Is Systemic Operation Design Capable of Reducing Significantly Bias in Operational Level Planning Caused by Military Organizational Culture?

by

Major Christopher J. Bell SG

British Army

School of Advanced Military Studies

United States Army Command and General Staff College

Fort Leavenworth, Kansas

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Approved by:

_____
Alice Butler-Smith, Ph.D.
Monograph Director

_____
Kevin C. M. Benson, COL, AR
Director,
School of Advanced
Military Studies

_____
Robert F. Baumann, Ph.D.
Director,
Graduate Degree Programs

ABSTRACT

IS SYSTEMIC OPERATION DESIGN CAPABLE OF REDUCING SIGNIFICANTLY BIAS IN OPERATIONAL LEVEL PLANNING CAUSED BY MILITARY ORGANIZATIONAL CULTURE? by MAJ Christopher J. Bell SG, 92 pages.

Bias caused by organizational culture is a constant companion of military planning. Cognitive models dominated by Newtonian, mechanistic, and reductionist thinking, have all but entrenched bias at the operational level of war where contextual, or environmental, orientation to a rival is rarely more than an unthinking or ideological mirage. The results are brittle campaign plans that are broadly predictable by any thinking competitor.

Systemic Operation Design claims to address this major problem by re-orienting users to each unique problem that they face. It rejects the unconscious application of previous experiences and cognitive templates as a dangerous trap that is more likely to produce incoherent and flawed actions, than effective operational art and science. A holistic approach, based on seven rounds of recorded (or textualized) discourse, it seeks to self-consciously, cognitively orient users to the problem at hand, before investigating the logic underlying the form of the system that connects them to a given rival entity. Instead of working in reverse from teleological, mechanistic, rigid, and pre-determined strategic end-states to possible actions likely to deliver them, the approach seeks to frame the logical terms for planning to begin, while recognizing that the most likely outcome of a given action is a series of new emergences that will alter the dynamic and adaptive system (in turn necessitating a cognitive re-structuring of its terms), preferably in the strategic direction desired. It sets as its goal the manipulation of the evolution of systemic changes, resulting from actions or threatened actions, which create circumstances that facilitate ones own logic and which are, in optimal conditions, self-regulating.

This paper will first examine the continuing problems of bias caused by military organizational culture, accompanied by an addiction to the rigid application of reductionist epistemologies. It will then investigate how Systemic Operation Design seeks to overcome the problems it claims to address, before concluding by outlining the principal future organizational challenges that its application might demand.

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INTRODUCTION

> The ideas and images in men's minds are the invisible powers that constantly govern them, and to these they all universally, pay submission. It is therefore of the highest concernment that great care should be taken of understanding, to conduct it aright in the search of knowledge and the judgments it makes.[1]
>
> John Locke, *Of the Conduct of Understanding*

To this day, Western military planning at the operational level of war is dominated by the reductionist paradigm. The goal of planning remains the reduction of observed phenomena to elementary entities that can be dealt with at the lower tactical level of war. Strategic and operational processes are ultimately reduced to military tactics. That is not to claim that related intellectual disciplines and government agencies are ignored in operational planning, but simply that, in almost all cases and including Iraq during 2003, the process has been conducted with the tacit assumption that in any conflict military action occupies the central position. Creative design, beyond the strictly military sphere, has been rare if it has existed at all.

The reductionist paradigm gained ascendancy amongst military planners because of the simple fact that it gives the illusion of bringing order to chaos. Nothing is more attractive to most Western military organizational cultures than the idea of imposing compartmentalized reason on sprawling complexity, and the prospect of reasserting order through discrete, decisive military action. The problem is that reductionist thinking comes at a high price. In making the assumptions and inferences necessary to decompose complexity to ordered simplicity an open invitation is offered to strong biases. Thought is reduced to linear procedures and logical steps each of which is designed to break down the problem at hand into its component parts. In short, reductionist approaches and analysis go hand-in-hand. Closed, compartmentalized, hierarchical

[1] John Dewey, *How We Think* (New York: Prometheus Books, 1996), 19.

military organizational cultures, so effective, and arguably necessary, for producing operational effectiveness at the tactical level, inject so much bias into these analytical processes that different armies have historically exhibited predictable ways of "doing business." For example, the US Army has revealed a propensity for total victories delivered by resource-heavy, large-scale forces while, in contradistinction, the British Army has shown a propensity for small-scale expeditionary operations projected, supported, and in some cases rescued, by the Royal Navy. As Henry Minzberg succinctly observed, "[People oriented to the analytical approach]. . . tend to favor convergent deductive thinking, to search for similarities among problems rather than for differences, to decompose rather than design."[2]

Minzberg not only suggested that reductionist planning lacks creativity, he went on to hint at the significant problem of organizational cultural bias that it encourages,

> The analyst tends to want to get on with the more structured step of evaluating alternatives [in this case usually based on military action] and so gives scant attention to the less structured, more difficult, but generally more important step of diagnosing the issue and generating possible alternatives [across the political, military, socio-economic, and information spectrum] in the first place. The result tends to be conservative problem solving, heavily biased towards the status quo [determined by the prevailing organizational culture]: problems are approached as they have always been conceived, in terms of the alternatives already available.[3]

In addition to the bias which characterizes reductionist planning models, as the world becomes increasingly networked by high speed travel and information systems, analytical, compartmentalized reasoning yields no common ground from which combined, joint, interagency and multidisciplinary approaches can be developed for multifaceted problems. Worse still, traditional reductionist military planning does not even stimulate the consideration of the type of complex, non-linear campaign design that can deal effectively with emerging complexities,

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[2]Henry Minzberg, *The Rise and Fall of Strategic Planning* (New York: The Free Press, 1994), 300.

[3]Ibid., 301.

themselves likely to alter the nature of any strategic competition or conflict. These challenges continue to the current day.

Systemic operation design claims to address the problem of reductionist planning in a complex, networked environment. It takes a holistic approach to problems and competing tensions that focus not on similarities between deconstructed components of the whole, but on differences and relationships between oneself, potential competitors, and target audiences within the terms of a single interconnected system. It seeks to create and design multidisciplinary operations with the purpose of disrupting rival sub-systems for predetermined advantage, and both general intended and specific emergent strategic end-states.[4] In his book on casualty and explanation, Wesley C. Salmon produced a broad concept of different types of understanding that is helpful in observing how a systemic approach and the related concept of strategic operation design combine to produce a more dynamic and comprehensive methodology for observing and determining the outcome of competition between two or more rivals. Salmon's model (Figure 1) includes the empirical, analytical reasoning of older military planning approaches, but also shows additional ways of understanding the strategic environment that are facilitated by a wider conceptual base.

Systemic operation design has the potential to create a quantum shift in operational planning capability and a transformation opportunity that could enhance and refine the ongoing technological and structural changes in many Western military forces. However, the approach will only realize its full potential if it can overcome the related subjects of a poor concept of information and biased reasoning caused by organizational culture. If it does not, systemic operation design will merely have produced a holistic model that will still result in predictable

[4]Ibid., 24-25. Intended strategy is pre-planned but not yet realized. Emergent strategy takes advantage of a realized pattern that was not expressly intended. Good strategy formation takes emergent strategy into account from the outset and considers implications within the context of the system as a whole.

organizational behaviors vulnerable to exploitation by a thinking rival. How well the approach is equipped for the challenge is the subject of this thesis.

