

SWP 2/03

**DEROGATION FROM PROCEDURE IN
TURBULENT ENVIRONMENTS:
DISCRETIONARY ACTION AS A
COLLECTIVE COMPETENCE OF TEAMS
IN HIGH RELIABILITY ORGANIZATIONS**

© Young, M.

Malcolm Young
Advanced Management Research Centre
Cranfield School of Management
Cranfield University
Cranfield
BEDFORD
MK43 0AL
United Kingdom

Tel: +44 (0)1234 751122

Correspondence regarding this paper should be addressed to Malcolm Young
E-mail: malcolm.young@cranfield.ac.uk

ISBN 1 85905 164 2

*The Cranfield School of Management Working Paper Series has been running since 1987 with nearly 500 papers published so far. The aim of the Series is to bring together research in progress from across the School for publication to a wider audience and to facilitate discussion. Papers are reviewed by senior faculty before acceptance into the Series. The agreement of the authors should be sought before referring to its contents in other publications. This paper is available electronically on the School of Management website:
http://www.cranfield.ac.uk/som/research/working_papers*

Editorial Board

Editor: Dr Michael Butler

Managing Editor: Mr Andrew Kirchner

Author Profile

Malcolm Young

As a Research Fellow in the Cranfield School of Management, Malcolm works in the general area of teamworking and knowledge management. In addition he is a keen student of high reliability issues. His PhD research is investigating discretionary activity in turbulent environments, which has implications for organisational reliability. This research draws on his operational experience in the armed forces but also investigates accident and emergency units, air traffic control centres and emergency response services (fire/paramedic).

Malcolm initially served for 30 years in the armed forces, seven years with the Parachute Regiment in the Regular Army followed by 23 years as a pilot in the Royal Air Force. As well as serving on operations world-wide he was employed as a qualified flying instructor and examiner. He commanded two squadrons and was deputy commander of a flying station. During his service Malcolm also worked as a staff officer in two army formations, on intelligence related duties in the Ministry of Defence and was on several occasions seconded to the Foreign Office as an adviser to foreign governments. This latter represented some five years of his career and included working in Saudi Arabia, Oman, Thailand and the USA. In 1989/90 he represented UK in a range of arms control related discussions between NATO and Warsaw Pact nations. In 1993 he retired from the RAF and became a director of Scott Douglas Group, responsible for internal restructuring, while also working as an independent management consultant. He was also a programme director for the Buckland Leadership Development Centre, designing and delivering top-level management team development programmes for large public and private sector organisations. In the voluntary sector he was until recently a member of the Executive Committee of a military charity.

DEROGATION FROM PROCEDURE IN TURBULENT ENVIRONMENTS: DISCRETIONARY ACTION AS A COLLECTIVE COMPETENCE OF TEAMS IN HIGH RELIABILITY ORGANIZATIONS

In making a conceptual contribution to the development of high reliability theory, this paper takes a critical view of the notion of procedure within organizational repertoires of action. It contrasts the essential requirement for procedures, that the environment is sufficiently stable to allow antecedent rationality to design organizational responses, with the increasing environmental turbulence being experienced and theoretically developed, to propose that organizational reliability will increasingly depend on discretionary action or derogation from procedure. It proposes that this notion of derogation from procedure, when viewed from the perspective of the increasing use of team-based work organization implies collective competence. It moves next to propose that for this to be credible an understanding of the characteristics of discretionary action, currently absent from the literature and therefore absent from substantive theory, is essential. It concludes by suggesting that a current piece of doctoral research into this phenomenon will fill an important empirical gap with implications for theory and for practice

Introduction and Background

The notion of organizational reliability, which Weick et al (1999) conceptualize as the capacity to work effectively in dynamic and unpredictable circumstances, is a vital competence in contemporary organizations (Bigley and Roberts, 2001). As more organisations move to privilege the concept of reliability over efficiency eg. education (Stringfield, 1994) telecommunications (Cox, 1998), pastoralism (Roe et al, 1998), medicine (Reason, 2000), they find that their respective fields currently have only tentative conceptual models which align with their specific contexts. Reliability challenges the orthodoxy and received wisdom of traditional management strategies, since it takes as a point of departure that human endeavour is based, in various combinations, on enduring, rationally derived procedures and free extemporization (Ryle, 1979; Laporte and Consolini, 1991). Together, these procedural and discretionary 'routines' (Pentland and Reuter, 1994), represent the repertoire of acceptable activity within reliable organizations however, any given repertoire exists in a tension between, on the one hand, a complex mix of historical antecedents and contemporary influences and, on the other, the turbulence of the environment. The notion of rationally designed organizations, their characteristics and procedures, is well researched and documented in both supportive and critical texts (Taylor, 1947; Weber, 1947; Fayol 1949; Braverman, 1974; Kouzmin 1980). This paper reviews the theoretical explications of both procedural and discretionary actions, placing them in the context of organizational reliability. It argues that while the notion of procedure as an organizational response to its environment is well explicated it is increasingly demonstrated as flawed, given the turbulence of organizational environments. It goes on to argue that, in response to environmental turbulence at the operational level, the mix of procedural and discretionary action is changing, but that, since the characteristics of discretionary action are not well researched, the potential for reducing reliability increases. Taken together these have implications for further research into the phenomenon of discretionary action as a contribution to the development of high reliability as a theoretical concept and organizational reliability as practice. Working from extant theory the paper suggests a new research direction, which investigates the characteristics of discretionary action as enacted at the workgroup, or team, level as a counterpoint to traditional proceduralized approaches.

