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David W. Britt

University of Maryland Eastern Shore

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Analyzing the Shape of Organizational Adaptability in Response to Environmental Jolts*

David W. Britt
University of Maryland Eastern Shore

ABSTRACT

Examining how organizational systems have responded to external jolts (threats, crises, etc.) is a useful precursor to large-scale organizational development projects. The shape of adaptability is introduced as a sensitizing concept for facilitating such analyses. The suggested elements of shape consist of three critical performance levels ([1] at the time of the jolt; [2] at the lowest point after any fall off in performance; and [3] its recovery level), and three time periods ([1] how long the organization is able to resist a fall off in performance [Resistance]; [2] how long it takes the organization to recover to its original performance level after a fall off [Resilience]; and [3] how long its recovery level lasts before decaying [Retention]). The success of the FAA's passenger screening system in defending against hijackings is used as a vehicle for discussion.

There are several situations in which the capacity of an organization to adapt to change becomes both theoretically and practically important. Organizational growth and decline pose challenges (for attempts to model some of the basic processes, see: Levine, 1978; McKinley, 1987; Starbuck et al, 1978; Whetton, 1980b; Zammuto & Cameron, 1982). Changing technologies create

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1 Science, 22, 151-162.

adaptation problems (Damampour & Evan, 1980, for example). Myer (1982) has argued that when such challenges are sudden, disruptive and potentially inimical—like a doctor's strike is for hospitals—much can be learned about organizational adaptability. He called such situations "jolts," to capture the characteristics of suddenness, disruptiveness and potential inimicalness. This paper develops the concept of the shape of adaptability to make the analysis of the impact of environmental jolts somewhat easier and richer in information.

The shape of adaptability is composed of six elements. Three tap levels of functioning: at the time of the jolt, at the lowest point after the jolt, and the organization's recovery level. Three other elements measure time periods during which the process of adaptation is taking place: the length of time a system can continue to function at the same level of success as before a jolt has taken place without a drop off in performance (Resistance); the length of time a system takes to recover to its pre-jolt level of performance after experiencing a drop off in performance (Resilience); and the length of time before the post-recovery level of performance begins to decay (Retention). Underlying these are straightforward interpretations of levels and time which capture much of the complexity of what is happening to organizations as they try to cope with jolts, while permitting a relatively comprehensible exchange between organization members and applied social scientists.

Some attempts to understand the dynamic process by which organizations adapt to environmental changes have exploited cases in which sudden shifts in environmental conditions and/or successfulness of response have exposed different aspects of the processes involved. Starbuck, Greve and Hedberg (1978) studied organizations in which long periods of success were followed by periods of severe and potentially continuing loss in order to explore the ironic paths by which success can lead to crisis. Myer (1982) analyzed hospitals with differing postures toward their environments in order to develop a model of how organizational attributes affect the capacity of an organization to adapt to environmental jolts in the short and the long term. For the applied social scientist, the exploitation of jolts is essential because of the rich information they cause to surface about adaptive processes, information that can lead to both short and long-term intervention strategies.

Jolts: There are several synonyms for jolt: crisis (Starbuck, Greve & Hedberg, 1982; Billings, Milburn & Schaalman, 1980; Hermann, 1969, 1972b), decline (Zammuto, 1982, provides a review), and catastrophe, among others. These appear to vary both in the intensity of their impact and in their degree of confusion with the responses of organizations, as well as in the number of alternative definitions possible for each of these terms. Of particular relevance is the concept of crisis, referring to a complicated set of reciprocal relationships among external and internal events which appear to jeopardize some central purpose or function of the organization and the organization's coping mecha-

nisms. Crisis is an apt description of such situations, for the enactment of normal organizational coping mechanisms ("business as usual" responses) often only makes things worse (Starbuck, Greve & Hedberg, 1980).

Jolts, as defined by Myer (1982) and used in this paper, simplify the analysis of such situations by focusing on a subset of these variables, the external events which may precipitate a crisis.¹ In so simplifying the analysis, Myer's use of the term jolt approaches Hermann's (1969, 1972a) usage of crisis as a situation characterized by threat, surprise, and requiring quick decisions.²

Jolts may take a variety of forms. School systems may have their budgets cut back severely, suffer major teacher strikes or undergo redistricting. Manufacturing concerns may be beset by new competitors with better and/or cheaper products, a suddenly changing labor force or a disappearance of demand for their products. Regulatory agencies may be jolted with increases in the level and intensity of actions with whose control they are charged. All of these have in common that they are difficult-to-foresee environmental events which are disruptive and potentially inimical to the organizations in question. By analyzing the patterns of response to jolts it is possible to examine how disruptive the jolts were and whether their impact was inimical, benign, or mixed.