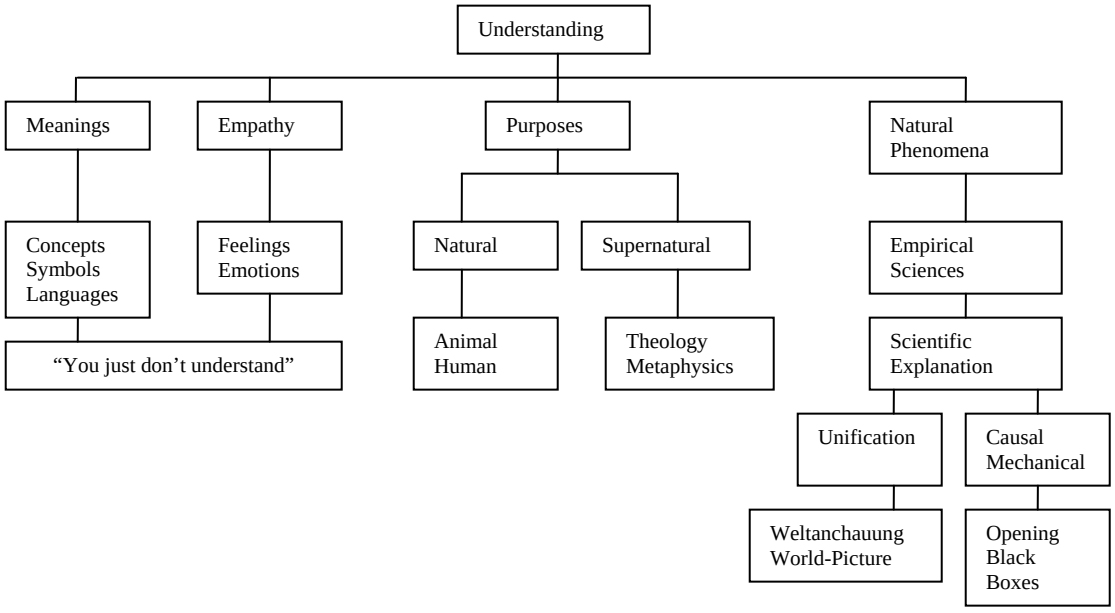


Figure 1. Types of Human Understanding
Source: Wesley C. Salmon, *Causality and* Explanation. Oxford: Oxford University Press, 1998, 83.

ANALYTICAL REASONING

Before examining how organizational culture is translated into bias, it is first necessary to understand the prevailing theory of analytical reasoning that has dominated Western military planning and decision-making at the operational level, arguably at least since the industrial revolution in Europe. In short, it is an empirical theory which posits that both social and natural science share the same basic goals of description, classification, hypothesis-testing, and prediction. It requires of the military planners who use it a systematic collection of evidence (data), an ordering and classification of that evidence in a search for discernable patterns (intelligence), and the building of more general causal theories, in turn leading to predictable practices such as the selection of a Clausewitzian center of gravity predicted to collapse an

adversary's source of power. At the heart of the approach is an evidence-inference methodological core.[5]

In his book *How We Think,* John Dewey developed a theory of reflective thought based on empirical reasoning, which revealed the foundations of operational planning today. Dewey developed five types of reflective thought:

1. A felt difficulty.

2. The location and definition of the felt difficulty.

3. The suggestion of a possible solution.

4. The development by reasoning of the bearings of the suggestion, or the implications of the possible solution.

5. Further observation and experiment leading to the acceptance or rejection of the suggestion, or the creation of a belief or disbelief. [6]

The first two steps refer to 'a moment of perplexity' where the observer is forced to attempt to link changed observable means to known ends by inserting terms that overcome the moment of perplexity and link them. The development of the suggestion in Dewey's third step is the heart of an evidence-inference methodology. It is the moment when the observer suspends judgment and leaves what is present to suggest something that is absent. In plain terms, it is a 'leap in the dark' informed by habits of mind, experience, education and a disciplined mental process. The result is a hypothesis that is subsequently tested in the final two steps. First, by rationally elaborating the suggestion into more thorough intermediate linkages that connect the moment of perplexity and known ends together into a consistent whole. Finally, if required the idea is verified through testing and experimentation. The result of the process is the development

[5]Todd Landman, *Issues and Methods in Comparative Politics: An Introduction,* (London: Routledge, 2003), 12. Landman uses this broad framework to show similarities between comparative political science and natural science. The same framework translates across to military planning.

[6]Dewey, 73.

of a belief which explains a given perplexity by linking it, using reason, to known ends. In the event that the process leads to the rejection of a suggestion, and a disbelief, it begins again as it would do in the event of a new observation of perplexity. As shown in figure 2, it is a process which starts and ends with observation and which makes use of systematic inference and reason between the two:

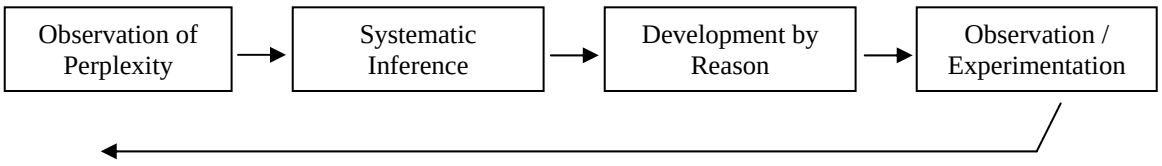


Figure 2. The Process of Reflective Thought

As described, analytical military planning uses a similar process of observation of perplexity (mission analysis), inference (development of courses of action), production of the detail and implications of a proposed operation through the planning process (for example a synchronization matrix, coordinating instructions, branch plans and sequels), and testing through observed experimentation (wargaming, and trial and error during execution). Where required, the process begins again either on new plans, or elements of an existing operation. The development of the hypothesis (course of action) that links perplexity to known ends (for example national strategic policy), is the moment of greatest inference and is based, in turn, on acquired habits of mind, individual and collective culture and experience, personal and institutional education, and a disciplined mental process produced by training, education, or a combination of both.

Despite the widespread acceptance of, and adherence to, this broad model and epistemological approach, it has some significant challenges. First, not all phenomena are observable, and what is most important may remain imperceptible. As Dietrich Dorner observed in *The Logic of Failure*, "Planners . . . may have to look, as it were, through frosted glass. They

must make decisions . . . whose momentary features they can see only partially, unclearly, in blurred or shadowy outline--or possibly not at all."[7]

In addition, there are significant but less immediately obvious vulnerabilities. Francis Bacon, quoted in Dewey, identified four sources of poor reasoning, or "idols" as he named them.[8] The first is called the 'tribe' and refers to standing erroneous methods of thought that have their roots in human nature generally. For example, impatience with the reasoning process or distractions caused by other demands on the attention of the individual. The second is called the 'market-place' and stems from confused or misunderstood intercourse and language, as might occur in a market-place. This is particularly relevant in a military environment where doctrinal language and discourse is often poorly understood or differs between components, agencies, disciplines, and states. The 'cave or den' refers to problems specific to the individual that they have brought with them since their early development. The fourth, and final idol, is called the 'theatre' and refers to problems of reason that have their source in the fashion, or general conduct, of the period. Once again, this is particularly applicable to any organization, such as a military, which develops fashions in thought and language, as well as adhering to deeper philosophical trends associated with a specific historical period. For example, the growth of humanism in Western society during the twentieth century. The key point exposed by Bacon is that the leap of knowledge required in the framing of a question and hypothesis during the analytical approach is prone to significant error, which is mostly caused by social rather than intellectual dynamics.[9] For example, an adherence to dogmatic principles rooted in accepted wisdom or tradition, a closed mind to alternative suggestions caused by an isolated social environment, an inability to separate

[7]Dietrich Dorner, *The Logic of Failure* (New York: Metropolitan Books, 1989), 40.
[8]Dewey, 22.
[9]Social dynamics are only one example and could be widened to include economic and cultural influences. The central point is that an analytical process cannot take place in a vacuum and is structurally prone to bias.

passion and reason based in any form of ideology, or an excessive dependence on, or reverence to, the authority of others all lead to beliefs that masquerade as law-like or law-related conclusions rooted in the supposed objectivity of natural science, while, in reality, remaining nothing more than a belief based on a wide range of intellectual and other influences. Once again, Dorner described a similar failure, "Complicated situations seem to elicit habits of thought that set failure in motion from the beginning."[10]

Immanuel Kant investigated the problem of to what extent the observed world could constitute a basis for knowledge. Although like Dewey and proponents of the empirical model Kant accepted that all knowledge begins with experience, he went on to suggest that there are two forms of knowledge. The first he referred to as 'material knowledge', which was knowable once it was perceived. The other was the 'form of knowledge' which accounts for the internal conditions in man which frame knowledge but are not themselves knowable through observation.[11] For the purposes of this argument, the key is that unlike Dewey, Kant did not understand the mind as capable of value-neutral reason, either naturally or through learning and intellectual self-discipline. In contrast, he believed that humans all had 'a priori' cognitions that precede experience.