A Critique of Current Concepts

The pervasive, oligarchic structure of traditional, formal organizations leads to a conceptual, and to an hierarchical, split between an autonomous elite of ‘thinkers’ and a cohort of ‘doers’ (Taylor, 1947; Fayol, 1949). These bureaucratic (Weber 1947) socio-technical systems are designed, and organizational activity is therefore, to a greater or lesser extent, predetermined, in a rational way (Roberts, 1990; Laporte and Consolini, 1991; Rochlin, 1999). In these organizations, the most common mechanisms for work supervision and co-ordination (Mintzberg 1989) is the use of procedures, or standardization of work, and direct supervision. The methods by which an organization co-ordinates its activities have also been described by Pentland and Reuter (1984) as ‘routines’, which fall into two main categories – effortful accomplishments and automatic responses. The former relates most closely to systems and procedures while the latter relates to taken-for-granted methods of organizing. The notion of procedure, therefore, is here taken to mean some rationally designed routine, which takes a codified and articulated form within an organization: hence, ‘normal procedures’, ‘emergency procedures’, ‘standard operating procedures’ etc. In addition, procedures are taken to entail some form of prescription, they must be adhered to, and/or some form of proscription in that they define, explicitly or implicitly, what must not be done. They represent the limits, in positive and negative forms, of essentially the same phenomenon – they express in formal language the activity in which it is deemed proper for the organization, teams or individual operators to indulge. However, the notion of discretionary action allows for routines that do not involve the kind of antecedent rationality evident in procedures. The meta-notion of routine therefore usefully offers a language for describing both procedure and the less bureaucratically constrained actions of discretion.

It remains a moot point among organizational researchers as to what extent organizational activity can, or indeed should, be proceduralized. As Tranfield et al (2001) note, traditional approaches to organizational performance continue to be driven largely by the efficiency mind-set, the focus of which is to apply tried and tested procedures (e.g., Total Quality Management), to seek zero-deviation from norms (e.g., 6Sigma) and to increase efficiency (e.g., lean production). As laudable as these aims may be, making procedural input, rather than reliable output, the focus requires an implicit assumption that the two are necessarily, and unexceptionally, causally related. However, as systems theorist Jan Smuts observed, such relations tend to derive from isolation of the most luminous elements of events which precede other events and label those causes, and then to isolate the most luminous elements of events which follow and label those effects (Smuts, 1926), ignoring the extent to which a cause may be a whole situation which imperceptibly passes into another whole situation, or effect. The strong predictive inferences taken as a result are enshrined in a general philosophical perspective, which is reducible to the classical scientific method, with its a strong realist ontology, positivist epistemology and faith in algorithmic solutions dominated by probabilistic interpretations of statistical data (Barrow, 1999; Gigerenzer, 2002; Kosko 1994, Paulos, 1998), and appear to be based on a wager. The wager is that the circumstances for which the procedures are configured, whatever empirical regularities have been observed in the past, will necessarily obtain in the future. The wager analogy here is interesting, since Paulos (1998) accredits the formalization of probabilistic prediction to 17th century attempts by Pascal and Fermat to solve problems in gambling, while statistics have their origin in mortality tables compiled in the same century. The current usage of both could be seen to betray their antecedents, an irony on which we need not dwell. In the context of management these predictions carry undertones of scientific management and administrative orthodoxy (Taylor, 1947; Fayol, 1949; Urwick, 1947). At the individual worker level, especially in highly routinized task environments, as much as 95% of the work may be routinized with only

5% discretionary, and that is often limited to the less important aspects of the job (Wickens, 1992), rarely granting workers a central role in innovation and often depending on task hierarchies rather than acceptance of more flexible work forms (Kraft and Dubnoff, 1986). For this whole enterprise to be credible we must make a further assumption, which in some environments may be valid, that the environment is either tranquil, or predictably dynamic.

Complexity scholars (Gell-Mann, 1994; Waldrop, 1994; Byrne, 1998) question this, at both the quantum and classical levels, and propose that there are few actions that can be legitimately predicated on the assumption that inputs are linearly converted into outputs, in a predictable manner, or that the environment remains sufficiently tranquil or predictably dynamic, for unmoderated procedures to provide reliable responses. There is a growing corpus of other literature which describes how activity, whether initiated by natural agency, as in meteorology (e.g. Lorenz 1963), or by human agency, as in economics (e.g. Arthur, 1990), involves non-linear feedback mechanisms, a concept now also being applied to domains as diverse as urban studies and health (Byrne, 1998), and software development (Johnson, 2001). It is also fundamental that while a weather forecast cannot change the weather, a social forecast can change the way that society acts, rendering the forecast valid, as is the nature of forecasts, but void (Rittel and Webber, 1973; Kosko 1994). Illuminating the debate from the symbolic interactionist perspective (Bryman, 1988) suggests that, for humans, any stimulus for action will undergo a process of interpretation before a response emerges, rather than simply provoking a response (Skinner, 1965), a notion that Zimmer (2001) claims may have an evolutionary basis. This resonates with Laing's notion of ontological discontinuity between human beings and it beings (Laing, 1967), which posits that instead of simply reacting to external stimuli, humans reflect on experienced phenomena and conjecture first on possible causes and second on suitable responses. Working from a philosophical perspective, Ryle (1979) postulates that all individual human actions are improvisational in that they will differ from previous actions in some way, even when identifiably similar, whether this is due to caprice or contextual sensitivity. These considerations call into question the extent to which rational design of organizational responses can be universally credible, even within the domain of the organizational context; a position exacerbated by the inevitable incompleteness of our knowledge (Simon, 1976; Williamson, 1979). Essentially this means that since all possible options cannot be considered, our decisions, and their concomitant procedures, however rational, are, at the very least, matters of probability rather than certainty, and will increasingly rest on notions of credibility rather than strict probability (Ayer, 1976). As described by Ayer, and reflecting the Humean concept that, while we may never know the truth, we may be well enough informed to make reasonable choices about the future, the notion of credibility:

'... implies that we have reason to feel at least more confident than not that such and such an event will come about. (Ayer, 1976:163).

As soon as we begin dealing with statements of credibility rather than statements of either probability or, in the limit, the pure, mathematical calculus of chance, then the assumed connection between prediction/procedure and the presenting situation becomes increasingly less direct and therefore less dependable. Three theoretical frameworks exemplify this interpretation. In the social sciences, first, from an economic perspective, Simon (1976) proposes that we lack the resources to consider all the information that may bear on a decision, leading to managers 'satisficing'. In the same context, Williamson (1979) goes further, to propose that we simply can never have enough information to make infinitely accurate decisions. A similar view emphasizes the limits of calculative rationality (Dreyfus

and Dreyfus, 1986; 1999). Second, Rittel and Webber (1973) identify a class of problems (referred to as wicked), which, since they cannot be exhaustively described at the outset, can have no obvious solutions. Rather, legitimate attempts at resolutions generate waves of consequences, each of which will be more or less wicked, and so on *ad infinitum*. The third, and perhaps most significant, because it questions perhaps the most formal of all sciences, mathematical logic, is grounded in the philosophical notion of vagueness (Russell, 1923; Smuts, 1926; Black, 1937). Often derided in the natural sciences as the philosophy of ignorance or simple sloppy thinking (see for example, Williamson, 1994), it is intended to connote the impossibility of achieving the absolute clarity of understanding on which accurate prediction depends; a concept which seems increasingly tenable now as complexity sciences develop. Contemporary articulations of vagueness – fuzzy logic and fuzzy set theory (Zadeh, 1965; Kosko, 1994) – imply that predictions about the future will not follow the Aristotelian logic of A or not-A, rather they will include A and not-A to some indefinable extent. In the social sciences, where inferences have to be drawn from observables, where mediating cognitions influence the way in which the environment is interpreted and where predictions can change actions, the notion of vagueness gains relevance.

Together, these perspectives call into serious question our ability, once divorced from the world of the natural and physical sciences, to make substantive predictions about the future and therefore our ability to design detailed procedures meet for all occasions; a conclusion which presents problems for theoreticians and for practitioners.

A Discretionary Response

Of common ground among a range of authors is the need to match activity to presenting circumstances rather than to those predicted. For example, Adler, Goldonftas and Levine (1999) emphasize how the structural and procedural features of bureaucratic control, which may prove useful in stable environments, vary from severely limiting to useless in turbulent task environments. Engestrom (1990, 2000) illustrates how, in general, all successful activity represents a *necessary* alignment with temporally significant environmental characteristics and only a *contingent* alignment with any prediction. Bigley and Roberts (2001) propose that coherent response entails that activity maps to the requisite variety (Simon 1957) of the situation. It follows that procedures only apply when temporally significant environmental characteristics are those that are both predictable and predicted – that is in stable/tranquil environments. In turbulent environments, as the transient rate of exogenous change outpaces rational planning cycles (Burgelman et al, 1996; Brown and Eisenhardt 1997) and the experienced environmental characteristics differ increasingly from any predictions, rationally developed procedures become variously inadequate, inappropriate, or obsolete (Eisenhardt 1989). Further, in turbulent environments, characteristics differ from predictions in high-velocity and error-sensitive ways (Roberts and Rousseau, 1989; Weick et al, 1999), rendering rational reconfiguration of procedures impractical (Eisenhardt, 1989). To place the procedural response argument in stark relief, in the subway tragedy in Korea of February 2003, the procedures for dealing with underground emergencies included electrical isolation of the rail system. In this case this led to a train unaffected by the initial conflagration being enveloped because it was in marooned on the opposite platform, unable to depart because of the electrical isolation.