The adaptability of FAA's passenger screening system in response to fluctuations in hijacking activity (as jolts) are the subject of this paper. The Federal Aviation Act of 1958 established the Federal Aviation Administration (FAA) to provide for safe and efficient utilization of the nation's airspace (Public Law 85-726; 49 USC 1348). Since 1973, the FAA's Office of Civil Aviation Security has been responsible for the implementation and coordination of security measures to deter acts of criminal violence and aircraft piracy (Public Law 85-726; 49 USC 1356 and 1357). Hijacking activity is a subset of significant criminal actions involving civil aviation, a category which includes bombings of airports, ticket offices, airplanes, terrorist actions other than hijackings, and so on (FAA, 1986). This paper concerns itself with hijacking activity exclusively for a number of reasons, not the least of which being that the data are much more reliable.

From June of 1973 through December of 1986 there were 214 hijacking attempts aimed at U.S. registered air carrier aircraft which were located either in U.S. cities or one of its territories or possessions (such as Puerto Rico). Excluded is all hijacking activity targetted at foreign air carriers (including one hijacking attempt against a Swiss airliner while it was in Chicago in 1986), all general aviation (i.e., helicopters and private planes) hijacking activity, and five attempts against U.S. air carriers while the aircraft were overseas. The general aviation cases are separated out because the threat against the travelling public is minimal. In the other excluded cases, the varying political relationships and responsibilities for passenger screening would introduce too many partially confounding elements. In France, for example, though the FAA holds U.S. airlines

accountable for proper security, it is the French government which provides the basic screening of bags and people boarding planes. Limiting the analysis to these 214 cases permits holding constant the political/responsibility relationships and extent of involvement of the travelling public.

The distribution of these 214 cases across time reveals that there were three periods during which there were several hijacking attempts in a short space of time. These severe jolts of hijacking activity occurred in 1974-75, 1980, and 1983. The shape of adaptability will be especially helpful in analyzing these severe jolts of hijacking activity.

Adaptability: Any organization has (potential) ways of measuring its performance across time, either for its own purposes or to respond to constraints placed upon it by other entities. FAA tracks both the number of hijacking attempts each year and the results of these attempts. These figures are reported to Congress semi-annually. Of these 214 cases, 114 (53.3%) represent prevented hijackings, defined as stopping the attempt before the hijacker(s) reached a plane. This is a conservative definition, as only very few hijacking attempts resulted in hijackers' getting to a plane and getting it to a destination; in only a few cases was there any harm inflicted on passengers.

The conservativeness of this definition of prevention success becomes more apparent from examining Table 1. In 35 cases during this period, hijackers were able to get planes to land where they wanted. The vast majority of these 35 cases occurred in 1980 and 1983, when Mariel boatlift people were hijacking planes to get back to Cuba. Aside from those cases, successful hijackings (defined narrowly as success in reaching destinations) have been rare.

With respect to FAA's passenger screening system, the level of adaptability for each year that the passenger screening system has been in existence may be operationalized as the percentage of hijacking activity which is prevented (Prevention Success). Operationalized this way, it is possible to examine how fluctuations in hijacking activity (as jolts) have had an impact on fluctuations in prevention success (as adaptability). In the same manner, one might examine, over time, levels of performance in response to levels of external threat of some kind for any organization.