The ramifications of Kant's understanding of the human mind is that while Dewey's observed perplexity can lead to reasoned beliefs, to be of signal intellectual value those same beliefs must be more than just the analysis of the materially perceived world, and related experience. In terms of knowledge, the most important beliefs are formed by a synthesis of analysis and 'a priori' cognitive judgments. For Kant, the limitations of analytical understanding were clear,

[10]Dorner, 10.
[11] Immanuel Kant, *Critique of Pure Reason* (New York: Prometheus Books, 1990), 3.

> Analytical judgments (affirmative) are therefore those in which the connection is cogitated through identity; those in which this connection is cogitated without identity, are called synthetic judgments. The former may be called *explicative*, the latter *augmentative* judgments; because the former add in the predicate nothing to the conception of the subject, but only analyze it into its constituent conceptions, which were thought already in the subject, although in a confused manner; the latter add to our conceptions of the subject and predicate which was not contained in it, and which no analysis could ever have discovered therein.[12]

The prevailing military planning model based on observed phenomena and analytical reason now becomes less robust in two central areas. First, it uses the language and logic of natural science but is in reality subject to a wide range of unstated influences, ranging from social dynamics through to 'a priori' cognition, during the creation of knowledge. To assume that the mind of an observer is at best value-neutral, and at worst only influenced by what Dewey refers to as, "an accidental conjunction of present circumstances" is mistaken.[13] The human mind and the environment in which knowledge is sought after are far more interactive and complex than Dewey suggested. Second, as Kant made clear, an analytical approach leads to explicative judgments that serve only to break down the whole into its constituent parts. While this may assist in making those parts more ordered and identifiable than when they were presented in a confused manner within the whole, it does not produce augmentative judgments that were not contained within the original whole and which are not identifiable using analysis alone. In short, analysis orders knowledge, yet rarely adds to it. In an operational planning environment these weaknesses have the potential to be significant during a struggle for advantage over an adversary.

Finally, by decomposing a whole into its constituent parts, analysis severs the connections between those parts. Such connections can often be as important as the nodes in understanding a problem. Equally, by severing connections between parts, an analytical model tempts the observer towards conclusions regarding consequences of actions that are prone to be

[12]Ibid., 7.
[13]Dewey, 84.

artificial or too narrow. This is true not only in terms of content but also in terms of time. For example, Dorner revealed that in an experimental planning game the players often, "assumed that the absence of immediately obvious negative effects meant that correct measures had been taken."[14] Perhaps most importantly of all, a narrow approach encourages the belief that a single action affects a linear causal chain of events ending in a single desired effect. By focusing on categorized parts at the expense of the dynamic, and often parallel, connections of the whole, such a prediction is almost always simplistic and inadequate. A single action may lead to multiple results, some of which are more important than the desired consequence, or even worse, make it irrelevant.

In summary, the analytical approach, so prevalent in military planning, has significant but rarely considered weaknesses. Of particular importance is the quasi-natural science structure and language of the model that dominates and erodes a full consideration of other factors in the knowledge creation process. Second, the limitations of pure analysis, or explicative judgments, compared to the addition of synthesis, or augmentative judgments, and finally the disadvantages of trying to assess the dynamics of a whole using only the sum of its observable parts. It is these weaknesses, all of which are yet to be fully addressed by most Western militaries that have institutionalized significant bias in analytical planning processes. If any new approach is to stand a chance of enhancing significantly the effectiveness of operational level planning it must address these three areas in particular.

[14]Dorner, 18.

INFORMATION, ORGANIZATIONAL CULTURE, AND BIAS IN KNOWLEDGE CREATION

The first central weakness of the prevailing analytical model is its poor conceptualization of the knowledge creation process. By over-emphasizing the logic and language of natural science, through an empirical model, in addressing problems with a much wider multidisciplinary base, current processes are structured to include and encourage significant bias resulting from powerful military organizational cultures. The consequences are predictable solutions, which rarely challenge the status quo of a rigid military hierarchy.

In his book *Issues and Methods in Comparative Politics :An Introduction*, Todd Landman reveals, albeit unwittingly, the negative consequences of employing a single epistemological approach to a multidisciplinary problem,

> The strong case for a science of politics suggests that both political science and natural science share the same basic goals, namely, description, classification, hypothesis-testing, and prediction. Both activities require the systematic collection of evidence; an ordering of the evidence and the search for discernable patterns; and the building of more general theories. Thus a science of politics always contains this 'evidence-inference' methodological core, or the 'customary pair' of theory and observation.[15]

The remainder of Landman's book goes on to consider the different natural science-related methods and techniques that should be employed to ensure that evidence is collected and ordered in a way that supports a given inference. In *Stray Voltage: War in the Information Age*, Wayne Michael Hall developed a similar epistemological approach in a military context. Hall's concept of 'knowledge war' is built around inductive reasoning, or put more simply, the conversion of collected data into knowledge and understanding. He defined knowledge war as an

[15] Landman, 55

intense competition for valuable information and knowledge that is needed to make better and faster decisions than an adversary. The goal in this type of conflict is to seek out, collect and process information in a quest for 'decision dominance,' which in turn leads to triumph by one side or the other.[16] Hall described the process that converts data into understanding. The links to the analytical approach are self-evident, "Data becomes information through the manipulation of machines and knowledge workers turn information into knowledge through thought, experience, intuition and creativity. Knowledge also leads to understanding, which occurs when decision makers combine several pieces of related knowledge into an intelligible collage. With understanding comes the potential to make effective decisions."[17]

Understanding Information

The dominance of models such as these in the knowledge creation process of Western militaries has led to a widespread and misconceived belief. The prevalent logic is that a military problem defined in terms of enough information will lead to a solution that will enable decisive and effective action. As the laws of natural science so clearly state, a valid and large enough sample combined with clear reasoning is the most likely way of attaining the knowledge necessary to intervene, and the understanding to predict future outcomes. Such an approach blinds those who rely on it to all the other, often a priori, forces at work on the decision maker. For example, the internal culture of the organization shapes the questions that it is likely to ask, assesses the validity of the sample, and imbues different types of information and inferences with different values. Equally damaging, it also leads to an over-investment in the perceived advantage

[16]Wayne Michael Hall, *Stray Voltage: War in the Information Age,* (Maryland: Naval Institute Press, 2003), 2. Hall's related idea of "decision dominance" has been accepted in U.S. Army doctrine and is also evident in the emerging U.S. theory of Network Centric Warfare. It is not accepted by the author as an achievable state as the remainder of the argument will reveal. However, it will not be specifically addressed in this thesis.

[17]Ibid., 3.

gained from rapidly changing information technologies. The underlying presumption is that by investing in technology the size of the sample can be increased dramatically. The knowledge that is gathered is then more likely to be well founded and, if that knowledge is in turn shared quickly enough, the resulting advantage will lead to victory. These ideas remain at the core of Western military approaches to complex problem solving. On January 5, 2005 the US Department of Defense Office of Transformation, headed by Vice Admiral (Ret) Arthur K. Cebrowski, published a pamphlet entitled *The Implementation of Network-Centric Warfare*.[18] The pamphlet explained the theory of network-centric warfare that underpins the current re-structuring of the US Army. The principal four tenets of the theory are that the force must be robustly networked to improve information sharing, that in so doing the quality of the information is improved and with it situational awareness, which improved situational awareness enables more effective collaboration, self-synchronization and faster, more sustainable command, and that the overall result is increased mission effectiveness. In essence, information advantage leads to combat power advantage. These tenets rely on the misconceived assumptions that the knowledge creation process is an overwhelmingly scientific one, and that technology is the enabler of a more effective application of it.

Given this context, it is not surprising that prevailing military wisdom perceives numbers of bytes, and bandwidth as central requirements of the emerging realities of life in a globalized world. There is good reason for such a view, information technologies have indisputably altered people's lives, and within that, military operations. Networked, digital information has changed the dynamics of time and space. Information is now available instantly not only at its source, but across the world. The nature of state sovereignty has been altered by global markets,

[18]Office of Force Transformation, *The Implementation of Network-Centric Warfare*, (Washington D.C.: Government Printing Office, 2003).

