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International Affairs

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THE LOGIC OF UNCERTAINTY: INTERORGANIZATIONAL
COORDINATION IN INTERNATIONAL DISASTER
ASSISTANCE

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The Problem: Effective Interorganizational Coordination in
International Disaster Operations

The environment of international disaster operations represents one of the most difficult tests for administrative capacity in actual practice. The primary characteristics of this environment -- uncertainty, complexity, urgency, variability -- run counter to the requirements for predictable professional administrative performance. The magnitude of disaster is such that the operations are necessarily interorganizational. No one individual, no single organization can respond to the multiple demands for assistance alone.

At the core of the problem is the human capacity to process information about the disaster event quickly and accurately and to share this information with others in a way that invites their constructive engagement in collaborative action to meet the massive, urgent needs for assistance to the affected population. Repeatedly, this process has broken down in the experience of past disaster operations. Individuals and organizations, making their best efforts, have nonetheless been racked with delay, failures in communication, conflicts in strategies of action, inappropriate allocation of resources and avoidable losses in lives and property.² Every post-disaster review of operations brings recognition of the need for improved communication, better coordination among the participating organizations and sober efforts to reorganize disaster response plans and preparedness

Theoretical inquiry into the process of human problem solving has focused on the commonly accepted explanation offered by the 'limited cognitive capacity' of human decision-makers, an

Theories of Human Problem Solving Capacity.

solving.

coordination and increased capacity in administrative problem solving in the region is through improved interorganizational the most productive means of reducing the risk to lives and nations are vulnerable to the recurring threat of disaster, and the western coasts of North, Central and South America. These 'Ring of Fire', the system of earthquake faults that runs along performance in disaster operations in nations that lie along the zational coordination is stubborn, yet crucial for improved decision-making have been on-going.⁵ The problem of interorganizational disaster operations and where efforts to improve disaster operations and actors know one another and have shared experiences from several American disasters of 1985, 1986 and 1987⁴, where many of the This problem is particularly interesting in the Latin conditions.

performance under uncertain, complex, urgent and highly variable with essentially similar demands for interorganizational a different location, under slightly different circumstances but operations. Fundamental problems recur in the next disaster, at performance to improve coordination in subsequent disaster largely unable to produce significant changes in their functions.³ Yet, the individuals and organizations involved are

hypothesis first advanced by Herbert Simon in his concept of bounded rationality in his classic work, Administrative Behavior in 1945.⁶ In developing his thesis in a later work, Simon and his co-author Allen Newell outline a structure of cognitive problem-solving that defines two types of memory, a limited short-term memory in which human decision-makers can manage to recall seven items at a time, plus or minus two, and an unlimited long term memory which essentially serves as a cumulative record of events and experiences over the subject's lifetime.⁷ To Newell and Simon, creative human problem solving activity occurs principally in the short-term memory, with its limited capacity to hold and manipulate information. Consequently, this limited cognitive capacity of human decision makers easily becomes overwhelmed in the complex, rapidly changing conditions of disaster operations. Add the cultural differences and inter-organizational requirements of an international disaster and the scope of demands upon human decision-makers becomes more than any single individual can manage successfully. The decline of administrative performance under operating conditions of complexity and stress has been observed and documented many times,⁸ and the reasons for this decline have been attributed to the limited cognitive capacity of human decision-makers. The process of problem solving has also been the subject of thoughtful inquiry by scholars in a variety of research contexts.⁹

The explanation offered by the thesis of limited cognitive capacity of human decision-makers for recurring failure in

interorganizational coordination is convincing if unsatisfactory in terms of meeting the practical needs for responsible administrative performance in disaster operations and assistance. Direct observation and inquiry into the process of disaster operations in three recent Latin American disasters, however, offer encouraging evidence that the limitations in administrative problem solving identified by Simon and his colleagues may be overcome by a better understanding of the process of organizational decision making under conditions of complexity and uncertainty.

Interesting work has been done on this problem that draws upon the concepts of evolutionary adaptation developed by biologists studying the capacity of living organisms to adapt to disturbances or changes in their supportive environments.¹⁰ These analyses identified the process of selection that occurs in complex environments and recognized the function of a 'criterion of fit performance' as the basis for choice, but they did not explain how the selection was made or in what ways, if any, it was the product of conscious choice by the decision maker. In applying this concept to decision-makers operating in a disaster environment,¹¹ the question remained whether the choice was the product of a deliberate effort to improve administrative capacity for operation in subsequent disaster environments or whether it was the chance selection of the most appropriate alternative for that given disaster, one which would have to be recreated with different actors in a different environment in the next disaster.

The problem of translating the insights gained by individual administrators from a given disaster experience into lasting improvement in interorganizational performance was not addressed. The Concept of Maximizing Equilibration.

A link between cognitive development in organizational learning and the theory of adaptation is offered by the very interesting hypothesis of 'maximizing equilibration' presented by Jean Piaget in his brief book, Adaptation and Intelligence.¹² Piaget accepts the basic theory of adaptation as a mechanism for learning in living organisms, but focuses his inquiry on the process of selection that is crucial to understanding the choices made and retained in the interaction between the subject and the environment. He further is interested in how information gained from that interchange is retained in the larger system of information that governs the continuing performance of the class of organisms under study.