To treat the analysis of adaptability as merely an exercise in the analysis of joint fluctuations in the level of performance and jolts is unnecessarily restrictive. The impact of the jolt may have intensities of effect which decay and/or expand over time in different ways. It is here that the analysis of shape becomes useful to the interventionist in the framing of questions about the causes of different patterns of response and what can be done about them. The elements of shape can be related to adaptability as a set of working assumptions which reflect starting points for these analyses.³

Level of Performance at the Time of the Jolt: How well the organization is functioning at the time of a severe jolt is the first key element in the shape of

Table 1: Yearly Date on Hijackings and Traffic Volume¹

	Total Hijacking Activity ²	Number of Prevented Hijackings ³	Prevention Success ⁴	Traffic Volume ⁵
1973	NA	NA	NA	202
1974	28	25	89	201
1975	41	35	85	202
1976	12	10	83	414
1977	7	2	29	509
1978	11	3	27	580
1979	16	5	31	593
1980	31	10	32	585
1981	15	8	53	599
1982	15	6	40	630
1983	25	7	28	709
1984	6	1	17	776
1985	8	4	50	993
1986	4	1	25	1101

¹ Data through 1985 abstracted from FAA (1986). Data for 1986 were provided by FAA statistical staff.

² All attempts to hijack domestic airline carrier aircraft.

³ Number of hijacking attempts in which hijacker(s) failed to get to the planes.

⁴ Percentage of hijacking attempts which were prevented.

⁵ Volume of passenger traffic passing through screening procedures (in millions).

the adaptive response. *The higher and more stable the level of functioning at the time of the jolt, the more adaptable the organization.* For the FAA's passenger screening system, this translates to the level of prevention success at the time of the jolt.

Resistance: Proceeding forward in time from the occurrence of a jolt, the first question of interest is how long the organization continued to function at a normal level in spite of increases in environmental jolt activity. *The longer the organization is able to resist a fall-off in performance, the more adaptable the organization is assumed to be.* If the passenger screening system's coping mechanisms and resources are sufficient to handle any hijacking situation that comes along, or if almost instantaneous learning is taking place and the result of that is learning how to cope better, then there may never be a drop in the capacity of the system to prevent hijackings. Typically, however, the coping mechanisms of any organization may be overrun at some point or under some conditions, so the length of time from the onset of the jolt before a decrease in effective functioning takes place is a useful indicator of adaptability. This aspect

of adaptability is being called Resistance. For the FAA's passenger screening system, this would be operationalized as the length of time the passenger screening system continued to function at a normal (pre-jolt) level of functioning without suffering a loss of effectiveness in its capacity to prevent hijackers from reaching planes.

Level of Functioning at Lowest Point After Drop-Off in Functioning: At some point, an organization's coping mechanisms may be overrun. The mechanisms themselves may have been relatively weak or the jolt may have been intense and/or different from what had been experienced before. At that point, knowing the extent of a drop on critical indicators of organizational functioning is important information. *The greater the fall-off in performance (actual or proportional), the less adaptable the system is assumed to be.* Myer (1982) chose three operationalizations of his responsive phase for hospitals: proportional declines in occupancies, FTE employees, and projected revenues. Where projections have some predictive validity, such an approach could be used. In the case of the FAA (as for many other organizations), predictions of both hijacking activity and prevention success are difficult. Two indicators are used here: the level of functioning at its lowest level after the jolt; and the percentage fall-off in prevention success.

Resilience: How long it takes an organization to recover after a fall-off in performance is also relevant. Myer (1982), for example, calculated the amount of time it took hospitals to return to pre-jolt levels of numbers of surgical procedures and the percentage of beds filled. *The shorter the time it takes the system to bounce back to pre-jolt levels of functioning, the more adaptable the system is assumed to be.* In the case of the FAA's passenger screening system, how long it takes the system to recover to its initial level of prevention success is used as an indicator of Resilience.

Level of Highest, Stable Functioning Attained After the Jolt: The stable, post-jolt level of functioning could be assessed as a longer-term index of adaptability, based on the assumption that *the higher the post-jolt level of functioning relative to the pre-jolt level, the greater the adaptability of the organization.* This also helps neutralize some of the ambiguity in assessment generated by the alternative end points for the time period assessed as Resilience, because it picks up the end-point level whether it is the same as the pre-jolt level of functioning, lower than the pre-jolt level or even higher than the pre-jolt level.

Retention: It must be realized, however, that the post-jolt level of functioning may not be stable, but may begin to decay immediately. *The longer the time period until any positive effects begin to decay, the more adaptable the system is assumed to be.* The approach to Retention taken in this paper differs from that of Myer (1982). For Myer, Retention is indicated when more profound and longer-lasting qualitative changes have taken place in the coping processes by

which the organization adapts to jolts. Theories of action may be modified. Structural configurations may be altered. Levels of slack resources may be increased. And, finally, behavioral repertoires may be augmented.