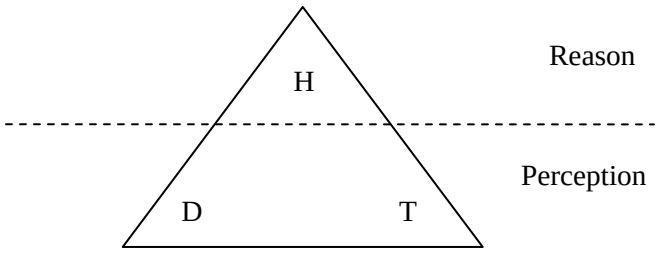
supranational institutions and the media, resulting in an inability to exercise will and execute policy in the more compartmentalized manner that was possible until the end of the Cold War.[19] The emerging, unaligned world is grey, vague, and fluid. Commercial hierarchies have flattened and information has become central to national strategies in almost every area. Yet if globalization embodies one thing more than any other, it is the reconfirmation that nothing is simple and there are multiple, parallel reactions for any action in an information network. In these circumstances, it is clear that the current understanding of what constitutes information is incomplete. By applying such a narrow approach, dominated by quasi-scientific language, to knowledge creation, information has been conceptually reduced to a misleadingly basic, value-neutral raw material. As has been demonstrated, it is no such thing. Information is as social as it is scientific and only an enhanced understanding, which can account for these wider dynamics, will provide a solid foundation for future operational planning. Intuitively this statement is self-evident, since if the current level of understanding was sufficient, then using Hall's model, individual and institutional decision-making would be better than at any previous time in human history. The historical record does not bear this out.

The quasi-scientific assumption that the knowledge creation environment is made up of value-neutral data just waiting to be found, collected, ordered and analyzed is flawed. Max Weber's argument that there is no such thing as objective data, but instead that there are always links and tensions between ideas and the interests vested in them is much more realistic. Weber argues that ideas have an 'elective affinity' by which recipients of ideas (as information) elect

[19]Historically, states have rarely been able to act in isolation from other states, but the compression of time and space by information technologies has introduced greater constraints on state governance both domestically and internationally.

those features with which they have a natural affinity.[20] In a globalized world, the sheer number of available ideas and, mostly unrecognized interests in both the sources and ourselves, has created a volatile mix of uncertainty and confusion. In these circumstances, a poor understanding of information leads to missed opportunities, a limited appreciation of the possible interpretations of actions and ideas or, worse still, a blind exposure of unanticipated vulnerabilities.

For the purposes of this argument, it is suggested that there are three basic elements to any unit of information. First, there is a symbolic or data element, such as detailed numerical and linguistic choices. Second, there is a technical element or choice of medium such as the visual display of information using the internet, oral discourse, or specific types of organizational written formats. Finally, there is a human or social element which reflects the context of the ideas and interests of the source, as well as the elective affinities of the recipients. Such affinities can result from a range of stimuli such as a priori cognition, individual character, education, and the organizational culture in which a recipient operates. These three interactive elements are integral to any unit of information and the assumption of the existence of value-neutral data is, therefore, rejected on the grounds that it so rarely, if ever, exists. As shown in Figure 3, the data and technical elements of information are knowable through observation, whereas the human element is only knowable through the application of reason:



[20]C. Wright Mills and Hans H. Gerth, eds. *From Max Weber: Essays in Sociology,* (New York: Oxford University Press, 1946), 63.

H = Human

D = Data

T = Technical

Figure 3. The Three Elements of Information and How They are Knowable

By applying a more developed concept of information to the knowledge process, it is immediately apparent that a greater breadth of understanding becomes more likely. No longer is the creation of knowledge restricted to inferences from Salmon's categorized natural phenomena. The improved concept encourages the conscious conceptualization of purpose, empathy and meanings in any given information. When applied equally to ourselves, and to a target audience, the likelihood of bias is reduced. Figure 4 shows diagrammatically the enhanced concept of information and how it improves the analytical knowledge creation process:

Organizational Culture and Historical Repertoires

Arguably the most important function of a more rigorous understanding of information is increased self-awareness and the resulting ability to limit the influence of the prevailing military organizational culture, as well as to prompt a more wary use of the institutional historical repertoire.

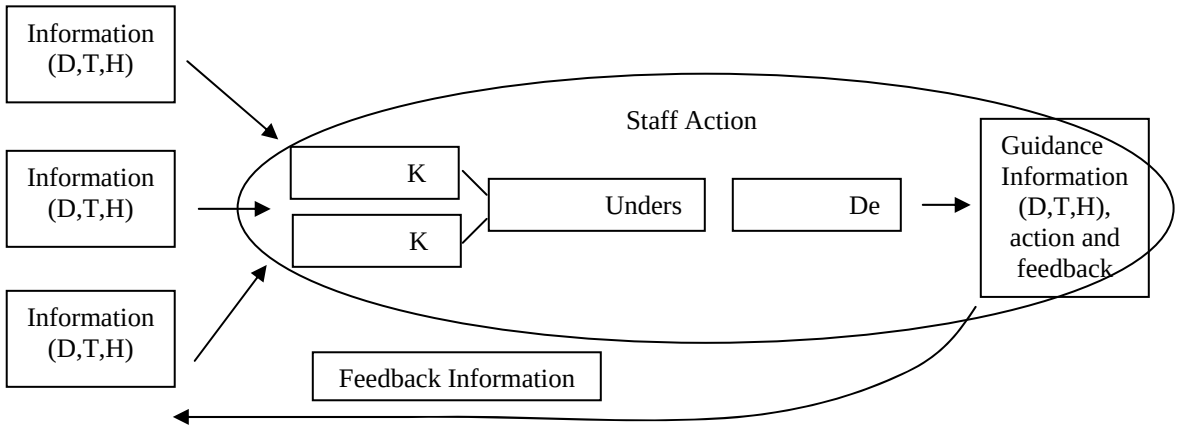


Figure 4. Enhanced Concept of Information in an Analytical Knowledge Creation Process

In order to understand these two concepts it is useful to briefly consider the example of the British and American armies. Both organizations are, for the most part, conservative, traditional, and historically suspicious of change. As modern all-volunteer forces they have less exposure to their wider societies today than at earlier times in their histories. The result is that they can often appear isolated from, or at least behind, the social trends in the rest of their populations. In training and preparing to conduct military operations both forces have necessarily developed their own organizational cultures and institutional repertoires as terms of reference for the uncertainty and stresses of attempting to maintain the full spectrum of conflict capabilities and dominance. In simple terms, their own ways of doing business based on their different organizational cultures (or group character), and institutional historical repertoires (or collective memories) of what they determine as historical successes and failures. The development of these different personalities is important because they become Locke's 'invisible powers' that constantly govern minds and shape understanding. These self-imposed cognitive boundaries manifest themselves in such ways as a tendency under time pressure to revert to established measures, an inability to consider non-linear networks of causation and repercussions, or as an inadequate understanding of the speed and dimensions of exponential development.[21] Organizational culture is the major force that produces the ideas, interests, and affinities which are central to the human element of information.

At the same time the institutional historical repertoire provides the data banks from which institutional knowledge, understanding, and doctrine are drawn. What is allowed to enter the

[21]These examples are common mistakes of cognition used by Dietrich Dorner, *The Logic of Failure* (New York: Metropolitan Books, 1989), 33.

institutional repertoire as a 'lesson learned' (as the basis for future training and/or education) is itself a product of the force's organizational culture. Hugh Roberts referred to the "unhistorical nature" of collective memory in his book *The Battlefield Algeria 1988*-2002, "A mind which is full of history is liable to be paralyzed by the weight and variety of the conflicting lessons which history teaches. . . . They are economical with the truth in the sense that they recognize only those facts which are grist to their mill."[22] The important consequence of these processes is that by studying the organizational culture and historical repertoires of a force it is possible to gain an understanding of how they seek, utilize and react to information.[23] This in turn makes them organizationally predictable, and therefore vulnerable.