The process of adaptation to which Piaget refers is the simple dynamic described by evolutionary biologists of stimulus, selection, observation, evaluation and new selection on the basis of a fitness criterion. The elements in this model of adaptation were outlined by Holland and discussed by this writer in reference to the disaster environment of the Mexico City earthquake.¹³ These elements, for present reference, are listed below:

1. Environment (E): the specific parts of the larger environment or universe to which the system under study is adapting.
2. Inputs (I): the range of signals transmitted from the environment to the system undergoing adaptation.

larger system of organismic choices. To Piaget, two phases are involved in this process of 'maximizing equilibration'.¹⁶ They are, first, the convergent reconstruction of a response to a disturbance in the environment from elements of previous actions and, second, an extension of this new pattern to the larger system governing organismic behavior that accepts the innovation

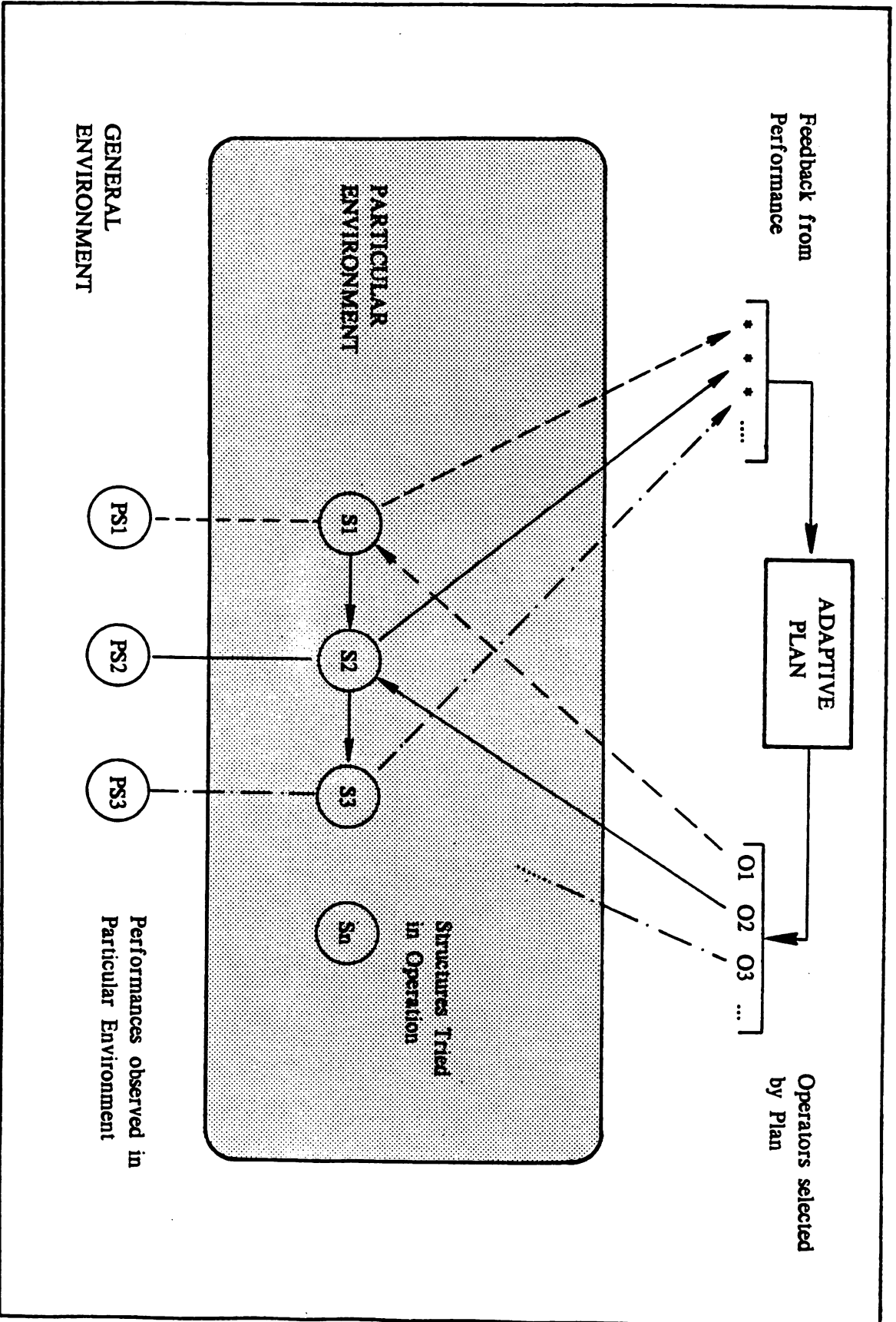
Piaget differs with this model of adaptation in his interpretation of the mechanism of selection. Piaget holds that the exogenous or external factors stimulating choice influence the endogenous or internal factors of the adapting organism to accept the selection made as an improvement to be continued in the larger system of organismic choices.

over centuries of development in living organisms. It is a process that biologists have observed in operation. It illustrates the functions of learning and memory in cognitive development. Interaction between a subject and its environment that illustrates the process of adaptation, involving the elements listed above, is represented in Figure 1.¹⁵ The model depicts the process of adaptation, involving the elements listed

3. Structures (S): the set of attainable forms within which the adapting plan acts in the environment.
4. Operators (O): the set of means or processes for modifying structures employed by an adaptive plan.
5. Memory (M): the specific aspects of the history of its interaction with the environment that the adapting system retains.
6. Limits (L): the existing constraints to the adaptive process.
7. Criterion (C): the measure by which different adaptive processes may be compared to determine fitness within the set.¹⁴

tion.