The extent to which an organization learns from environmental jolts is of undeniable interest. It signals an organization on the path to becoming more capable of adapting to environmental jolts of greater intensity and variety across time. In this paper, however, the focus is on outcomes only, so the length of time before a decline occurs after recovery is used as an index of Retention.

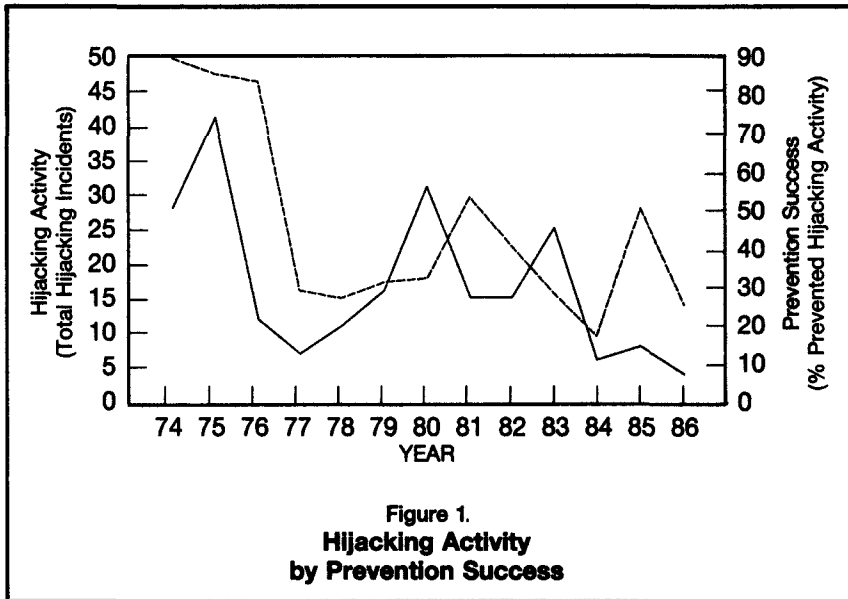
The elements of shape may change across time. The length of time it takes an organization to recover to pre-jolt levels of performance, for example, may get longer with successive jolts, suggesting that the organization is becoming less adept at recovering from such jolts. On the other hand, there may be a positive trend. The recovery times may be getting shorter, suggesting some improvement in the capacity to respond to such events. Even a complicated set of trends in levels and times can be described simply using the concept of an organization's changing shape of adaptability.

Relating Jolts and Adaptability

Level Analysis: Figure 1 displays the yearly data for the relationship between Hijacking Activity and Prevention Success for the years 1974 through 1986, the years for which data are available from semi-annual FAA reports. Hijacking Activity is considered to be the jolt in this case, and Prevention Success is considered to be an organizational outcome which taps the capacity of the system to respond in the short term. Increases in hijacking activity have been associated with subsequent increases in prevention success after a lag period. Decreases in hijacking activity have been followed by decreases in prevention success after a lag period.⁴ More formally, there appears to be a positive, lagged effect of hijacking activity on prevention success.

Rather than undermining the system's capacity to adapt, occurrences of jolts of hijacking activity appear to have stimulated the passenger screening system to become relatively more successful in preventing hijackings. However, it also appears that the stimulation has been only temporary. When the level of hijacking activity has fallen off (as it did in 1976 and 1981, for example), this has been followed by a decline in the percentage of hijacking activity which is prevented at the boarding gate.

Shape Analysis: Looking more closely at Figure 1, however, provides a different impression of the closeness of the lagged relationship between the jolting impact of hijacking activity on the performance of the passenger screening system in preventing subsequent hijackings. The shape of the response to jolts appears to have changed over time. Though superficially similar, the im-



part of the jolts of hijacking activity appear more negative across time, with drop off's being more pronounced, recovery times taking longer and any positive effects beginning to decay more rapidly.