Quasi-Scientific Analytical Techniques

By establishing a more robust concept of what constitutes information and how the organizational culture and historical repertoire of a force combine to inject significant long-term, widespread, and (most dangerously) unconscious bias into how knowledge is created, it is now possible to understand fully the ramifications of the quasi-scientific discourse that has dominated military use of analytical models. An individual or organization, reassured by the perceived objectivity of an underlying natural science epistemological approach and language, that describes, classifies, creates hypotheses, tests them against self-selected criteria, and extrapolates causality without a coherent understanding of information and organizational bias is a source for grave concern rather than success. The beliefs that such an organization is likely to produce, and advocate to others, will primarily reflect internal social interaction and culture. The major contribution of the organization to the creation and execution of national strategic policy is most

[22]Hugh Roberts, *The Battlefield Algeria 1988-2002*, (New York: Verso, 2003), 141.
[23]See Appendix IV- The Social Life of Military Thought.

likely to be to inject dangerous biases and to create vulnerabilities open to exploitation by adversaries equipped intellectually to identify them.[24]

Any new approach to operational planning must address this central weakness of the current analytical model. Until this problem is overcome, it will remain up to the individual to rise to President Kennedy's challenge during the Cuban Missile Crisis in 1962 of becoming "more than military men," rather that to submit to the easier, culturally encouraged avenue that Maurice de Saxe identified in 1732 as characterized by those that, "pass their lives drilling troops and believe that it is the only branch of the military act. When they arrive at the command of armies they are totally ignorant, and, in the absence of knowing what should be done, they do what they know."[25] Sadly, what one already knows may be irrelevant to the systemic challenges that await them.

THE SYSTEMIC APPROACH

It is now clear that any process that is to improve upon the empirical model of analysis must contain an enhanced concept of information. In addition, it is unlikely to increase the effectiveness of an operational level planning process significantly unless it is utilized within an approach that recognizes the second major weakness of the analytical model: that the sum of the whole is not knowable through an analysis of its parts.

General System Theory

Just such an interdisciplinary approach was first formulated by Ludwig von Bertalanffy in his book *General System Theory*, published in 1968. The cornerstone to Bertalanffy's approach

[24]For more discussion of this topic see Samuel P. Huntington, "The Making of the American Military Mind" in *The American Military: Readings in the History of the Military in American Society*, ed. Russell F. Weigley. (Massachusetts: Addison Wesley Publishing Company, 1967).

[25]US Army Command and General Staff College, *A534 Joint Force Command.* (Fort Leavenworth, KS. December 2004), L1-2-2. Maurice de Saxe, *Reveries on the Art of War* quoted in US Army Command and General Staff College, *H200 Military Revolutions,* (Fort Leavenworth, KS. December 2004), H202RA-51.

was to look beyond the analysis and explanations of the various components within a system, and to attempt to identify the laws governing the whole. In so doing he provided a new language and points of reference for defining and understanding complex problems across the academic disciplines. He argued that, "in one way or another we are forced to deal with complexities, with 'wholes' or 'systems,' in all fields of knowledge. This implies a basic reorientation in scientific thinking."[26]

Bertalanffy defined a system as "sets of elements standing in interrelation" and General System Theory as the result of the unsatisfactory record of "science (that) tried to explain observable phenomena by reducing them to an interplay of elementary units investigable independently of each other."[27] In contrast, his theory aimed to accommodate what he identified as the emerging integration of both the natural and social sciences into a more general and unified paradigm where the goal went beyond analysis and the isolation of individual, linear causal trains.

As Shimon Naveh observed, Bertalanffy used three basic cognitive tools for assessing and criticizing systems.[28] First, a quantitative parameter that concerned the number of elements composing a system. Second, the matter, which concerned the species of the elements involved, and finally the qualitative parameter, which centered on the attributes of the relations between the various elements of the system. In a simple demonstrative example, Naveh applied these tools to a military problem by using the quantitative parameter to reveal the size of the forces involved, matter to examine the weapons systems and deployed forces, and the qualitative parameter to examine the relationships between all the elements, such as command and control.

In addition, Bertalanffy identified living systems, such as those encountered in a military context, as "open systems." He defined them as, "a system in exchange of matter with its

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[26]Ludwig von Betralanffy, *General System Theory*, (New York: George Braziller, 1968), 5.
[27]Ibid., 36-37.
[28]Shimon Naveh, *In Pursuit of Military Excellence*, (London: Frank Cass, 1997), 4-5.

environment, presenting import and export, building up and breaking-down of its material components."[29] Open systems operated in contrast to "closed systems" which were considered to be isolated from their environment.[30]

The Major Attributes of Systems from a Planning Perspective

M. Mitchell Waldrop recognized the significance of the relations between variables within a given system in his book *Complexity*. By way of an introduction to the idea of complex adaptive systems, he quoted Brian Arthur's reflections on an Austrian Tyrolean village in 1977. As Arthur admired the long sloping roofs, gables, and distinctive balustrades on the snow-covered chalets he came to the startling realization that, "rather than thinking that this was a nice jigsaw puzzle picture, I realized that there was not a single part of the village that wasn't there for a purpose, and interconnected with the other parts." Arthur then crossed the Italian Border into the Dolomites, expecting to see the same characteristics and interconnections in villages created to cope with the same environmental conditions. To his surprise he found that the villages, at a similar elevation and separated by a matter of a few kilometers, were not Tyrolean at all, "It was no one thing that you could point to. . . . Over time, the two cultures had arrived at mutually self-consistent patterns that are different."[31] In his example, Arthur observed three essential qualities of a system. First, the interconnection of the parts of the village, second the influence of the human element of information revealed by the different cultural responses to very similar

[29]Bertalanffy, 141.

[30]Samuel P. Huntington described the impact of "professionalization" in the US Army as creating a closed system subject to an all-pervasive organizational culture that is hostile to external intervention. See "The Making of the American Military Mind," in *The American Military: Readings in the history of the Military in American Society*, ed. Russell F. Weigley, (Massachusetts: Addison Wesley Publishing Company, 1967).

[31]Mitchell M. Waldrop, *Complexity. The Emerging Science at the Edge of Order and Chaos*, (New York: Touchstone, 1992), 28.

environmental causes, and finally, the properties, or impressions, which different villages possessed as a whole.

A more famous example of a systemic approach is *The Origin of Species* by Charles Darwin. The theory of natural selection reflects the workings of a hierarchical, adaptive system, including variables, different forms of life, and holistic systemic qualities such as the organization of life in the world,

> Natural Selection acts exclusively by the preservation and accumulation of variations, which are beneficial under the organic and inorganic conditions to which each creature tends to become more and more improved in relation to its conditions. This improvement inevitably leads to the gradual advancement of the organization of the greater number of living beings throughout the world.[32]

Robert Jervis consolidated these systemic themes in his definition that, "We are dealing with a system when (a) a set of units or elements is interconnected so that changes in some elements or their relations produce changes in other parts of the system, and (b) the entire system exhibits properties and behaviors that are different from those of the parts."[33]

Jervis' definition leads to some important consequences for a systemic approach to problem solving. First, as discussed, the outcomes of a system cannot be understood by adding together the parts, or their relations. For example, the differences in Austrian Alpine, and Italian Dolomite villages are not explicable through an analysis of their houses. The two systems have developed patterns, over time, which are now mutually reinforcing with the parts. Second, systems are characterized by non-linear relationships between units. This is particularly important in attempting to consider casualty in a military and political context. Finally, there are likely to be multiple results for any action taken within a system, analogous to the ripples expanding from the

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[32]Charles Darwin, *The Origin of Species by Means of Natural Selection. The Descent of Man and Selection in Relation to Sex*, (London: Encyclopedia Britannica, Inc. 1952), 60.