FIGURE 1
A MODEL OF ADAPTATION



Adapted from John Holland, Adaptation in Natural and Artificial Systems, p. 22.

There are three points in Piaget's exposition of this process that bear careful attention in our inquiry into cognitive development in organizing systems. First, he identifies the

phenocopy to the larger system that governs the range of responses of organisms in the environment.¹⁹

librium with the environment, the organism then reproduces or "copies" the variation in its continuing interaction with the environment. The organism then seeks to extend the variation or phenocopy to the larger system that governs the range of responses of organisms in the environment.¹⁹

tion. If the variation succeeds in recreating a stable equilibrium with the environment, the organism then reproduces or "copies" the variation in its continuing interaction with the environment. The organism then seeks to extend the variation or phenocopy to the larger system that governs the range of responses of organisms in the environment.¹⁹

to function.¹⁸ The disturbance alters the equilibrium of the organism living in the environment and the organism, in response, produces a variation in its performance that corresponds to the characteristics of the disturbance. In producing this variation, the organism engages in 'convergent reconstruction', that is, the assimilation of other behavior and rearrangement of earlier characteristics in such a way that it enables the organism to meet the demands imposed by the changed environment in a more satisfactory way. The variation then alters the environment, sensitizing the internal elements of the organism to its function. If the variation succeeds in recreating a stable equilibrium with the environment, the organism then reproduces or "copies" the variation in its continuing interaction with the environment. The organism then seeks to extend the variation or phenocopy to the larger system that governs the range of responses of organisms in the environment.¹⁹

ism that is activated by an organism in response to a disturbance in the environment that demands a new adaptation for the organism to function.¹⁸ The disturbance alters the equilibrium of the organism living in the environment and the organism, in response, produces a variation in its performance that corresponds to the characteristics of the disturbance. In producing this variation, the organism engages in 'convergent reconstruction', that is, the assimilation of other behavior and rearrangement of earlier characteristics in such a way that it enables the organism to meet the demands imposed by the changed environment in a more satisfactory way. The variation then alters the environment, sensitizing the internal elements of the organism to its function. If the variation succeeds in recreating a stable equilibrium with the environment, the organism then reproduces or "copies" the variation in its continuing interaction with the environment. The organism then seeks to extend the variation or phenocopy to the larger system that governs the range of responses of organisms in the environment.¹⁹

Piaget describes the phenomenon of 'phenocopy' as a mechanism that is activated by an organism in response to a disturbance in the environment that demands a new adaptation for the organism to function.¹⁸ The disturbance alters the equilibrium of the organism living in the environment and the organism, in response, produces a variation in its performance that corresponds to the characteristics of the disturbance. In producing this variation, the organism engages in 'convergent reconstruction', that is, the assimilation of other behavior and rearrangement of earlier characteristics in such a way that it enables the organism to meet the demands imposed by the changed environment in a more satisfactory way. The variation then alters the environment, sensitizing the internal elements of the organism to its function. If the variation succeeds in recreating a stable equilibrium with the environment, the organism then reproduces or "copies" the variation in its continuing interaction with the environment. The organism then seeks to extend the variation or phenocopy to the larger system that governs the range of responses of organisms in the environment.¹⁹

endogenous learning for the organism.¹⁷

into its permanent array of possible actions. The process occurs through the phenomenon of 'phenocopy', the interaction between subject and environment that converts the exogenous stimuli into

regions of disequilibrium in an environment as possible sources of innovation and learning and outlines a series of phases in this learning process of maximizing equilibrium. He acknowledges that the first reaction to a disturbance in the environment is likely to be an effort at rejection or denial of the external factor by the organism in order to conserve its normal pattern of behavior. The organism seeks to retain its equilibrium with the environment by simply rejecting the disturbing condition and emphasizing the positive aspects of its present behavior. If equilibrium is not reestablished by this first reaction, the organism next seeks to reestablish equilibrium by seeking a compromise or an accommodation with the changed condition in the environment. In seeking this accommodation, the organism will accept that accommodation which reestablishes equilibrium at the least cost to the normal pattern of behavior of the organism. If the disturbance continues beyond this phase, the internal elements of the organism, sensitized by the disturbance, create a response that represents a continuing accommodation to the change in the environment. The organism thus seeks to reestablish equilibrium with the environment by the permanent acceptance of the accommodation into the systemic range of behaviors for the organism.

The second point in Piaget's argument follows from his account of the continuing search for equilibrium through the reciprocal accommodation and adjustment between organism and environment. He notes that any lasting accommodation by an

organism to a change in its environment incorporates the negative as well as positive effects introduced by the disturbance. The means of creating this accommodation is through the rearrangement of information and characteristics from earlier levels of behavior in a new construction that meets the demands imposed by the environment more appropriately. This reconstruction, however, requires that the accommodation be accepted by each of the sublevels of the system, and that the equilibrium be attained at a systemic level.