The first wave of hijacking activity, for which we are able to get reliable data on all variables of interest, occurred in the early seventies (Peak "A" in Figure 1). The response appears to have been immediate, positive and relatively long-lasting. The success of the system in preventing hijackers from getting to planes was consistently above 80%, the response was close to being immediate, and it lasted for a year after the volume of hijacking activity dropped precipitously between 1975 and 1976. During and after this wave, Resistance, Resiliency, and Retention appeared high. Although it is not possible to assess the level of performance of the system before this time period, it is clear from the lack of any fall off in performance from the wave of hijacking activity and the initial high level of this performance that the impact of the wave of hijacking activity had only positive effects on the capacity of the system to respond, at least through 1976. Undoubtedly, there is a strong confounded effect from the newness of the system, with perhaps a heightened sense of enthusiasm about how well the newly-designed system was working.

Ironically, this extraordinary level of prevention success set the stage for a sizeable drop after 1977. As the level of hijacking activity dropped from 41 in 1975 to 12 in 1976, the passenger screening system was quite effective for another year, then dropped off rather rapidly from a prevention success rate of

83% in 1976 to a rate of 29% in 1977. The passenger screening system continued to limp along at a prevention success rate of between 20% and 30% as long as the level of hijacking activity remained low.

The first Mariel boatlift took place in 1980. It was responsible for the second surge of hijacking activity which has occurred under the current passenger screening system (Peak "B" in Figure 1), and stimulated a different pattern of responsiveness from that of the first jolt. The system was operating at a fairly low level of effectiveness (around 32%), presumably attributable to the relatively low level of stimulation that it had received during the past three years. There was no falloff in the capacity to adapt to the threat of hijacking; hence, Resistance and Resilience—according to simple definitions of falloff irrespective of level of initial functioning and recovery time—were still good. It took a year however, for the stimulation of the jolt of hijacking activity to register any positive effect on how well the system functioned (an increase from 32% in 1980 to slightly over 53% in 1981). The system did ultimately move to a higher level of prevention success than it had attained prior to the occurrence of the jolt. This positive effect was, however, short-lived. When the jolt of hijacking activity subsided in 1981, it appears that the stimulating effects of the jolt began to decay immediately, dropping to 40% by 1982 and continuing to slide back around 28% by 1983. Retention, in short, was fairly low.

Comparatively speaking, the second jolt of hijacking activity had a longer delay before it had any positive effect, and the system had been operating relatively poorly (32% rate of prevention success) at the time the jolt took place. The magnitude of the positive effect was less the second time, and the highest rate of prevention success attained was only 53%. In addition, the positive effects of the jolt were much shorter lived.

Note, however, that if Resilience and/or Retention were considered by themselves, they would give a misleading picture of the capacity of the passenger screening system to respond to the threat of hijackings and how that capacity was changing. The relatively elevated impression given by these two indices after the first Mariel boatlift appears to be more attributable to the relatively low rate of prevention success rather than to a high capacity to adjust to the threat of hijackings. The value of the several indicators of shape is that they permit separation of these kinds of artifacts from substantive changes. The other indicators of shape demonstrate rather clearly that the system was not working as well as it was during the first wave of hijacking activity.

The capacity of the system to respond to the threat of hijacking activity seemed to be eroding even further with the third jolt (Peak "C" in Figure 1). At the time of the second Mariel boatlift, about 28% of hijacking attempts were being prevented before hijackers reached a plane. The third jolt of hijacking activity was followed by a reduction in the performance of the passenger screening system, a loss of from 28% to 17%.⁵ It took longer for any positive benefit

to be noticeable (2 years), and the highest rate of prevention success was 50%. Lastly, when the resilient response did take place, it began to erode almost immediately, back to around 25% after one year.

For the FAA's passenger screening system, what appears to have happened to the shape of adaptability over time, is that:

- 1) The passenger screening system has become less able to resist the impact of a jolt of hijacking activity;
- 2) It has begun to suffer a negative drop-off in prevention success with the onset of such hijacking waves;
- 3) The system has been taking longer to bounce back to pre-jolt levels of functioning (lower resiliency);
- 4) Although the system has bounced back to higher levels of functioning, only about 50% of hijacking attempts were stopped before planes were reached, and even these levels are being retained for shorter periods of time.