But, in order to achieve reliability in turbulent environments, with what might we replace procedures? To avoid the barbarism of having a procedure for not following procedures, one possible answer is a routine (Pentland and Reuter, 1994) of *derogation from procedure*, with the attendant discretion to act in ways which a) are sensitive to temporally significant

environmental characteristics and b) accomplish the task, but which c) vary from procedure (Carpenter and Golden, 1997), being delegated to the operational level. In conceptualizing a spectrum of activity, which has been described as ranging from the prescriptively normative to the spontaneously inventive (Crossan and Sorrenti, 1997; Hatch, 1998), Handy (1985) draws on work by Stewart (1983) to invoke the notion of the 'inside-out doughnut', with a solid center (prescribed, normative), a solid outer boundary (proscribed, normative) and an empty inter-space (discretionary, inventive). While this is a useful conceptual model, it remains arguable that truly discretionary action may involve ignoring both prescriptions and proscriptions. The phenomenon of discretionary action is reported by many authors (Crossan and Sorrenti, 1997; Hatch, 1998; Mirvis, 1998; Weick, 1998; Bigley and Roberts, 2001; Chelariu et al, 2002). Most often expressed, somewhat indiscriminately as improvisation and related to an over-extended metaphorical allusion to jazz, the phenomenon of discretionary action is nowhere described in terms of fundamental and discrete characteristics. One possible reason for the dearth of empirical study in this area of the social sciences may be that, by definition, formal procedures are codified, explicit and delimited activities, and are often policed by organizational or higher level regulation. But, as action becomes discretionary it also becomes, by extension, less amenable to delimitation and regulation. However, this is not the same as suggesting that discretionary action has no fundamental and discrete characteristics. It is neither intellectually beguiling nor academically rigorous simply to identify discretionary activity as non-procedural activity or something akin to jazz improvisation, and leave it at that. A new research trajectory could usefully establish what the fundamental and discrete characteristics of discretionary action are.

The literature that speaks most explicitly to the topic of autonomous choice resides largely in the psychology and social psychology canons (Carpenter and Golden, 1997; Finkelstein and Hambrick, 1990; Hambrick and Finkelstein, 1987; Mischel 1977, Rotter, 1966) and deals, almost exclusively, with individual perceptions of individual discretionary authority within the context of overall organizationally acceptable levels of discretion. This literature also concentrates on top management echelons. In the management literature, discretion is also addressed from the top management decision-making perspective (e.g., Mintzberg, Raisinghani and Theoret, 1976) and its strategic impact. The topic of improvisation has received much attention as a metaphor for organizing (Crossan and Sorrenti, 1996; Hatch, 1998; Mirvis, 1998; Weick 1998) but improvisation represents a limiting case and does not fully capture the range of activity by which we may deviate from procedure. Reliability has been investigated from the perspectives of organizational design by the Berkeley Group, from the perspective of human agency by Marone and Woodhouse (1986) and from the perspective of the search for safety rather than the mitigation of error by Wildavsky (1988). However, the specific role of derogation from procedure as a credible organizational routine for reliability is less well explored.

Nonetheless, most commentators agree that sooner or later we come across a problem or set of problems that is not tractable by applying the "standard" approaches and tools that came with our selected profession or the procedures and routines which are prescribed at the sector or organizational level. This is well illustrated by Laporte and Consolini (1991 p32) who note that critical operational functions which are complex and tightly coupled contain a) jobs which can be specified in detail and b) contingencies. To quote some prosaic but illuminating examples, the TV listings for 25 May 00 presented an illuminating if non-rigorous opportunity to observe two contexts in which the hazard was high, risk was variable and yet where reliable outcomes were critical. The first was a documentary entitled 'The Missileers' which was an overview of the Minuteman ICBM missile crews in the continental United

States. The second was an episode in the drama series 'Always and Everyone', which focused on the activities of a fictitious major accident and emergency (A&E) unit and the programme that night was clearly a dramatized version of the rescue operations which followed the Kegworth air crash. In the Missileers the key demand on the teams was absolute conformity and near perfection in a zero-defect culture based on rationally derived and operationally prescribed procedures. This was to deliver what Cox (1998) refers to as 'surety' or the confidence that a system will perform in acceptable ways in both intended and unintended circumstances. The Missileers were also of course dealing with a nuclear weapon system, which both Perrow (1984) and Sagan (1993) characterized as having high catastrophic potential. In A & E a 'satisficing' (Simon, 1957) approach was used. Responses combined triage (prioritization) and bricolage (making do with the resources to hand) in acts of spontaneous invention in the hazardous environment of the severely damaged and unstable aircraft fuselage. To compensate for the lack of theatre based surgical and support resources, an extreme example was to save life with mutilating surgery, which might have been avoidable if the patients had already been in a fully equipped surgery. In the first example, procedures were rigidly prescribed and deviation just as rigidly proscribed, and in the second the framework of procedures was more loosely prescribed with actors both organizationally authorized and occupationally empowered to use discretion and invention. In a third example, during a newscast transmitted immediately prior to the surgery to separate Siamese twins, undertaken in Manchester, a retired expert in peri-natal surgery described how the surgical team could plan for many of the eventualities but also emphasized that once the surgery was commenced the team would encounter situations for which planning was not possible, except perhaps in the most generalized sense of being ready for anything. This latter concept argues for more rather than less autonomy of action, or discretion as conceptualized here. Albeit that these examples are in bounded contexts, the learning potential in extreme environments is held to be greater than that in tranquil, benign environments (Pettigrew 1974). If we extend this concept to include the researcher, then arguably, credible theory, applicable beyond the bounded context of the research, is more likely to emerge from extreme contexts.

