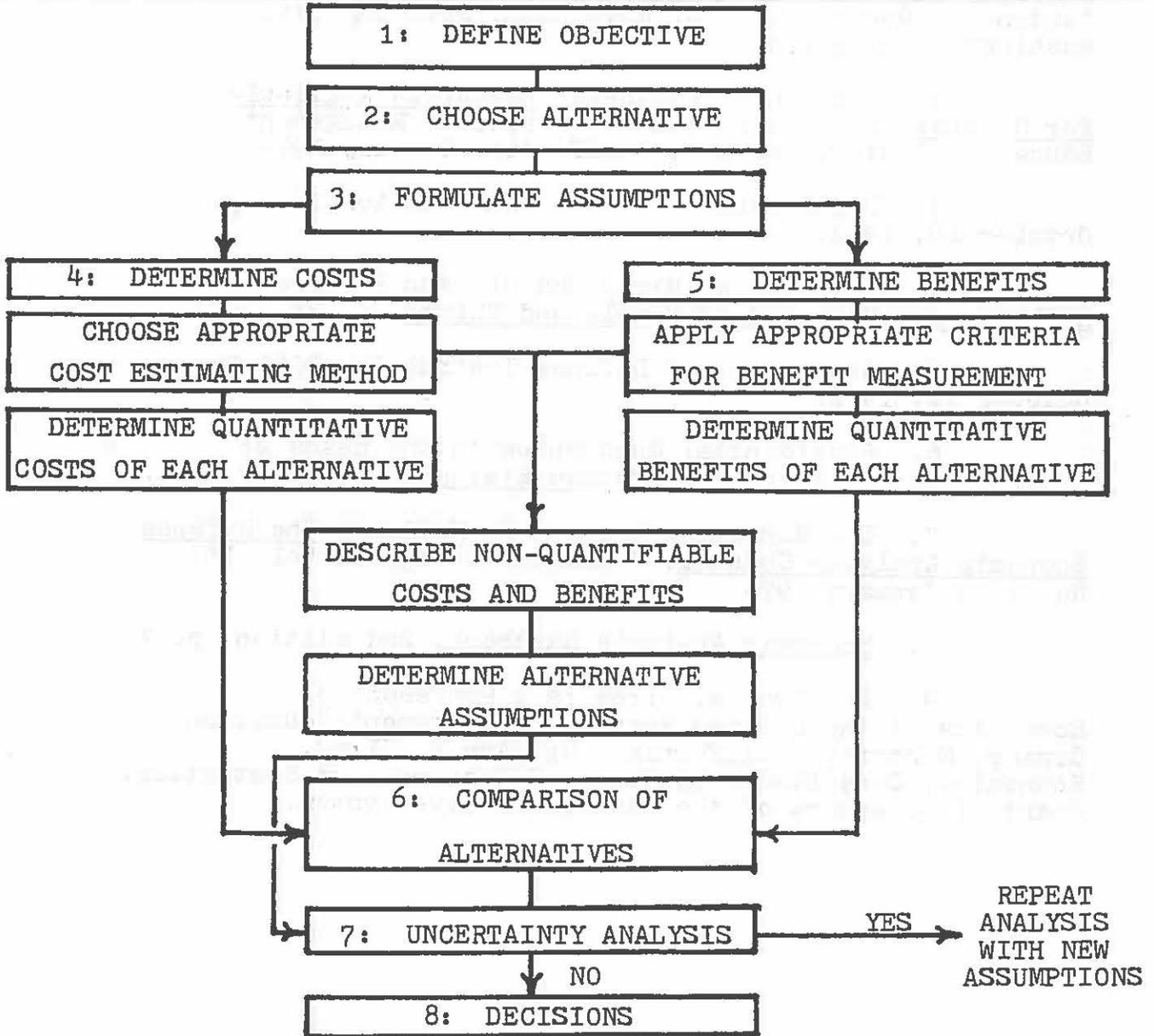
H. DECISIONS - To assume that decisions can be made by simply determining the priorities of various alternatives would be a mistake. The process discussed up to this point should be regarded as an aid to the decision-making process and nothing more.