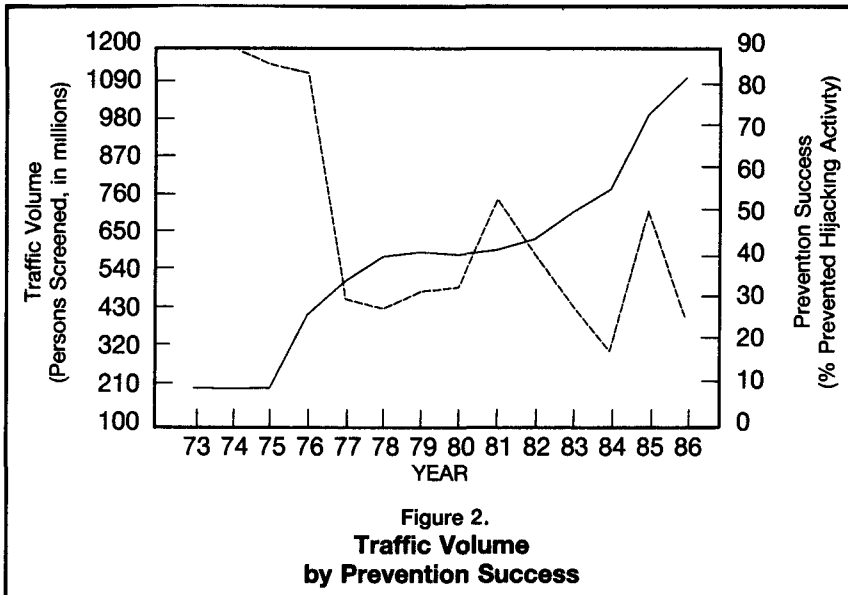
It should be noted that some rather dramatic changes have occurred during the last year or so which may serve to revitalize the passenger screening system and reverse these trends. New people have been brought into key positions within Civil Aviation Security, and the structure of Civil Aviation Security has been changed to permit better communication among domestic and international security. More sophisticated equipment is being pilot tested. Since August, 1986, the system's capacity to respond has been tested on a monthly basis so as not to depend exclusively on external jolts for such stimulation. A more proactive research approach is being taken to discover what works and what doesn't work in the field.

Constructing Scenarios for Research and Intervention

The analysis of adaptability—both as a smooth process of adaptation to environmental jolts and as a response whose shape may change over time or situation—may provide valuable clues about the relationship of any organization to its relevant environments (or, indeed, for any department in relation to its external constituencies [cf., Kanter & Buck, 1985]). More importantly, perhaps, such an analysis can target areas for further investigation (through interviews, case analysis, survey and secondary data sources) and generate questions which may be usefully asked about these areas.

With respect to the environment, two questions surface immediately: 1) Are the jolts having a positive, negative, or mixed effect on adaptability through time?; 2) What sorts of scenarios can be developed for further analysis—scenarios which can lead the organization's members to a finer understanding of what has happened and what to do about it.

In the FAA case, for example, analysis of the hijacking activity (as a jolt) and prevention success (as adaptability) series revealed a mixed effect in which



the impact of the jolt had a lagged, positive effect on the capacity of the organization to respond to the threat of hijacking. The shape of adaptability had, as well, been changing over time in such a way that several aspects of adaptability appeared to be eroding. Whatever variables were responsible for this changing shape were therefore probably major, system-wide factors.

Two external factors appeared to be exerting a negative influence on several elements of adaptability through time: system overload and market structure. Escalating volumes of traffic appeared to be overburdening the system. The relationship between traffic volume and prevention success (Figure 2) has been both strong and negative. As the number of people passing through the passenger screening system has escalated, the drop off in success in preventing hijackers from getting to planes has been quite marked.

A second factor affecting the performance of the passenger screening system has been the pressure for controlling security costs at checkpoints. The market within which security contracts were negotiated was such that in most cases only minimum wage could be offered to screeners. The identification of these factors has permitted the development of more precise research questions to isolate the paths through which these factors were operating and the development of strategies for their neutralization.