Piaget's final point is that this process of maximizing equilibrium leads to the creation of systems that produce new content in their continuing interaction with the environment. This capacity for innovative behavior, to Piaget, derives from action. Through action, that is, engagement with the disturbing element in the environment, the organism learns and accepts new information that enables it to respond in a more appropriate way to the external challenge.

The importance of Piaget's interpretation of the mechanism of phenocopy and the process of maximizing equilibrium is that it explains how external information from the environment is accepted and assimilated by an organism, which then transforms its range of responses accordingly. The process is a continuous one of reciprocal adaptation and accommodation between the organism and its environment. The organism is seen as a self-regulating entity rather than merely a reactive body, an organism capable of acting in the environment as well as being acted upon

If Piaget's interpretation of cognitive development in

Maximizing Equilibration in International Disaster Operations.

in view of the continuing environmental risk. international disaster operations and assistance, a costly price time to inadequate performance in the complex conditions of problem solving appears to sentence human decision-makers for all acknowledge this capacity for cognitive development in human but human cognitive capacity may indeed be unbounded. Refusal to The tasks of integration may require observation and reflection, continuously reciprocal process of human cognitive development. memory with new information from the present environment in a problems by integrating resources and skills from long-term solving to include the capacity to create solutions to present extend the concept of limited short term memory in human problem interpretation is correct, it offers a powerful argument to decision-makers responsible for disaster operations. If his tics of living organisms, which includes the class of public-tions and interpretation clearly in the biological characteris-tional disaster assistance is clear. Piaget anchors his observa-adaptation and learning in the complex environment of interna-tion, but its applicability to the problem of organizational This is a very brief account of Piaget's thoughtful presen-the range of responses for multiple organisms.

and its environment to a larger system of organization governing the adaptation produced by this interaction between the organism by external forces. Further, Piaget notes the tendency to extend

An account of the adaptation process in international search and rescue operations in the disaster environment of the Mexico City earthquake of September 19, 1985 is presented by this writer in an earlier article, "International Disaster Assistance in the Mexico City Earthquake."²¹ The details will not be recounted here, but problems of interorganizational interaction identified

The Mexico City Earthquake, September 19, 1985.

ing equilibration in the adaptation process.

disaster environments to illustrate Piaget's concept of maximiz- areas for interorganizational learning are examined in the three problems of organizational interaction that indicate significant historical account of the three disasters. Rather, selective disaster operations.²⁰ Time and space will not permit a full, decision-makers; and 3) a review of documentary materials for direct professional observation; 2) interviews with participating sources of data for each of these disaster environments: 1) in Napo Province, Ecuador. This analysis is based upon three October 10, 1986 in San Salvador, El Salvador; and March 5, 1987 are the earthquakes of September 19, 1985 in Mexico City, Mexico; and decision-making in international disaster assistance. These of the same set of problems in interorganizational coordination consecutive years in Latin America serve as recurring instances international disaster operations. Three disasters in three that occur between the levels of administrative organization in patterns of resistance, accommodation, disruption and learning complex environments is valid, it should help to explain the

in that disaster environment will be re-examined in the subsequent disaster environments of the San Salvador earthquake of October 10, 1986 and, briefly, the Ecuadorian earthquakes of March 5, 1987.

Three problems of organizational interaction in international disaster assistance observed in the Mexican earthquake illustrate both the strong tendency toward maximizing equilibrium initiated in Mexico City and the difficulties encountered in achieving organizational equilibrium in complex disaster environments. Although these problems provide evidence of disequilibrium in international disaster assistance, they also indicate important areas of potential learning in international disaster operations.

The first problem involved the decision to request and/or send international disaster assistance. When the disaster occurred, President Miguel de la Madrid's first response was to decline the offer of U.S. assistance, stating that Mexico would be able to manage the response to the disaster with her own resources.²² In Piaget's terms, this refusal represents a classic first response to a disturbance in the environment, that of rejection or disbelief in the changed condition. As information regarding the scope and severity of the disaster became apparent, the President of Mexico sought an accommodation with the needs emerging from the disaster environment and requested a modest amount of assistance from the United States and other international donors.

The disaster created a massive disturbance to the normal operating environment of the United States Embassy. As Mexico is considered a "graduated country" in terms of economic development, there is no separate Agency for International Development (AID) Mission in Mexico City. AID is the organization that has formal responsibility for U. S. international disaster assistance. Consequently, the disaster management team sent by the

is used to illustrate the problem.

major actor in the international disaster assistance community, national embassies,²⁵ but the example of the United States, as a such magnitude. Similar disequilibriums were noted in other upon regular Embassy staff who were ill-prepared for an event of rene of the disaster and the unexpected responsibilities thrust generated within the United States Mission by the sudden occurrence in the response to the disaster. This was the disequilibrium within the subsystem of United States' organizations participating in the response to the disaster. This was the disequilibrium that surfaced in Mexico City was observed

The second problem that surfaced in Mexico City was observed relevant parties so that no further disruption ensues.

the environment but is accepted as an appropriate response by the essentially recreated each time a similar disturbance occurs in second level of equilibrium defined by Piaget, one that is Salvador²³ and Ecuador.²⁴ This accommodation represents the community and was replicated in the subsequent disasters of San its needs, has largely been accepted by the international affected nation's capacity to request assistance and to outline The adaptation evolving from this exchange, respect for the

Office of Foreign Disaster Assistance worked directly with States government and to facilitate the reception and distribution of the extraordinary outpouring of charitable assistance from United States' voluntary organizations.²⁶ Embassy personnel with other assignments in normal operations assumed disaster responsibilities with little preparation, training or facilities for operation.