SUMMARY

In this paper I have tried to point out that economic analysis/program evaluation in the Department of Defense encounters major difficulties. Namely, benefits and outputs are difficult to measure. This difficulty should not discourage the imaginative military manager. The complexity of the analysis will depend directly on the size of the proposed project. The average manager should develop the skills to enable him to do simple studies. Complex problems will still require that the study be completed by a professional analyst. And finally, the analysis procedures discussed are not intended to make decisions, but rather as one of the tools used by the decision-maker in arriving at logical conclusions.

APPENDIX I

THE PROCESS



FOOTNOTES

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UNITED STATES POLICY ON AIR HIJACKING

by

Fred Bradley, Jr.

Air transportation is highly vulnerable to terrorist acts. The author traces the history of aircraft hijacking and the resultant piecemeal development of policies and procedures to counteract this threat. The study concludes with a close look at a recent hijacking and the ineffectiveness of present procedures.

This study was submitted to Lieutenant Commander Robert W. Sagehorn, USN, in partial fulfillment of the course requirements for Transportation Management (MN 3373).

The Editors

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NON-DEVELOPMENT OF A CONSISTENT
ANTI-HIJACKING POLICY

The times in which the world is now living is characterized by terror and is being punctuated almost daily by reports of acts of terror. There is no longer just the personal motives of the mad bomber, as portrayed in the early movies, but now intertwined with the insanity of individual man, is the craziness of groups of men and women.

The vehicles used for both pleasure and business are among the most susceptible to terrorist acts. Because of such widespread use of vehicles, both arbitrary and mandatory for the existence of man, they will remain the targets for these acts of terror until the causes of terror are ultimately eliminated.

Until the grandiose dream of cause elimination is achieved, we are left with the problem of reducing the transportation susceptibility to acts of terror. The importance that the role of safety takes in the national sphere of influence is perhaps best summed up in the Department of Transportation's statement:

It is the policy of the Department of Transportation to provide the highest practicable level of safety for people, property and the environment associated with or exposed to the nations transportation system.¹

Although the realm of terrorist acts in transportation cover innumerable facets, only the specific areas of United States air transportation will be investigated as to its response to the terrorist acts involving air transportation. Terrorist acts for this paper will be defined as those acts which could or do cause either mental or physical damage to life and actual or possible physical damage to material possessions.

Due entirely to its uniqueness, air transportation is totally vulnerable to either real or imaginable terrorist acts. An inflight air vehicle cannot just stop and be evacuated. It operates in an environment that if a motive or control problem arises, there are few if any safe alternatives. There are no curbs to drive against to slow the speed and certain vehicle areas are totally inaccessible for investigation or repair while in flight. The total confinement of passengers

and cargo into the same physical unit make either of these areas prime target locations for acts of terror.

Aerial hijacking or the piracy of air carriers has been an international problem, particularly during the 1960s, beginning with the first "Cuban" hijackings in 1961. There were numerous, little-published incidents, during the early Cold War era, of the seizing or forcible diversion of military aircraft from one side of the Iron Curtain to the other, possibly with the tacit encouragement or aid of the military intelligence units of both sides.² In the 1960s, however, because of the very frequency of repetition of the hijackings and the increased political intensity of these incidents coupled with the disregard and mistreatment of innocent civilian aircraft passengers caught in the web of the incident, the act of hijacking changed from being characterized as an occasional romantic adventure to an event to be despised.³

In the context of the Mediterranean and the Middle East areas, hijacking seems to have developed merely as one means, among a number of available alternatives, for trying to achieve political objectives without recourse to direct military action or confrontation and the risks of defeat that any such military action might involve. The advantage of hijacking as a weapon for achieving major national political objectives by non-military means, has been the unusually small expenditure of money, energy and lives that such actions would normally require.