In all three cases above, the socio-technical systems involved had to perform with high reliability, but activity was distributed along a continuum from prescription through discretion to invention. Interestingly, in the military context actions were exclusively prescribed, in the A&E context actions were largely invented, and in the Siamese twins case actions along the whole spectrum were envisioned. When dealing with contingencies there is therefore a need for rapid adjustment not easily directed from hierarchical levels which are not in contact with the problem and:

'In such times organizational norms dictate non-interference with operators, who are expected to use considerable discretion.' (emphasis added) (Laporte and Consolini, 1991:32)

This 'norm', which requires the use of 'considerable discretion', leads us to the need to identify just what characteristics discretionary and inventive actions at the operational (team) level have. Taken together, past applications of the notion of discretion have produced some useful beginning concepts. Combining elements from Moorman and Miner (1998) and Weick (1998) a suitable starting point is:

'Activity which progressively diverges from established procedure and for which planning and execution progressively converge in time'

Within these explications we can also detect continua of divergence from procedure variously described as: shift – switch – revise – create (Moorman and Miner, 1998), interpret – embellish – vary – improvise (Weick, 1998) such that the divergence is expressed as (a) a qualitative difference or (b) an incremental quantitative variation or (c) a continuous progression in what Weick (1998) calls ‘full system improvisation’. However, these represent behavioural descriptions rather than fundamental characteristics of discretionary activity.

A Meso-level Perspective

If we now consider the possible incidence of discretionary action at three easily identifiable organizational levels, the individual or micro-level, the workgroup or meso-level and the organizational or macro-level, a number of issues arises. Ryle (1979) suggests that instantaneous invention is observable in almost all micro-level activity, meaning that almost all individual human actions are to some extent variations from norms and therefore improvised, while Weick (1998) is representative of a broad view that discretion and improvisation are difficult to conceptualize, much less observe, as macro-level phenomena. This challenges Moorman and Miner (1998) who have conceptualized organizational improvisation as both an application and a source of organizational memory. Their position seems to conflate ‘sub-organizational level improvisation’ with ‘organizational-level outcomes’ rather than to demonstrate organizational improvisation per se. As Weick (1998) observes, the notion of a whole organization engaged in discretionary action in a co-ordinated way is difficult to envision. Conversely, it has been established that that meso-level discretionary action not only exists as an observable phenomenon but also has an influence on performance (see for example Crossan and Sorrenti, 1997; Hatch, 1997).

The significance of the team as a vehicle for discretionary action reflects the increasing preference for organizations to configure around a work-group concept. As Tranfield et al (1998) note, this generic concept includes, jointly and severally, shared purpose, identification, a collectivity of interdependent individuals and skill sets, co-ordination by mutual adjustment etc. It perhaps begs the question to assume that co-ordinated discretionary action necessarily takes place only within teams, but the activity-theoretic ideas of Vygotsky (1978) allow us the term ‘collectivity’, which includes both groups and teams. The significance of discretionary action in a collectivity is that, inter alia, whether or not it is initiated by an individual, if it is to be effective and to avoid the potential for disaster, it will require co-ordination. Where mutual adjustment is the co-coordinating mechanism (Mintzberg, 1989; Tranfield et al, 1998) the adjustments themselves, as well as any consequential activities, will be discretionary. The co-ordination of multi-actor (more than one actor) and multi-level (different numbers and combinations of actors) discretionary action can therefore be said to represent a real and present challenge for organizations. Focusing on the team level of action also heeds Schulman’s invocation that:

A great deal more needs to be learned about the dynamics of organizations seeking and maintaining reliability in very demanding circumstances before we can fully understand how the balance between holistic control and heroics might be chosen. (1996:72)

That meaningful group activity can be an emergent characteristic of fragmented, differentiated, independent activity is already well researched (Hutchins, 1991). The focus here is on the spontaneous and harmonized use of discretion by a number of actors working in a group on a single definable task, what Vygotsky (1978) calls an activity system. But, as Sandberg (2000) observes, for an activity system to work reliably it must develop collective competence and collective consciousness, not simply to be able to perform discretionary

actions, but to use its potential to greatest effect. Collective competence is conceptualized as interaction between several people engaged in the same activity, each contributing a specific and differentiated individual competence, based on a shared understanding of the collective work and goals.

The concept of team-level discretion is reported as most tractable and observable when the team works in close proximity on the same task in organizational communities or occupational communities (Van Maanen and Barley, 1984). The difference is important since in the former the organization in which the actors exist dictates the rules, norms and procedures. In the latter, professional guidance is extra-organizational, for example, accountants (Chartered Institute), surgeons (Royal Colleges), etc. In most contexts an element of both is present. When these teams are empowered to use discretion to construct actions in environments where that activity is what Pinker (1997) describes as purpose pulled (eg. realized reliability is more important than procedural conformity) rather than cause pushed (eg. procedural conformity is paramount) then discretion becomes both a routine which is a unifying mechanism for the group (Blackler, 1993) and a credible activity in reliability. For example, the radical use of activities and artifacts in a manner demonstrably, indeed necessarily, disconnected from established procedures made the recovery of Apollo 13 possible (Lovell & Kluger, 1995). It is also arguable in this case that it was the application of occupational rather than organizational influences that made the recovery possible.