[33]Robert Jervis, *System Effects. Complexity in Political and Social Life*, (Princeton: Princeton University Press, 1999), 6.

splash of a pebble thrown into a pond. Some will be expected and intended, others will be unintended. In military planning the intended outcomes must not be predicted without consideration of the possible alternative or parallel outcomes resulting from an intervention. Failure to understand the nature of the system in terms of its linkages and as a whole can make the intended outcomes irrelevant even if they are achieved. For example, throughout the 1990s, the Al Qaeda terrorist network stated that the expulsion of Western military forces from Saudi Arabia was a central aim of the organization. By 2003 the objective had been, to all intents and purposes achieved, but the same actions that had led to the departure of US forces led indirectly to the invasion of Iraq and greater Western intervention in the region than at any time since the departure of the colonial powers. Multiple outcomes resulting from a system intervention had produced multiple direct and indirect results, some of which proved to be far more important than others. Which ones Al Qaeda genuinely planned, and which were unintended remains a matter of conjecture outside the inner circles of the organization. For the military planner, the consequences of these dynamics are a much more complex problem, with a large number of variables and multiple outcomes, and little guarantee that the intuitive prediction of the results of actions planned on the basis of previous experience, such as is contained in an organization's institutional historical repertoire, will have any degree of accuracy.

Systems also have the capability to act as magnifiers of beliefs. As shown in Figure 5, a small informational bias, allowed to creep into a decision, may have only a minor effect on directly related nodes within a system.

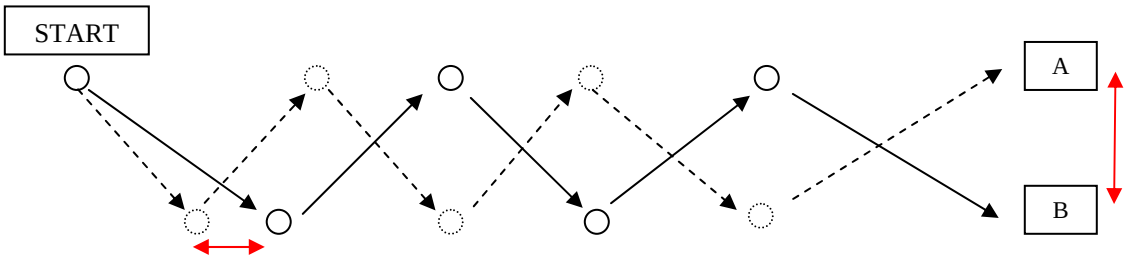

Figure 5. The Expanding Effect of Knowledge Beliefs Across a System

However, as the effect spreads indirectly across other nodes it has the potential to expand in magnitude and eventually become a dominant factor in producing an unexpected outcome. This systemic quality can alter fundamentally the significance of the original action and even neutralize the desired outcome.

Finally, the use of systems as a mode of thinking has been made all the more relevant by the emergence of global digital technology. Robert Axelrod and Michael D. Cohen described this dynamic using the metaphor of the Industrial Revolution,

> The Industrial Revolution made metaphors of machines and factory production widely available. . . . They led to an emphasis on predictability and control. . . . Recently, there has been increasing dissatisfaction with the costs of the industrial mode of thinking and action. Its impersonality and rigidity are frustrating. Its slowness and inability to adjust to changing circumstances and local conditions have become obvious. . . . Just as the clock and the steam engine provided powerful images for the metaphor of society as a machine, distributed information technology can provide a powerful image for a metaphor of society as a complex adaptive system.[34]

A solely analytical approach is tied to such a mechanistic view of the environment. Systems approaches are designed to reach beyond this rigidity in a compact, fast and interconnected world.

Linkages, Complexity, Adaptation, and Value-Bias

As should now be clear, seeking to understand a problem through analysis into its constituent parts presents an incomplete picture. The properties of the components of a system are meaningless without comprehension of their linkages to other components and the qualities of the

[34]Robert Axelrod and Michael D. Cohen, *Harnessing Complexity: Organizational Implications of a Scientific Frontier,* (New York: Basic Books, 2000), 28-30.

system as a whole. In his book *Design For a* Brain, W. Ross Ashby makes this relationship clear in his description of how the human nervous system learns,

> When we consider its [nervous system] various parts, however, we find that the value of one part's behaviour cannot be judged until the behaviour of the other parts is known; and the values of *their* behaviours cannot be known until the first part's behaviour is known. All the variations are thus *conditional*, each depending on the others. Thus there is no criterion for 'better' that can be given absolutely, i.e. unconditionally.[35]

In terms of operational planning, Ashby's idea of 'conditionality' means that the components of a given system are influenced by interactions that may be displaced in location and time from the initial focus of enquiry. When the interactions are dense, complex, and indirect it becomes difficult to follow the history of causation, or predict the future impact of actions. In short, any identified systems are almost always complex and difficult to manipulate for desired outcomes such as fixed national strategic objectives. However, it is only by focusing on these interactions and linkages that desired outcomes can be obtained. As Jervis reflects, even with determined and planned actions on both nodes and linkages, desired outcomes are difficult to achieve, "Interconnections can defeat purposive behavior. Not only can actions call up counteractions, but multiple parties and stages permit many paths to unanticipated consequences."[36]

In addition, the systems themselves are robust and adaptive. As Darwin's theory of natural selection made clear, a system designed to cope with competition and adversity is rarely broken by stresses at a single point. In the context of military planning the lesson is clear, application of pressure by a single means at a single point, or node, is unlikely to collapse a system although it is likely to alter it, either in terms of advantage, disadvantage, or altered relevance of specific behaviors at given systemic nodes by any competitor. Arguably, the

[35]Ross W. Ashby, *Design For a Brain. The Origin of Adaptive Behaviour*, (London: Butler & Tanner Ltd, 1960), 15.

[36]Jervis, 17.

invasion of Iraq by coalition forces in 2003 represented the application of stress to the Iraqi leadership using military means. The result was to remove the leadership but also to alter the entire environmental system in Iraq for better, or worse, depending upon the observer's perspective. For example, from some perspectives, the removal of President Saddam Hussein so altered the system between the two major rivals (US and Iraqi regime forces) that the resulting outcomes, such as conventional military victory by the coalition, merely altered the nodes at which competition would continue, rather than generating the anticipated systemic collapse.

M. Mitchell Waldrop took the same idea of robustness a step further and argued that some systems are so complex, with so many interactions, that they are capable of dynamic self-organization. For example, in a military context, disparate groups of people trying to satisfy their needs can unconsciously organize to their best advantage through a myriad of social, political, economic, cultural and military interactions.

> All of these complex systems have somehow acquired the ability to bring order and chaos into a special kind of balance . . . often called the edge of chaos. [It is] where the components of a system never quite fall into place, and yet never quite fall into turbulence either . . . . War takes place at the edge of chaos, where new ideas challenge the status quo (or vice versa), in a commonly shifting environment including anarchy and stability and where the context is spontaneous, adaptive and alive.[37]

In such dynamic, shifting environments appearances are deceptive and an actor's prevailing organizational culture and associated institutional historical repertoire can become a disadvantage in the process of trying to establish causation, or predict future outcomes. For example, a relationship with a selected actor, informed by a poor use of information, may be miscalculated due to an assumption, based on accepted collective experience, that a deliberate action will cause a predicted result. However, in reality, the relationship between the selected actor and third actor may be more important and so lead to both unexpected and indirect effects.

[37]Waldrop, 29-31.

The problem returns to the central concept of conditionality in systems. If the results of actions are conditional on other actions, or the results of strategies dependent on their interaction with other strategies, and the only certainty is that any action will have multiple results, then ultimately all plans are the result of the actor placing different values on different interactions, or linkages. These value judgments are, in turn, informed by the prevailing organizational culture and lessons learned from the institutional historical repertoire. Even where a force avoids template analytical planning and is adaptive enough to react to emergent lessons and strategies as actions in a given system cause multiple effects, those which the organization chooses to respond to, and how they respond are themselves value judgments. While it is apparent that a systems approach is far more effective for considering complex problems than a solely analytical approach, it also seems that it still suffers from the same lack of understanding of information. The result is value-bias in considering system linkages and predicting interactions.