Yet with considerable individual initiative, endurance and practical inventiveness, Embassy staff worked with volunteers and representatives of U. S. search and rescue organizations to make accommodations and adjustments to the demands from the disaster environment. The organizing goal of the disaster operations, articulated by the OFDA team and shared widely through the set of participating organizations, was to save lives and provide assistance to the victims of the disaster.²⁷ Accepting this 'criterion of fit performance', the set of organizations within the U.S. subsystem slowly brought increasing order to the initial chaotic situation.²⁸ Such adjustments represented, again, the second level of equilibration, an adaptation that allowed the set of U.S. organizations to function in the disaster environment, but one that would have to be recreated at the next disaster occurrence.

Many U.S. participants and observers of the Mexican disaster sought ways to extend the insights and experience gained from participation in the disaster environment to improve training and

preparedness at other levels of organizational action.²⁹ In Piaget's terms, such efforts represent the intent to extend the reconstruction of organizational actions to create a new framework of operation in international disaster assistance, the third level of equilibrium. Obstacles of resources, time and differing views of disaster operations, however, constrained these efforts at extension, and an overall new structure for disaster management did not emerge. Conserving forces within the United States' political and charitable communities supporting disaster assistance operated to inhibit change to the existing pattern of essentially spontaneous arrangements for response and assistance after a disaster occurs.

Such resistance, to Piaget, is a normal reaction by living organisms to change in their environment.³⁰ Any adaptation or modification would have to be understood and accepted by each component of the overall system that is involved with international disaster assistance for the United States. This is indeed a large and complex system with multiple levels of organization, differing constituencies and varied motives for participation in international disaster assistance. It is not surprising that proposals for change should encounter powerful forces of resistance within this system of organizations. Activated only on a sporadic basis, the U.S. system of organizations generating international disaster assistance tends to be discontinuous in its learning, as the integration of new experience and information through its various levels of organization is slow and difficult.

difficult. A third area of significant disequilibrium observed in the Mexico City disaster was the apparent conflict in search and rescue strategies among the various international teams. The conflict in urban heavy rescue techniques emerged most visibly between the United States and French teams.³¹ This interchange again represented Piaget's first level of equilibration when the immediate conflict ended with the French team's withdrawal, but with both teams resisting change in their respective procedures. The lack of coordination among the international search and rescue teams, however, led the United States, Swiss and German teams to seek a means of reducing the problem through nightly meetings of team leaders in order to share information and to plan jointly for the next day's search.³² The result was a second level of equilibration, an adaptation accepted by the participating team members as satisfactory at the time, but one that would have to be recreated again at the next disaster, with the next set of participants.

Efforts were made to extend some of the adaptations that evolved from the Mexican experience to a wider system of international search and rescue organizations. For example, members of the U.S. Dog Team prepared an organizational design and set of guidelines for a permanent U.S. Dog Team to be available for international search and rescue operations.³³ International conferences explored common guidelines for providing medical assistance and other types of aid following disaster events.³⁴

Barely a year later, iterations of the same set of problems

The San Salvador Earthquake, October 10, 1986.

respectively normal operations from the disaster environment. Issues were largely set aside as participants returned to their gent reconstruction, was not consistently achieved. Unresolved response actions, a requirement for Piaget's concept of conver- well as positive characteristics into innovative disaster ment, but the critical capacity to incorporate the negative as sought to function as well as possible in the disaster environ- Some adjustments in performance did occur as participants tion among participating international search and rescue teams. international disaster assistance process; and 3) the coordina- subsystem of United States' organizations participating in the international disaster assistance; 2) the coordination within the the host and donor nations in the decisions to request and send in disaster environments. These are: 1) the interaction between areas also indicate potential sources for organizational learning disequilibrium in international disaster assistance, but these In summary, the Mexican experience revealed areas of international levels.

through multiple levels of organization required at national and encountered obstacles in obtaining the resources and support these efforts were either deflected by stronger interests or of international search and rescue experts.³⁵ However, many of and rescue teams that would enable them to join the growing cadre other nations, such as Japan, began to develop national search

First, El Salvador was already suffering severe social and economic losses from the six-year old civil war that had set back the nation's per capita income level by twenty-five years.³⁷ The losses imposed by the disaster, estimated at \$904 million, amounted to approximately one-quarter of the nation's

conduct of international disaster response operations. Salvadorean disaster environment that affected the conception and operations. There were a number of critical differences in the organizations regarding the goals of international disaster revealed a deep, but vital conflict within the U.S. subsystem of was not so easily resolved. Rather, efforts at coordination organizations in coordinated disaster response actions, however, The second problem, the integration of the subsystem of U.S.

organizational learning from the Mexican experience. facility with which these actions were taken showed evidence of little difficulty in the initial hours of the disaster.³⁶ The Salvadorean environment with mutual respect among the nations and response by international governments, was recreated in the initial request for assistance by the host government and The first problem identified in the Mexican case, the surfaced in international disaster assistance activities.

the disaster nonetheless generated significant similarities as well as differences in organizational adaptations as disturbances surfaced in the disaster environment of San Salvador, following the 10 October 1986 earthquake. Occurring in a different political and economic environment with largely different actors,

gross income. The disaster, consequently, threatened an already fragile economy and vulnerable society, increasing the sense of loss to the victims proportionately.