Conclusion and Implications for Further Research

The increasing turbulence in organizational environments, with the concomitant reduction in predictability, suggests that reliance on rationally designed procedural responses becomes less dependable. Since a) the environment frequently misaligns with prediction (worked from established antecedents or best guess forecasts) and that b) humans interpose a cognitive process between stimulus and response, which leads to contextual modification even when procedures exist, then for organizations to operate with high reliability, there may be a case to include discretionary action in the repertory of acceptable organizational activity at all levels. Here discretionary implies that actions are configured, somewhat improvizationally, in contact with the presenting problem and not prescribed by the organizational hierarchy through procedure. Interestingly, in none of the foregoing literature, most of which accepts both tacitly and explicitly to varying degrees the need for discretion, is there much evidence that the characteristics of discretionary action are well understood. By this interpretation the concept as currently used represents at best an allusion and, at worst, an illusion. Nothing in this argument suggests that procedures do not have their place, rather that the selective introduction of discretionary responses increases the chances of reliable outcomes. With the emergence of team-based work practices, this further suggests that the ability of teams to invent and coordinate contextually sensitive responses has the potential to make a significant contribution to organizational reliability. This notion makes a conceptual contribution to theory. However, for this conceptual contribution to carry weight it requires to be demonstrated, which suggests that there is a clear empirical gap. In addressing the empirical issue, two options are available. First we may take a quantitative, hypothetico-deductive approach, but this would require that the phenomenon was understood and could be measured in some way, what Gibbs, Morgan and Taylor (1980) refer to as a first order perspective. However, it is the thrust of this paper that, notwithstanding the tacit, and to some extent explicit, acceptance of the significance of discretionary action in reliability, the characteristics of discretionary action are poorly explicated, if at all in any meaningful sense. This suggests that, in order to place discretionary action within the repertory of organizational activity with confidence, a first move must be to understand the characteristics of the phenomenon. Here

Gibbs et al (1980) propose that when the phenomenon itself is the object of investigation then a second order perspective is required. Taking a second order perspective indicates that a grounded, qualitative, inductive approach is needed. For example, discretionary action may have characteristics such as bricolage, which Levi-Strauss (1967) defines as making do with the materials to hand. When planning and action are closely proximal, resources may indeed be limited to those at hand, which in turn may limit the action options. Intuition or spontaneous judgment not based on exhaustive, conscious trains of reasoning (Turing, 1936) may be useful in high velocity situations when time for formal analysis is not available. The validity of these intuitions may then depend on what Turing (1936) goes on to describe as ingenuity, or the suitable arrangement of intuitive steps. As this review has shown, there are no extant explications of such issues. Let us lastly, then, consider how these concepts might be translated into a research project

For research into this phenomenon to be meaningful it will be useful for the contexts to be rich in discretionary action (Weick, 1998), performed by experts (Dreyfus and Dreyfus, 1986, 1999) with reliable outcomes (Roberts, 1990). Organizations constructed specifically for, or able to respond routinely to, extreme situations have been categorized as (high) reliable organizations (Grabowski and Roberts, 2000), exhibiting continuous, nearly error-free operation in turbulent and often hazardous task environments (Roberts, 1990). Exemplars are of aircraft carrier operations, air traffic control operations, accident and emergency departments, and fire crash rescue emergency services. These extreme environments (Perrow, 1974) also offer the greatest learning potential. It is also posited that it will be more credible to generalize from extreme to tranquil environments rather than the reverse. Research in these contexts therefore carries the potential to discover fundamental characteristics of discretionary action, the explication of which would lead to a better understanding of the phenomenon. This understanding would make a contribution to high reliability theory especially as it relates to repertoires of action. In turn this would make a contribution to practice by enabling organizations to develop routines for derogation from procedure.

The arguments deployed in this paper, coupled with the emergent empirical gap, second order perspective and exemplar research contexts are being used to guide a current piece of doctoral research with the Cranfield School of Management. The outcomes also have the potential to be an important aid for those whom Tranfield et al (1998) call 'organizational designers and engineers' in breaking free from the bureaucratic and efficiency mindsets.