Actions Based on Impressions

An unsophisticated systems approach determines that actions are based on an actor's initial impressions of interactions, or linkages, between elements. Adaptive systems are problematic for any actor to understand, since not only are they complex, but they also resist comparison with previous experiences or similar cases due to their interlinked and changing variables. Even an apparently small difference between similar systems changes the dynamics of the whole. In addition, as demonstrated by Darwin, systems are capable of adaptive substitution of one element with another when circumstances change. Ashby goes as far as to suggest that complex adaptation is a form of rational action based on stability, similar to homeostasis, where variables constantly change to maintain the stability of the whole system. This idea is in turn linked to Waldrop, who maintains that the greatest complexity is found in systems where such stability is never quite possible.

For a planner, determined to achieve a desired output from a system, these dynamics produce significant challenges. As has been described, cause and effect is difficult to judge, and even when a chain of causality is suspected, it is impossible to test using the organizationally-templated and preferred empirical approach. Valid experimentation and observation is not possible when the subject element and its systemic environment affect each other reciprocally. In addition, actors within the system disguise behavior in the knowledge that another actor may evaluate it as evidence of future actions. This behavior, in itself, then alters the linkages within the system in a way that will produce a different future environment. How actors perceive systemic linkages, and what subsequently drives them to given actions remains an enigma that is impossible to know through observation, or even at all. In simple terms, environments understood as systems are unsuitable for a solely analytical approach to planning and demand dynamic and continual qualitative, as well as quantitative modes of enquiry. This form of understanding is permeated by impressions, subjective interpretations and assessments of other actors' intentions. Attempting to conduct qualitative assessment without a strong understanding of information is perhaps even more significant than in a purely analytical approach. Not only will the resulting bias change individual actors' assumptions and conclusions, as in the empirical model; it will also change the very environment in which decisions are taken, through altering the entire system indirectly. In a system where actions are based on impressions, understanding the human element of information is critical.

Learning to Act in a System

Although systems are undoubtedly complex, they offer a more useful (if more difficult) means to understand the strategic and operational environment. When used effectively a systemic approach can deliberately limit the linkages available to an adversary and can galvanize actors with common interests into united and coordinated actions. Most importantly of all, it raises the focus of enquiry beyond the consideration of the constituent parts of a problem, to include their

linkages to one another, including oneself. A systemic approach, suggests to the planner, new questions to answer and new modes of interaction. No longer is enquiry restricted to analysis of the whole through the sum of the parts and isolated actions by different agencies, but is broadened to interacting with the whole, directly and indirectly in order to achieve a desired outcome.

On February 24, 2004, US Joint Forces Command published *Pamphlet 4, Doctrinal Implications of Operational Net Assessment*. The pamphlet set out to describe a systemic approach to operational planning known as Operational Net Assessment (ONA). It described ONA as, "the integration of people, processes, and tools that use multiple information sources and collaborative analysis to build shared knowledge of the adversary, the environment and ourselves."[38] Focused at the operational level, the model attempted to consider all aspects and perspectives resulting in elements relevant to the problem (Net) and utilize a systemic process of analysis, appraisal, and review to determine salient information and develop knowledge (Assessment). It viewed the adversary as a "system-of-systems" made up of political, military, economic, social, infrastructure, and information (PMESII) sub-systems. The overall objective was to, "determine the significance of each PMESII system and its various elements to the overall adversary system in order to assess the systemic vulnerability of the various elements and how we can exploit them to achieve desired effects."[39] The process represents a significant improvement in current operational planning models despite the clear demand for a more complex and adaptable approach. It widens the breadth of consideration of a given problem, lays the foundations for co-coordinated action across PMESII, and includes analysis of the perception of friendly actions in a system through the use of a 'red cell' formed for that specific purpose. ONA

[38]U.S. Joint Forces Command, *Pamphlet 4. Doctrinal Implications of Operational Net Assessment (ONA)*, (Washington D.C.: Government Printing Office, 2004), 1.

[39]Ibid., 5.

represents one of the first attempts to establish an enhanced systemic methodology for operational level planning and dealing with adaptive complexity in an information-networked world. However, it still fails to conceptualize sufficiently the conditionality and dynamism of an adaptive system. The use of any template, PMESII or otherwise, risks intellectual rigidity and mechanical methodism in application, which may or may not be useful in understanding the system under examination. In addition, it still places key emphasis on the analysis and reduction of a system into its related parts, above the synthesis of holistic systemic qualities and attributes.

Problems

While a systemic approach provides a much stronger basis for understanding a problem than a narrow use of the empirical model, it does not confront the weaknesses associated with a poor concept of information. Value-bias, stemming from organizational culture, still permeates the logic grounds for operational planning, and shapes the use of even this improved approach. Ashby describes the problems of value-bias in choosing how to frame a problem, or system for consideration,

> Because [a given problem] has an infinity of variables, from which observers (with different aims) may reasonably make an infinity of different selections, there must first be an observer (or experimenter); a system is then defined as *any set of variables* that he selects from those available. . . . It is thus a list, nominated by the observer and is quite different in nature from [reality]. . . . The 'system' will always refer to this abstraction, not to the real [world].[40]

Ashby makes the key observation that through the necessary process of intellectual abstraction, the whole approach is left as open to bias and rigid, irrelevant application as any earlier model. To a certain extent, bias is compensated for by the increased self-awareness of oneself as an actor in a system, shared with and, learning about an adversary. However, because the system is defined ultimately by the planner, it is still subject to informational bias and the

[40]Ashby, 16.

possibility of starting a campaign from a significantly removed and disadvantageous cognitive abstraction of reality. Dorner identified the same problem bias in value judgments and argued that, "Thought is always rooted in values and motivations. We ordinarily think not for the sake of thinking but to achieve certain goals based on our system of values. . . . [T]he conflict between treasured values and measures that are regarded as necessary can produce some curious contortions of thought."[41]

Christopher Alexander considered a similar problem of trying to comprehend complexity in building designs. He identified a quality that defied definition but which was critical to a successful design, "But so far, concretely, we have not seen this quality in any system larger than a tree, a pond, and a bench. Yet it can be in anything--in buildings, animals, plants, cities, streets, the wilderness--and in ourselves. We shall begin to understand it concretely, in all these larger pieces of the world, only when we first understand it in ourselves."[42] Alexander identified that situational awareness, and the ability to intervene in complex systems for desired outcomes (in this case a building with an indefinable quality rather than an operational endstate) is only possible through enhanced self-awareness. Such self-awareness is assisted by the systemic approach, and by organizational changes such as the US introduction of 'red cells' to the staffs of Standing Joint Force Headquarters, but ultimately it is not possible without an enhanced concept of information which enables such self-awareness. Human impressions about a system, that they themselves define, determine the range of actions taken within it, and whether those actions achieve their intended strategic, or operationally educational, outcomes.

Despite the clear benefits of a systemic approach utilized in conjunction with an enhanced understanding of information, analytical preferences and prescriptive models continue

[41]Dorner, 8.

[42]Christopher Alexander, *The Timeless Way of Building. (*New York: Oxford University Press, 1979), 47.

to slow down the necessary transformation of knowledge creation processes. Even the potentially promising addition of ONA to US joint doctrine still seeks to analyze and categorize information into defined checklists such a PMESII. In addition, it also imports clumsy concepts into its primary components. For example, knowledge and decision superiority stem directly from the fallacy that speed and quantities of information contain inherent advantage, as well as the intriguing idea that a relative form of knowledge and decision superiority is even attainable, since different actors require different forms of knowledge for their different actions. For example, an insurgent can be effective with significantly less general knowledge about a given operational environment than counterinsurgent forces, provided he has limited but accurate local knowledge and a capacity to change his routines and locations. In addition, far from accepting the dynamic and unfolding, evolutionary nature of adaptive systems, it posits pre-determined end-states as a means to work back through the system to determine desired actions. In an open and constantly changing system, such an approach has little chance of success. In these and most circumstances, such templated concepts applied to unique circumstances have, at best, limited utility.

In summary, it is clear that a systemic approach increases the effectiveness of operational planning, and that when combined with a rigorous concept of information it has the potential to represent a leap in capability. However, without such a concept, and when applied with mechanical rigidity, it is still vulnerable to the same bias caused by organizational culture that currently plagues basic analytical techniques.