Second, given its distressed economic condition and politically sensitive location in Central America, the United States had a strong and well-financed Agency for International Development Mission as well as a fully staffed Embassy in El Salvador. Members of the regular AID staff were seasoned civil service personnel who took pride in their professional administrative capacity as well as their ability to function under the stressful conditions of the civil war. Nonetheless, they had relatively little formal disaster preparedness training.

Third, the United States Embassy was destroyed during the earthquake, a critical condition that greatly affected disaster operations. Embassy and AID staff lost access to files, computers, telephones and the normal routines of bureaucratic offices. Staff were operating out of improvised locations in the Ambassador's home and working at card tables set up in the patios of the AID Guest House.³⁸

Finally, members of the regular Embassy and AID staffs were themselves victims of the disaster, vulnerable to the same consequences of stress, dislocation and fatigue as the population they were seeking to serve.

Given these stressful environmental conditions, it is not surprising that disequilibrium was evident among the United States' organizations involved in disaster assistance. The form

taken by the conflict and the content of the issues in dispute, however, are very revealing in terms of the underlying tensions and ambiguities of international disaster assistance. The explicit issue was the conflict in authority between the regular AID Mission and the Disaster Operations Team sent by the Office of Foreign Disaster Assistance (OFDA) to manage the disaster operations of the United States' government organizations. The implicit issues were conflicts in goals of operation, management styles and operating procedures.

To the Acting Director of the AID Mission, the issue was clear. He was in charge of disaster operations as the responsible official heading the permanent AID Mission operation. The OFDA Disaster Operations Team was sent to assist him in meeting the additional demands created by the disaster. Although the disaster was an unfortunate event that disrupted regular operations, the principal responsibility of the AID Mission was continuing the programs of economic development for the country. His primary goals were the responsible management of U.S. resources, personnel and time under the difficult conditions of the disaster. He expected to be fully informed of all operations and insisted that professional procedures be followed, since he would be accountable to the Ambassador for all actions and expenditures undertaken in the disaster operations.³⁹ To the Acting Director, the principal criterion for professional performance was the systematic, efficient, accurate accounting of the personnel, equipment and materials expended during the disaster

The two sets of organizational values represented by the leaders of the AID Mission and the OFDA team were clearly in conflict. Initial efforts at rejection, control, or avoidance failed to alleviate the tensions. The disequilibrium continued over the period of disaster operations at an uneven rate, with efforts at accommodation alternating with renewed frustration over unexpected differences, until the OFDA disaster team began to close down its operations and prepared to leave the disaster environment. The conflict was an especially deep and difficult one, for primary values of both leaders were involved. To alter

making process.⁴¹

To the Coordinator of the OFDA Disaster Operations Team, the issue was equally clear, but opposite in its requirements for action. He was sent to San Salvador specifically to organize and coordinate the U.S. response to the disaster. There were some 1,200 people dead, 10,000 injured and approximately one-fifth of the population of metropolitan San Salvador, estimated at over a million persons, left homeless.⁴⁰ His primary goal was to take immediate action in order to save lives and get needed assistance to the victims of the disaster as quickly and effectively as possible. His first obligation was to meet the needs of the disaster victims, and he fulfilled his professional commitment to OFDA by doing so quickly, efficiently and effectively. To the Coordinator of the OFDA team, commitment to humane values, initiative, flexibility, and innovativeness drove the decision-

the values of either experienced leader would have reduced the credibility of the disaster operation, in his terms. The uneasy accommodation ended with the closure of disaster operations, but no clear reconstruction was reached. To do so would have required a totally fresh approach to disaster management that would have incorporated the two opposing, yet valid, perspectives on disaster operations. Some equilibrium was attained, as indeed the disaster operations were conducted and concluded. But differing interpretations of the impact of disaster, the primary goals of disaster response and appropriate procedures for action in a disaster environment inhibited the reformulation of an integrative approach to disaster operations.

The third area of disequilibrium, conflict among the international search and rescue teams, emerged even more vividly in San Salvador than in Mexico City. Ironically, the conflict reflected the fact that the number of participating teams and the sophistication of their respective technologies were greater than the situation actually required for the scope of the disaster. Of the twenty-four buildings that were seriously damaged, only twelve major structures possibly had live victims.⁴² Yet there were at least fourteen international search and rescue teams, each with their own special technologies, motivations and audiences seeking to assist in the process. Search and rescue operations focused on one collapsed building, the five-story Ruben Dario structure, believed to have had 300 persons trapped inside at the time of the earthquake. This single site became a

crucible in the disaster environment for the play of differing techniques for search and rescue operations and differing styles of management among the various international teams. That conflict occurred among the participants in this environment is not surprising. To Piaget, such responses would be first level reactions of rejection of perceived interference or refusal to acknowledge unknown characteristics in a preferred mode of operation, predictable living organisms.