The enormous international publicity for political purposes that hijacking has managed to generate and the perverse sympathy that these acts of piracy worked in many quarters stemmed no doubt from the superficial comparison of the physical frailty of the hijacker himself as compared to the accumulated power and prestige symbolized by the jets or jumbo-jets that the hijacker succeeded in taking over. This success trend in public emotion was reversed with the multiple hijackings to the Jordanian desert in September 1970.⁴

Faced with the practical failure of international responses by the multilateral convention or treaty route, and also the relative ineffectiveness of control of anything other than hijackings wholly committed within their own national borders, the legal means had to be laid aside and other alternative forms of social control would have to be pursued, since the social problem of hijacking showed no signs of abating.⁵ Bombing

incidents forced the United States and the Soviet Union into leading the way to international legal changes. However, the Middle East is one area where, even today, the true legal control, or want of control, is still lacking.

Although overly simplistic, the problem that the United States found itself involved in during the early 1960s does present a unique government or country position. Having to go against air piracy when it is now perpetuated against yourself, as compared to silently rooting for the "politically oppressed" to succeed in reaching the United States, is a difficult task at best. The action of the United States Government in response to acts of terror within its boundaries follows what appears to be direct relationship to the number of terrorist acts that are committed.

In fiscal year 1967, the only FAA overt concern was in the area of investigating anonymous telephone calls that threatened the bombing of aircraft.⁶ In 1968 the FAA reported that since 1960 a number of promising research and development approaches to the aircraft-sabotage problem had been evaluated, but that no economically feasible or effective solutions had been found. Efforts were also being directed during the year for a research and development solution to the aircraft hijacking problem.⁷

In 1969, after seven years of almost no aircraft hijacking, air piracy erupted on an epidemic scale. The government's only prior experience had occurred in 1961. Only four United States carrier aircraft had been hijacked during this lull. Thirteen were hijacked in calendar year 1968 and a total of twelve occurred in January of 1969. A total of ten more air carrier aircraft had been successfully hijacked by the end of year 1969. The total as of 30 June 1969 stood at thirty-nine.⁸

Although the air piracy acts of 1961 did produce some anti-hijacking measures, such as Public Law 87-197 which defined aircraft piracy and enumerated various punishments and fines for certain acts, the main non-paper product of the law was to allow the air carriers to refuse transportation to anyone, if in their opinion they might be dangerous to flight safety. Also, as a result of the 1961 hijackings, selected FAA employees were trained as peace officers. In addition,

the door to the flight deck or cockpit in air carriers would be closed and locked. These measures were largely frustrated in the 1968-69 hijackings by certain circumstances favoring the hijacker. When he made his move aboard an aircraft in flight, he had the advantage that any effort to resist him would be a gamble with the lives of all on board. But arresting him after the plane had landed was generally not possible either; the planes were all being hijacked to Cuba, where the hijacker was allowed to remain after the plane and its other occupants had been permitted to return to the United States. Of the grand total of thirty-nine U.S. air carrier aircraft successfully hijacked by June 30, 1969, all but one had been forced to land in Cuba; the lone exception, shortly after takeoff from Honolulu on August 31, 1965, was forced to return to the Honolulu airport.

In response to the alarming rate of hijackings prevailing at the end of 1968 and in January 1969, the FAA in February 1969 created an eight-man Task Force on the Deterrence of Air Piracy, assembling in this group a broad spectrum of agency expertise under the leadership of the Deputy Federal Air Surgeon. Systematic study of the problem by the task force revealed, among other things, that a hijacker "profile" could be constructed from behavioral characteristics possessed in common by many of the hijackers of the past. When the task force combined this "profile" with a weapons-screening device developed by the agency, the result was a detection system promising usefulness in dealing with the problem under the purview of the agency and the airlines, i.e., by trying to prevent potential hijackers from boarding aircraft in the first place.⁹