References

- Adler, P.S. Goldoftas, B. and Levine, D.J (1999), 'Flexibility versus Efficiency? A Case Study of Model Changeovers in the Toyota Production System', *Organization Science* Vol 10, pp.43-68
- Arthur, B. (1990), 'Positive Feedbacks in the Economy', *Scientific American*, February, pp 92-99
- Barrow, J. (1999), *Impossibility*, Vintage, London
- Bigley, G.A. and Roberts, K.H. (2001), The Incident Command System: High Reliability Organizing for Complex and Volatile Environments, *Academy of Management Journal*, Vol. 44, No. 6, pp1281-1299.
- Black, M. (1937) 'Vagueness: An Exercise in Logical Analysis', *Philosophy of Science*, Vol 4, pp 427-455
- Blackler, F. (1993), 'Organizations as Activity Systems and the Reframing of Management', *Journal of Management Studies*, Vol. 30, No.6, pp 863-884
- Braverman, H. (1974), *Labour and Monopoly Capitalism: The Degradation of Work in the Twentieth Century*, Monthly Review Press, New York.
- Brown, S. and Eisenhardt, K. (1997), *Competing on the Edge of Chaos*, Harvard University Press, Harvard
- Bryman, A. (1988) *Quantity and Quality in Social Research*, Routledge, London
- Burgelman, R. Maidique, M. and Wheelwright, S. (1996), *Strategic Management of Technology and Innovation*, Irwin, Chicago.
- Byrne, D. (1998) *Complexity Theory and the Social Sciences*, Routledge, London
- Carpenter, M. and Golden, B. (1997), 'Perceived Managerial Discretion: A Study of Cause and Effect', *Strategic Management Journal*, Vol 18, No 3, pp 187-206
- Cox, R. (1998), *Surety of the Nations Critical Infrastructures*, Sandia National Laboratories, PO Box 5800, Albuquerque.
- Crossan, M. and Sorrenti, M. (1997), 'Making Sense of Improvisation', *Advances in Strategic Management*, Vol. 14, pp155-180
- Dreyfus, H.L and Dreyfus, S.E. (1999), From Socrates to Expert Systems: The Limits and Dangers of Calculative Rationality,
<http://www.socrates.berkeley.edu/~frege/dreyfus/socrates.html>
- Dreyfus, H.L. and Dreyfus, S.E. (1986), *Mind over Machine. The Power of Human Intuition and Expertise in the Era of the Computer*, Free Press, New York.
- Eisenhardt, K. (1989), 'Making Fast Decisions in High Velocity Environments', *Academy of Management Journal*, Vol. 32, No. 3, pp543-76
- Engestrom, Y. (1990), *Learning Working and Imagining: Twelve Studies in Activity Theory*, Orienta-consultit Helsinki
- Engestrom, Y. (2000), 'Comment on Blackler et al. Activity Theory and the Social Construction of Knowledge: A Story of Four Umpires', *Organization*, Vol. 7, No. 2, pp301-310
- Fayol, H. (1949), *General and Industrial Management*, Pitman, London.
- Finkelstein, S. and Hambrick, D. (1990), 'Top-management Team Tenure and Organizational Outcomes: The Moderating Role of Managerial Discretion', *Administrative Science Quarterly*, Vol 35 pp 484-503
- Gell-Mann, M. (1994), *The Quark and the Jaguar*, Freeman and Co, New York
- Gibbs, G. Morgan, A. and Taylor, E. (1980) *A Review of the Work of Ferenc Marton and the Goteborg Group*, Institute of Educational Technology, Open University
- Gigerenzer, G. (2002), *Reckoning with Risk* Penguin, London
- Grabowski, M. and Roberts, K.H. (2000), 'Risk Mitigation in Virtual Organizations', *Organization Science*, Vol 10, pp704-721

- Handy, C. (1985), *Understanding Organizations*, Penguin Books, London
- Hambrick, D. and Finkelstein, S. (1987), 'Managerial Discretion', *Research in Organizational Behaviour*, Vol 9, pp 369-406
- Hatch, M-J. (1997), *Organization Theory*, Oxford University Press, Oxford
- Hatch, M-J. (1998), 'Exploring the Empty Spaces of Organizing', *Organization Studies*, Vol. 20, No. 1, pp75-100
- Hutchins, E. (1991), 'The Social Organization of Distributed Cognition', *Perspectives on Socially Shared Cognition* pp283-307
- Johnson, S. (2001), *Emergence*, Penguin, London
- Kraft, P and Dubnoff, S. (1986), 'Job Characteristics in Computer Software', *Industrial Relations*, Vol 25, No 2, pp 179-195
- Kosko, B. (1994), *Fuzzy Thinking*, Flamingo, London
- Kouzmin, A. (1980), 'Control and Organization: Towards a Reflexive Analysis', in Boreham, P. and Dow, G. (Eds.), *Work and Inequality, Volume 2, Ideology and Control in the Labour Process*, The Macmillan Company of Australia Pty Ltd
- Laing, R. (1967), *The Politics of Experience*, Penguin, London
- Laporte, T. and Consolini, P. (1991), 'Working in Practice but not in Theory', *Journal of Public Administration and Theory*, Vol. 1, No. 1, pp19-47
- Levi-Strauss, C. (1967), *The Savage Mind*, University of Chicago Press, Chicago.
- Lorenz, E. (1963), 'Deterministic Nonperiodic Flow', *Journal of Atmospheric Sciences*, Vol 20, pp 130-141
- Lovell, J. and Kluger, J. (1995), *Apollo XIII*, Simon and Schuster, New York.
- Marone, J. and Woodhouse, E. (1996), *Averting Catastrophe: Strategies for Regulating Risky Technologies*, University of California Press, Berkeley.
- Mintzberg, H. (1989), *Mintzberg on Management*, Free Press, London
- Mintzberg, H. Raisinghani, D. and Theoret, A. (1976), 'The Structure of Unstructured Decision Processes', *Administrative Science Quarterly*, Vol 21, pp 246-275
- Mirvis, P. (1998), 'Practice Improvisation', *Organization Science*, Vol. 9, No. 5 pp 586-592
- Mischel, W. (1977), 'The Interaction of Person and Situation', *Current Issues in Interactional Psychology*, pp 333-437
- Moorman, C. and Miner, A.S. (1998), 'Organizational Improvisation and Organizational Memory', *Academy of Management Review*, Vol. 23, pp698-723.
- Paulos, J.A. (1998), *Once Upon a Number*, Penguin Press, London.
- Pentland, B. and Reuter, H. (1994), Organizational Routines as Grammars of Action, *Administrative Science Quarterly*, Vol. 39, pp485-510.
- Perrow, C. (1984), *Normal Accidents: Living with High Risk Technologies*, Princeton University Press, Princeton, NJ.
- Pettigrew, A. (1974) 'Learning in Extreme Situations' *Warwick Working Papers*
- Pinker, S. (1997), *How the Mind Works*, Penguin Press, London.
- Reason, J. (2000), Human Error: Models and Management, *British Medical Journal*, Vol. 320, pp 768-770
- Rittel, H. and Webber, M. (1973) 'Dilemmas in a General Theory of Planning', *Policy Sciences*, Vol 4, pp 155-169
- Roberts, K. (1990), 'Managing High Reliability Organizations', *California Management Review*, Vol. 32, No. 4, pp101-17
- Roberts, K.H. (1990), 'Some Characteristics of High Reliability Organizations', *Organization Science* Vol. 1, pp160-177
- Roberts, K.H. and Rousseau D. (1989), 'Research in Nearly Failure Free, High Reliability Organizations: Having the Bubble', *IEEE Transactions on Engineering Management*, Vol. 36, No.2, pp132-139