More interesting is the content of the conflict and the evolution of actions taken by the different teams to reach a workable accommodation in difficult disaster environment.

The explicit conflict centered on control of operations at the disaster site. The implicit conflicts reflected differences in techniques of tunneling vs. burrowing in collapsed concrete structures, norms of professional courtesy and respect among the participating teams, differences in management style, training experience, language, culture and varying political and professional constituencies for the support of search and rescue work. After an initial round of rejection, withdrawal and reestablishment of control at the disaster site, a very interesting accommodation was made on the fifth day into the disaster, when the U.S. fire chief on duty at the command post created an international dog team, with one British, one French, one Swiss and one U.S. dog and handler, respectively, working together on the site at the same time.⁴³ This innovation was accepted by the participating teams and the rescue work proceeded smoothly,

Piaget's second level of equilibration. The cost was the delay in time. It was then Day Five after the earthquake, too late for many of the victims trapped in the building.

In San Salvador, a very interesting effort was made to reframe the concept of international search and rescue in a new operational format, Piaget's third level of equilibration. At the initiative of the Israelis, discussions were held with a small group of leaders from the Israeli and U.S. operations teams to explore the possibility of designing a set of international guidelines and recommended qualifications of search and rescue operations.⁴⁴ An initial step in such a process is to gather information, perspectives and recommendations from experienced professionals in the field. Toward this end, a survey was designed and sent to all teams that participated in the Salvadoran search and rescue operations in March-April, 1987.⁴⁵ The returns are currently being analyzed and will serve as the basis for designing the next set of actions to be proposed to a wider group of international professionals in search and rescue operations. This exploratory phase is still in process. It is too early to assess the outcome, but from action comes the insight necessary to guide the next step. It is clear that a workable framework for international search and rescue operations can only evolve with integration of the conflicting perspectives and modes of operation that were revealed so vividly in the Salvadoran context.

The three problems identified in the Mexican and Salvadoran earthquakes played out quite differently in the Ecuadorian disaster environment. The first problem involving coordination

The Ecuadorian earthquakes presented a very different environment for disaster operations than the Mexican and Salvadoran earthquakes. First, the earthquakes occurred in the sparsely settled province of Napo, with the largest structural impact occurring in the adjacent Andean provinces of Carchi and Imbabura. Relatively minor impact was felt in the metropolitan area of Quito, the capital city, with substantially more damage occurring in provincial towns and barrios of Pichincha. The immediate impact of the earthquakes affected a relatively small number of people in comparison to the disasters of Mexico City and San Salvador with estimates ranging from 300 to 1,000 people dead, and 3,000 to 5,000 persons left homeless. The enormous hidden cost of the earthquake was the destruction of thirty kilometers of the oil pipeline, thereby adversely affecting the economic condition of the entire nation, dependent upon oil exports for 50% of its gross annual income.⁴⁶

The earthquakes of March 5, 1987 in Napo Province, Ecuador offer the most recent of three Latin disaster environments for observation of the coordination among international disaster assistance organizations. In the interest of brevity, only summary observations will be offered in reference to the problems of interorganizational coordination under analysis.

The Ecuadorian Earthquakes of March 5, 1987.

between the Ecuadorian government and other nations on the initial request for, and response in, international disaster assistance was affected by the delay in adequate assessment of the damage that occurred in the rural provinces. Yet, once the extent of the damage was clear, the interaction between Ecuador and other members of the international community regarding the need for disaster assistance was recreated with mutual respect and responsible action.⁴⁷

The third problem, coordination among international search and rescue teams did not recur in this disaster environment, as the disaster occurred in rural areas with a relatively small number of people affected. The buildings most seriously damaged were one and two-story structures, where the inhabitants were severely frightened, but most escaped unharmed. Most lives were lost in the flash flooding of towns along the Salado River, but the torrent of water was so swift and powerful that there was little hope for survivors. Consequently, there was little need for the sophisticated international urban heavy rescue teams that participated in the Mexican and Salvadorean disasters. More interaction among international organizations occurred during the reconstruction phase in rebuilding the communities after the disaster occurred. These interactions occurred, however, without the driving urgency of time in the rescue of human lives, and the style and form of the interaction could be designed with more deliberate care.⁴⁸

Most interesting, however, was the form that evolved for the

The conflict in operational goals between the AID Mission and the OFDA Disaster Operations Team that emerged in the Salvadoran disaster environment was sidestepped in the Ecuadorian context by placing the direction of disaster operations with the AID Disaster Relief Officer and sending only one member of the OFDA team to work directly with community organizations in the distribution of U.S. disaster assistance to the affected population. The disaster operations within the U.S. subsystem worked quite smoothly, with relatively little conflict among the participating organizations.⁵⁰ The price of this internal cohesion within the U. S. subsystem, however, may well have been the overall effectiveness of the U. S. disaster assistance effort in terms of the actual needs and perceptions of the affected Ecuadorian population. The form and content of the disaster

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The basic conflict over goals of disaster assistance clearly was not resolved with the particular accommodation among the subsystem of U.S. organizations reached in the Ecuadorian disaster environment. It is a fundamental conflict in values, and it is not likely to be resolved without incorporating elements of both views into a new overall reconstruction of international disaster assistance.