Fiscal year 1970 brought about the turning point in air piracy. There was a drop in incidents down to twenty-six. The pattern of aircraft diversion to Cuba was broken when five of these aircraft were forced to go elsewhere. Developments in anti-hijacking were highlighted by the selective use of the detecting system. Of special note is that no hijacking incident occurred on any flight on which this system had been applied. Several other events had impact upon the air piracy picture, these being:

1. There was an increase in the number of arrests and trials of hijackers of U.S. aircraft. Forty-five arrests had been made since the hijacking of the first U.S. aircraft in 1961 including: fourteen returnees from

Cuba (all through some other country); eighteen convictions on various charges, with sentences ranging from an indefinite term in a correctional school for certain juveniles to twenty years for four adults; three findings of mental incompetence to stand trial and three acquittals, one on grounds of temporary insanity; and twenty-one cases pending.

2. An announcement by Cuba (September 1969) of a new law that apparently would allow return of aircraft hijackers, except those regarded as political refugees, to the countries from which they had fled if those countries would reciprocate in the case of persons fleeing Cuba.

3. The U.S. ratification of the Tokyo Convention on Offenses and Certain Other Acts Committed on Board Aircraft took place September 5, 1969. Though ineffectual against hijackings to non-signatory countries, the convention was a forward step in its clarifying of jurisdiction over crimes aboard aircraft anywhere in the world.

4. An extraordinary session of the International Civil Aviation Organization's Assembly at Montreal, June 16-30, 1970, considered possible measures by member states to combat aircraft piracy and other criminal acts endangering civil air transport. The Federal Aviation Administrator attended as vice chairman of the U.S. delegation.¹⁰

Fiscal year 1971 brought in the age of organized international blackmail with the mass air hijacking plan of four air carriers (including one United States carrier) on 6 September 1970. Four aircraft being blown up, resulted in the President of the United States calling for: first, armed U.S. Government guards on flights on U.S. commercial airlines; second, extending the use of electronic surveillance equipment and other surveillance techniques by American-flag carriers to all gateway airports and other appropriate airports in the United States, and in other countries wherever possible; third, accelerating Federal Government efforts to develop security measures, including new methods for detecting weapons and explosive devices; fourth, full consultation with foreign governments and foreign air carriers on anti-hijacking techniques; and fifth, a more effective international anti-hijacking arrangements.¹¹

Although all items did receive action, only the second and third deal with the actual prevention of terrorist acts before they occur. To these ends, there were noticeable improvements.

Of great importance were the new and improved detection devices introduced. Hijacking incidents during 1971 were studied for further insights into hijacker motivations and psychological types for updating of screening materials. A considerably more sophisticated magnetometer than the model initially put in service was being tested at the year's end by the Department of Transportation at Washington's Dulles International Airport, a model aided by a computer and capable of detecting nonferrous as well as ferrous objects and of distinguishing guns from other metal objects.

The combined efforts of government and industry have established a baseline for the state of the arts including weapon detection, bomb detection, behavioral screening, detecting nonlethal weapons, developing communication systems, and electronic systems for security.

A fast neutron activation analysis system for detecting concealed explosives has been given a tentative health and welfare clearance, and the design of an operational version is under way. FAA has initiated plans for an operational test of a pulse X-ray system for detection of explosives in baggage. The Transportation Systems Center has initiated plans for evaluation of an economized version employing a new image intensifier screen. The system, with higher light output and resolution than present screens, has potential for significantly improving detection of bombs and contraband in baggage and cargo.

A successful demonstration of detection of explosives by K-9 Corp dogs was coordinated by the FAA, leading to plans to have a set of dogs trained to handle bomb threats at the Washington National Airport. In addition, in-flight security was enhanced by the design and development by the FAA of a prototype armored cockpit.¹²

Fiscal year 1972 introduced a new American air piracy act, that of extortion. After the initial successful extortion of \$200,000 in cash, similar incidents occurred which resulted in the mandatory screening of all passengers boarding an aircraft, a requirement for air carriers to submit to the government for approval

an anti-hijacking program, and set down security standards for airports regularly serving scheduled air carriers. This period saw thirty-four acts of piracy vice thirty-one for fiscal year 1971, but the important measuring stick is that only thirty-five percent were successful as compared to sixty percent in fiscal year 1971.¹³

Fiscal year 1973 signaled the "end" of the terrorist acts of air piracy. Eleven attempts were made to hijack with only three being successful and those in calendar year 1972.