- Rochlin, G. (1999), 'Safe Operation as a Social Construct', *Ergonomics*, Vol. 42, No. 11, pp1549-1560
- Roe, E. Hintzinger, L. and Labnow, K. (1998), High Reliability Pastorialism, *University of California at Berkeley*, Discussion Paper 3.
- Rotter, J. (1966), 'Generalized Expectancies for Internal versus External Control', *Psychological Monographs*, Vol 80, pp 609-621
- Russell, B. (1923), 'Vagueness', *Australian Journal of Philosophy*, Vol 1, pp 84-92
- Ryle, G. (1979), Improvisation. In *On Thinking*, Blackwell, London
- Sagan, S. (1993) *The Limits of Safety: Organizations, Accidents and Nuclear Weapons*, Princeton University Press, Princeton, NJ.
- Sandberg, J. (2000), 'Competence – the Basis for a Smart Workforce'. In Gerber, R and Lankshear, C. (Eds) *Training for a Smart Workforce*, Routledge, London
- Schulman, P. (1996), 'Heroes, Organizations and High Reliability', *Journal of Contingencies and Crisis Management*, Vol. 4, No. 2, pp72-82
- Simon, H. (1957), 'A Behavioural Model of Rational Choice'. In *Models of Man*, Wiley, New York
- Simon, H. (1976), *Administrative Behaviour*, Free Press, New York
- Skinner, B. (1965) *Science and Human Behaviour*, Free Press New York
- Smuts, J. (1926), *Holism and Evolution*, MacMillan, London
- Stewart, R. (1983), *Choices for the Manager*, McGraw-Hill, New York.
- Stringfield, S. (1994), Towards schools as high reliability organizations. Education reforms and students at risk: A review of the current state of the art *Working Paper*
- Taylor, F. (1947), *Scientific Management*, Harper and Row, London
- Tranfield, D. Duberely, J. Smith, S. Musson, G and Foster, M (2000) 'Organizational Learning - Its Just Routine', *Management Decision*, Vol. 38, No. 4, pp 253-261
- Tranfield, D. Parry, I. Wilson, S. and Foster, M. (1998), 'Teamworked Organizational Engineering: Getting the Most out of Teamworking', *Management Decision*, Vol. 36, No. 6., pp 378-
- Turing, A. (1936), 'On Computable Numbers, with an Application to the Entscheidungsproblem', *Proceedings of the London Mathematical Society*, Vol. 42, pp230-65
- Urwick, L. (1947), *Elements of Administration* Pitman, London
- Van Maanen, J. and Barley, S.R. (1984), Occupational Communities: Culture and Control in Organizations. In Staw, B. and Cummings, L. (Eds) *Research in Organizational Behaviour*, Vol 6, JAI, Greenwich
- Vygotsky, L. (1978), *Mind in Society: The Development of Higher Psychological Processes*, Harvard University Press, Cambridge, MA.
- Waldrop, M. (1994), *Complexity*, Simon and Schuster, London
- Weber, K. (1947), *The Theory of Social and Economic Organization*, Oxford University Press, Oxford.
- Weick, K. (1979), *The Social Psychology of Organizing*, Addison Wesley, Reading
- Weick, K. (1996), 'Drop Your Tools: An Allegory for Organizational Studies', *Administrative Science Quarterly*, Vol. 41, pp301-313.
- Weick, K. (1998), 'Improvisation as a Mind-set for Organizational Analysis', *Organization Science*, Vol. 9, No. 5, pp543-55
- Weick, K. Sutcliffe, K.M. and Obstfeld, D (1999), Organizing for High Reliability: Processes of Collective Mindfulness. In Staw, B.M. and Sutton, R. (Eds) *Research in Organizational Behaviour*, Vol. 23, pp 81-23.
- Wickens, P. (1992), 'Lean Production and Beyond: The System its Critics and the Future', *Human Resource Management Journal*, Vol 3, No 4, pp 75-89

- Wildavsky, A. (1988), *Searching for Safety*, Transaction Books, New Brunswick.
- Williamson, O. (1979) 'Transaction Cost Economics, *Journal of Law and Economics* Vol 22 pp 233-262
- Williamson, T. (1994) *Vagueness*, Routledge, London
- Zadeh, L. (1965), 'Fuzzy Sets', *Information and Control*, Vol 8, pp 338-353
- Zimmer, C. (2001) *Evolution*, Heinemann, London