States.⁵¹

influencing the allocation of disaster assistance in the United Team in San Salvador, was subjected to strong pressures to conform to the particular interests of political constituencies sionately, articulated by the coordinator of the OFDA Operations people affected by the disaster quickly, effectively and compassionately, articulated by the coordinator of the OFDA Operations ethical commitment to meet the basic needs of the Ecuadorian disaster assistance. The primary goal of disaster response as an improvements for organizational coordination in international the Ecuadorian disaster might be translated into long-term cumulative economic, social and organizational consequences of unusual experience of multiple sites for the disaster and the sought. Relatively little reflection was expressed on how the feedback from the affected population was not systematically Little evaluation was done of the actions taken, and critical Ecuadorian people who suffered from the impact of the disaster. constituencies in Washington than the actual needs of the response actions appeared to be determined more by the political

Toward Maximizing Equilibrium in International Disaster Assistance.

Reflecting on the experience of interorganizational coordination in the differing environments of recent disasters in Mexico, El Salvador and Ecuador, this writer offers four conclusions that may contribute to a better understanding of the process of maximizing equilibrium in international disaster assistance.

First, the standard pathologies of organizational behavior in uncertain environments -- ego-striving, self-interest at the expense of the larger group, narrow perspectives, distortion in communication and assertions of domination or control -- can be better understood and more easily overcome if we see them as reflections of the inherent biological tendency of all living organisms to regain equilibrium in environments undergoing significant change. Disaster environments create conditions of traumatic change and uncertainty for participants in which their normal mode of operation is being fundamentally challenged. The disequilibrium created by disaster is profound, and human beings, as biological organisms, are likely to respond in ways that protect familiar patterns of operation.

Second, areas of disequilibrium or conflict that surface in disaster environments serve as primary sources of potential learning to improve performance in disaster operations. Rather than being suppressed as evidence of failure, these areas deserve to be studied carefully by the participants in order to discern the substance and form of the issues in conflict to inform their understanding of the process.

Third, the most effective means of dealing with negative behaviors in organizational interaction is to acknowledge their existence and to incorporate insights gained from both negative and positive patterns in a reconstructed framework for inter-organizational action. It is crucial to design a learning environment so that the participants may see directly the consequences of their own actions on other participants in the process as well as the effect upon their shared organizational goal.

Finally, evidence grows that human cognitive capacity may be unbounded. That is, through learning processes of reflection, integration and synthesis at multiple levels of organizational interaction, human decision-makers have demonstrated a capacity to move consistently toward improving their performance in the uncertain, complex and highly variable environments of international disaster assistance. It is also evident that this learning process can be facilitated through thoughtful design and continuing action.

NOTES

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3. See, for example, the account of this problem by Louise K. Comfort in "International Disaster Assistance in the Mexico City Earthquake" in New World, Vol. 1, No. 2, 1986, 10-43. See also the discussion by Louise K. Comfort and Anthony G. Cahill in "Increasing Problem Solving Capacity Between Organizations: The Role of Information in Managing the 31 May 1985 Tornado Disaster in Western Pennsylvania" in Louise K. Comfort, ed., Managing Disaster: Strategies and Policy Perspectives (Durham, N.C.: Duke University Press, forthcoming, 1988).

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5. The Office of Foreign Disaster Assistance, Agency for International Development in the U. S. Department of State has sponsored a continuing series of training programs, research projects and international conferences on emergency preparedness and response over the last fifteen years. Interview, Alan Swan, Assistant Director for Latin America, Office of Foreign Disaster Assistance, San Salvador, October 19, 1987.
6. Herbert A. Simon, Administrative Behavior, 3rd Ed. (New York: The Free Press, 1976): 38-41.
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12. Jean Piaget, Adaptation and Intelligence (Chicago: University of Chicago Press, 1980).
13. See John Holland, op. cit., pp. 3-5.

14. This list of elements is presented by Holland in Adaptation, p. 5. The model is also presented in application to international search and rescue operations in Comfort, "International Disaster Assistance in the Mexico City Earthquake," op. cit., pp. 15-20. It will not be discussed in detail in this paper. The reader is referred to the earlier presentation.
15. This figure is cited in I. Comfort, "International Disaster Assistance in the Mexico City Earthquake," op. cit., p. 18.
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17. Jean Piaget, Adaptation and Intelligence, p. 11.
18. Piaget, op. cit., p. 93.
19. See Piaget, op. cit., especially chapter 5, The Model Proposed.
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23. See telex sent by the United Nations Disaster Relief Organization (UNDRO) cable sent to the German Search and Rescue team, dated October 26, 1986, following the Salvadoran earthquake of October 10, 1986.
24. Hoy, Quito, Ecuador, March 7, 1987.
25. Interview, Consul Minister, British Embassy, Mexico City, 9 October 1985; Interview, Press Attache, West German Embassy, Mexico City, October 11, 1985.
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30. Piaget, op. cit., p. 106.
31. Comfort, op. cit., p. 30.
32. Linda Wallace, member, U.S. Dog Team, Interview, November 22, 1985.
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