The most plausible scenario suggested by these results is that both increases in traffic volume and pressure for minimizing costs associated with security increase turnover among passenger screeners, though for somewhat different

reasons. Traffic volume appears to overburden the system. The resultant increasing stress levels create a variety of individual-level problems for both managers (Holsti, 1978; Bass, 1981) and screeners (Levine, 1978; Whetton, 1980a, 1980b; Zaleznick et al, 1977). These elevated levels of stress may also make effective coordination and cooperation among system elements (airports, airlines, and security companies, with the FAA as regulator) more difficult and conflictual (Hermann, 1963; Levine, 1978). These latter elements may also feed into a variety of individual-level problems (Hall & Mansfield, 1971; Starbuck et al, 1978). Depressed wage scales, although perhaps increasing stress levels (Brief et al, 1981), may have a more critical path through the intention of screeners to quit as soon as higher paying jobs become available (compare Hall & Mansfield's [1971] early treatment with Cammann et al, 1983). High turnover and the lack of integration of the system components may then undermine the capacity of screening teams to respond effectively to hijacking situations by minimizing the training, experience and commitment among the screeners that are left.

Generalizing to Other Organizations

In looking at organizations more generally, if jolts were to have exclusively negative effects on all the elements of shape, with large fall-offs in performance, slow recovery times and short-lived retention (assuming that the organization ever gets back to where it once was), then a fair set of assumptions with which to start would be:

- that the system's response repertoires are inadequate to the task (Brown, 1982) or that norms which organize and control such responses have lost their influence (Erikson, 1966);
- that both technology and the social systems wrapped around them may be inappropriate (Pasmore & Sherwood, 1978; Walton, 1985; Damampour & Evans, 1984);
- that there are few slack resources available in the system (Galbraith, 1972; Myer, 1982);
- that influence rests in the hands of those who are not sensitive to pertinent environments (Huff, 1982; Kanter & Buck, 1985; Pfeffer & Salancik, 1982), or who are interpreting those environments through inappropriate filters (Ford & Baucus, 1987; Starbuck et al, 1978);
- and that there were either ideological and/or cultural biases against adaptation (Hedberg et al, 1976; Myer, 1982; Schein, 1970).

Where jolts appear to be having a positive effect across time on the shape of adaptability, with resistance to the jolt becoming longer, fall-offs shallower, resilience quicker and retention longer, then it might be useful to ask whether the response repertory of the organization would be adequate if more severe

and/or qualitatively different kinds of jolts were experienced (Zammuto & Cameron, 1982). Such apparently benign results should bear the caveat that continued success may generate processes in which the organization separates itself from its relevant environments because they are viewed as being non-problematic (Starbuck, Greve & Hedberg, 1982, for example).

The most intriguing cases, however, are those where there are mixed results from the jolt across time and situation, as in the FAA case. Such situations might be especially susceptible to continuation of a single-loop-learning logic (Argyris, 1985) because the kinds of delayed responses that are made do seem to work, at least in part and for the short term. The improvement in performance, even though moderate and short-lived, may reinforce existing ways of thinking about environments and never permit prevailing norms and operating assumptions to be challenged sufficiently to make other operating assumptions more valid (Ford & Baucus, 1987). The restimulation was perhaps just enough to permit responding as usual to have some slight positive effect on the capacity of the system to prevent hijackings (compare Erikson, 1966). The analysis of shape across time in such cases is especially helpful not only in uncovering the external variables which appear to be undermining the system, but also in developing credible arguments regarding trends for client constituencies.

For the interventionist, a question of considerable importance is what the organization does after the jolt subsides. Does it go back to "business as usual"? Is the impact of the jolt absorbed by existing routines, without much being learned that requires any redefinition of what is happening or why (or how to respond), and with no permanent changes taking place?⁶ Alternatively, are new ways of thinking, acting and justifying action developed that exert pressure for different ways of acting and/or structuring the organization (Cf. Ford & Baucus, 1987; Myer, 1982)? There is some evidence to suggest that bureaucracies faced with external jolts (like catastrophes) initially try to absorb the effects of jolts by responding to them with their existing repertoire of coping mechanisms. When such efforts fail (or appear doomed to failure), then either structural changes are made or there are changes in tasks or procedures—the repertoire of coping mechanisms. Only when these appear inadequate will more profound changes be made (Brouillette & Quarantelli, 1970).

Examining the shape of adaptability provides a set of windows on how the organization has responded and why it has responded that way. The level of functioning at the time of the jolt, for example, provides a window on equilibrium conditions and business as usual with respect to the environment. By itself, however, the level of functioning at the time of the jolt cannot inform us regarding:

—The extent to which the organization's response repertory is flexible, punitive, and focused on causes (Argyris, 1985; Britt & Allen, 1988; Brown, 1982; McCan & Galbraith, 1981.)