The 1974 aviation security records confirmed that the drop in attempted hijackings achieved in 1973 was not an accident. No U.S. aircraft was hijacked during fiscal year 1974, and the number of attempts fell from eleven to four. Significantly, no hijackings were attempted in the air. Two hijackers who forced their way aboard a passenger aircraft on the ground were not successful. One killed himself after being wounded by an airport policeman, and the other was disarmed and captured. In two attempted hijackings of helicopters, both culprits were apprehended.

There is little doubt that the airport and airline security measures instituted in 1972, and subsequently improved, were instrumental in containing the hijacking threat. The effectiveness of the pre-boarding screening procedures is demonstrated by fiscal year 1974 statistics: a total of 4,275 passengers were denied boarding privileges for security reasons; 655 others were arrested for carrying weapons; and 2,843 guns and other weapons were confiscated.

While hijackings were prevented in 1974, bomb threats continued to plague security officials. Airports reported 221 bomb threats and 1,138 threats were made against aircraft. These figures compare to 1,424 aircraft threats and 146 airport threats in 1973.

To counteract the problem, the FAA sponsored an Explosive Detection Dog Handler Team Program, under a grant from the Law Enforcement Assistance Administration. Nineteen teams were trained and assigned to airports by the end of 1974. Seminars in bomb detection and aviation explosives security were held throughout the country.¹⁴

The aviation security program continued to be a

success with not a single U.S. air carrier being successfully hijacked during fiscal year 1975. During that year 5,041 air carrier passengers were referred to law enforcement officers for security reasons and 2,714 were arrested and 92,355 weapons and dangerous articles were detected.¹⁵

As can be traced through history, there had been a rise and fall of air piracy within the United States starting in 1961 and basically ending in 1972. It appears, however, that due to the inactivity of aerial hijacking, there has been a corresponding lack of security development during the lull years. As evidence of this, on September 10, 1976, there was a successful hijacking by Croation Nationalists for apparently political motives. This was accomplished by the use of harmless components carried on board the aircraft by different individuals and then assembled on board into what appeared to be a convincing pot bomb. To insure the authenticity of the fake bomb, a genuine bomb, similar in construction, was placed in a transportation center locker.

The alarming fact is that the screening system worked exactly as it had been designed to work. The pot container had even been detected but allowed to pass as luggage. Likewise, the other items used in the construction of the fake bomb had either been passed or were not detected as critical safety items. In view of this recent development, it appears that new or improved security measures are likely to follow.¹⁶

The stark realization of this new successful type of hijacking is that national policy directed towards hijacking is driven by the acts themselves and not by forethought. The actual prevention of terrorist acts can realistically be viewed as only two alternatives: the first is the reliance upon an increased police type manpower; and the second is the expansion and development of electronic or other devices to complement law enforcement.

An important consideration in settling upon the optimum security is the evaluation of its cost effectiveness. In conclusion, the United States Government and its policy at this point in time should be sophisticated enough and responsible enough not to have to wait for a new rash of catastrophic incidents or innovative hijackers to produce counter actions.

Policy should be able to start with the fact that in this country, transit patrons must be considered easy prey to those who choose to generate income or political notoriety through acts of air terror.¹⁷ Thus, the area of predicting future courses of action to prevent future possible incidents of air hijackings must be studied and evaluated for effectiveness on a continuing basis, and not solely in response to a specific act or occurrence of terrorism. If not, it will only be a matter of time until we witness another, possibly more serious, air hijacking.

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