—The flexibility of its integrative mechanisms (Walton, 1985)—The amount of slack in the resources that can be brought to bear (Galbraith, 1972)

—The degree of centralization of non-routine decisions (Perrow, 1970; Galbraith, 1972; McKinley, 1987).

If an organization is becoming less resilient over time, for example, is it because the jolts are getting larger? Has the organization absorbed the impact of the jolts with its existing repertoire of coping mechanisms and failed to examine them after the fact. Have maladaptive responses been adopted and resources cut? Are ideologies becoming more defensive? What other internal and external factors are making it increasingly difficult for the organization to respond effectively? These questions need to be asked with respect to resistance and retention trends, and other critical levels of performance should be examined. A more informed, richer picture of the organization's present capacity to adapt will then emerge along with alternative intervention strategies.

NOTES

1. The actual definition offered by Myer (1982) for jolts is "transient perturbations whose occurrences are difficult to foresee and whose impacts on organizations are disruptive and potentially inimical (p 515)." The essential characteristics are suddenness, disruptiveness and potential inimicalness.

2. Though I am using the term "jolt," I do not find much difference between that term and Hermann's usage of crisis as threatening and surprising situations requiring quick decisions. Consider hijacking activity and the FAA. Hijacking activity threatens a valued goal to which FAA must attend (airline safety). There is restricted decision time when hijacking incidents take place in that there is pressure both from above and outside the agency to "do something about the problem." In spite of attempts at environmental sensing, there is usually some surprise associated with the occurrence of these jolts of hijacking activity. I use the term jolt rather than crisis because of the multiple meanings associated with the latter term and the extent to which jolts appear to be more easily interpreted as environmental events. In either case, there is a subjective component overlayed on these events by the actors in the situation, and their interpretations and definitions may vary considerably (see the discussions by Billings, Milburn & Schaalman, 1980; Lentner, 1972).

3. Discussing how the elements of shape are related to one another is beyond the scope of this paper; there simply are not enough data points. Myer's (1982) analysis of how 17 hospitals reacted to the same doctor's strike suggests that the more prominent the fall-off in performance, the longer it takes an organization to recover (Myer, 1982: 532). Much research is needed in sets of organizations where numerous jolts have occurred and where performance can be measured accurately in short time frames. Assessing length of time until drop off in functioning (Resistance), length of time until there is a gain in functioning (Resilience), and the length of time that any gains are maintained (Retention) are exercises which improve dramatically in their statistical validity the closer together the observational units are in time and the more units of observation there are. With yearly data, so few data points, and so much going on, more sophisticated longitudinal regression using dummy variables to represent the waves of hijacking activity, or econometric analyses specifying hypothetical decay curves for the effects of waves of hijacking activity on adaptability, would be of dubious value. To be of use to interventionists, however, techniques need not be sophisticated to be relatively powerful

aids in understanding how an organization is behaving, and in laying groundwork for understanding why it is behaving that way.

4. Damampour and Evans (1984) have examined the applicability of Ogburn's concept of cultural lag to libraries, asking how long after a technical innovation (like a new piece of equipment or a new product) does the administrative system (how things are coordinated and controlled) take to adjust to the demands of the innovation. Although there is an interesting overlap between Damampour and Evans' concept of the impact of technological innovations on organizations and the impact of jolts discussed in this article, the use of the term "lag" here refers simply to the fact that there is a delay after hijacking activity changes before prevention success changes.

5. Even collapsing these cases of hijacking activity together for entire-year periods still leaves small numbers. For 1984, for example, there were only 6 hijacking incidents. The percentages could change considerably with small changes in these numbers. Consequently, the actual percentages must be interpreted with caution.

6. Myer's (1982) discussion of the threads in the laying out of these options is instructive. It draws from Maruyama's (1963) distinction between deviation amplification and deviation absorbing actions; from Argyris' (1976) single versus double-loop learning; and from Watzlawick, Weakland & Fisch's (1974) distinction between first-order and second-order change. However, by calling the former response pattern Resiliency and the latter, Retention, his categorization precludes the possibility that organizations which recover quickly can come out of the process by changing how they are structured, what they do, and how they explain it. These are empirical questions, but for the interventionist, definitions should sensitize us to possibilities, not exclude possibilities from consideration.

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