DESIGN OVER DECONSTRUCTION

Having established that any new approach to campaign planning is likely to be improved only by the combination of an enhanced concept of information and a systemic approach to complex problems, it is now necessary to address the final weakness identified in the prevalent military use of the analytical approach. An effective operational level planning process must be

specifically designed not only to identify given systems, selected variables within them, and the overall rules of their interaction, but in addition it must be able to produce augmentative judgments, or synthesis, about the evolving purpose of the system itself. Put more simply, it must be a creative process of design that is able to track the altering aim or purpose of a specified system and then create, or identify, a structure that is able to tolerate the stresses of the transition from paper abstraction to physical application in reality. Naveh recognized the importance of this overall purpose and design of a system by arguing that, "in other words, the definition of the aim is the cognitive force that generates the system and determines the directions and patterns of its action. Thus, the deliberate exposition of the aim of a system's operation, which is made prior to its occurrence manifests the holistic approach at its best."[43]

Military operational design is not alone in confronting the challenge of a requirement for complex designs, created in a finite time, in order to achieve less than clearly stated objectives, or changes to the current environment. In all these areas architecture, in particular, has instructive similarities. As during military campaign design, architecture deals with the requirements of understanding and synthesizing information from multiple sources and then applying it to alter a chosen environment. This process of application, in turn, also involves a systemic understanding of the building, its purpose, functions, and how they relate to the space in which it is built. As Alexander described, the process is more than simply an investigation into the quantity and qualities of the interrelationships that make up the whole. In architecture, the model itself becomes part of the creative process through learning and synthesis,

> Within this process, every individual act of building is a process in which space gets differentiated. It is not a process of addition, in which preformed parts are combined to create a whole, but a process of unfolding, like the evolution of an embryo, in which the whole process precedes the parts, and actually gives birth to them by splitting.[44]

[43]Naveh, 6.
[44]Alexander, xiii.

In both military and architectural design, the overall purpose drives the combination of components in time and space, and imbues them with significance only in terms of the whole design. This critical quality of any design is demonstrated in Figure 6. Taken together, the components of the architectural design (or system) at the Getty Center in Los Angeles assist the visitors perceive a separate, peaceful, artistic environment, where every detail is important, and which exists in contradistinction to the busy city it overlooks. However, taken individually, the lines of tables, white railings, angular pathways, or view of the horizon reveal nothing other than a description of physical properties. A systemic examination of their interrelationships begins to reveal the operation and qualities of the whole, but falsely starts from the premise that the parts combine and interact to create the dynamic whole, rather than that the whole is the driving force which determines the parts.

Figure 6. The Augmentative Quality of Architectural Patterns to the Perception of Environments. The Getty Center, Los Angeles, June 2005.

In short, a design approach starts with the definition, purpose and qualities of the whole, and then seeks to create those qualities through selection of the parts. This approach builds upon the systemic model already discussed, because of its emphasis on the desired qualities of the whole, and learning through interaction with it, as a means to know the components. A purely systemic approach arrives at an understanding of the laws governing the whole via the variables and their interrelationships, and involves the value bias inherent in defining the limits to a system and how the parts are linked. Bryan Lawson described the importance of the purpose and real-world application of a creative design approach in his short book *Design in Mind*,

> Papers in scientific journals are scrutinized not only for the correctness of method but also for the accuracy of description of that method. A design, on the other hand, will only appear in a journal or magazine if it is seen to have merit in itself. Scientists do a job that is essentially one of description, that is, they try to tell us how things are. Designers, on the other hand, are prescriptive since their job is to tell us how things ought to be. We expect design to have artistic values, and yet design is also more than art, for designs must not only express appropriate ideas and values but must also be usable and work.[45]

Learning through Design

Like operational campaign designers, architects often begin the process of design with problems that are incomplete and poorly defined. Lawson referred to them as 'wicked problems' and described their implications for the designer,

> They are the sort of problems where the information you need to understand them rather depends upon your ideas for solving them. This sort of design then is a 'knowledge-rich' as opposed to 'knowledge-lean' activity. In other words, design requires us to have considerable amounts of knowledge beyond that which is stated in the problem description. Above all, we must recognize that design is a process in which there will be no one recognizably correct or even optimal answer.[46]

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[45]Bryan Lawson, *Design in Mind*, (Wallington, Surrey: Tecset Ltd. 1994), 1.
[46]Ibid., 2.

Arguably, design should not even be considered a problem solving process due to the misconceptions that such a description causes. As Lawson suggested, there is no clear question or start point, and there is no optimal solution. The most important quality of design lies not in definitions, or even the multiple possible solutions, but in learning through finding problems, understanding and clarifying the overall purpose before attempting to then assemble the means and criteria for success. For all the reasons and biases already described, any model that seeks to identify actions that lead to pre-determined objectives through analysis, or even systemic evaluation and synthesis are likely to fall short of the demands of application to reality. As an 'architectural approach' identifies, understanding of a problem comes from the interactive process of seeking to identify the purpose of the whole. In simple terms, the components of a problem are most efficiently identified not through linear decomposition or seeking out systemic linkages, but through the interactive and emergent learning process of trying to comprehend the whole.

Of all the techniques and models identified to this point, architecture places a much stronger emphasis on the importance of learning through investigation and through continual interaction with the client's purpose, however vaguely stated. Whatever opinions, guidelines, doctrine or interests a designer brings to a process, they are ultimately less important than the emergent learning which subsequently occurs as a result of the process itself. Of all the 'guiding principles' for good design, architectural, military or any other, this is a central method through which bias can begin to be addressed.

Richard Burton, a leading British architect made famous by his modernist designs for the London Docklands Light Railway Extension and the British Embassy in Moscow, recognized the dangers to learning in a closed community dominated by its own ideas and organizational culture,

> To rely continually on common assumptions can be dangerous, not least because it can lead to stagnation, so we welcome intervention . . . it's essential that the group should not become a closed community. Indeed we see closed communities as seed-beds of fantasy.[47]

For operational designers, the challenge is not only to ensure that the process becomes a genuine learning and augmentative one. Critically, it must remain free from the restrictions of organizational culture by operating as an open process that seeks intervention and dialogue with those outside of both the planning team and the wider organization, such as other states, different government departments, non-government organizations and private companies. Failure to do so risks a narrow understanding of the whole ,or misidentification of the problem, and invites the 'seed-beds of fantasy' to begin sprouting plans that reveal more about the authors' organizational culture and resulting biases than about the environment which they seek to alter.

Complexity and Speed

An important consequence of a 'design learning' approach is that by resisting the temptations of decomposing a problem into parts that feel more intellectually manageable, the planner is left with a mesmerizing breadth of complexity. Lawson's description of Robert Venturi's design of the Sainsbury Wing extension to the British National Gallery in central London's Trafalgar Square is a good example of the requirement for a designer, or planner, to be able to develop and sustain 'parallel lines of thought'.[48] In the example of the National Gallery, Venturi had to consider not only the qualities of the space he wished to create, but also how it would interact with the existing gallery, as well as the extreme limitations and sensitivities of altering the overall environment of such an important part of central London. Despite completion in July 1991, the extension remains the subject of wide-ranging opinion to the current day.

[47]Richard Burton RWA, quoted in Bryan Lawson, *Design in Mind,* (Wallington, Surrey: Tecset Ltd. 1994), 12.

[48]Lawson, 101.

Venturi related how these two parallel thoughts became central to his planning, before being united in the final design. His problem throughout, was when to reconcile these ideas into a single concept. Too early and they would be underdeveloped, poorly understood and subsumed. Too late and they would encounter ideas which had solidified and become too rigid to accommodate them. He did not suggest that there is any easy formula to know when to begin to collapse parallel lines of thought, only that it requires a bravery, which flies in the face of military organizational culture, to keep them intact longer than feels comfortable, at least to an inexperienced designer. The benefit is that by keeping such breadth, the learning process is enhanced and, as a result, the potential is generated to render organizational bias less significant. Operational design faces the same demands for parallel lines of thought for as long as it takes to understand the system adequately. Once such understanding is achieved it is then possible to blend the breadth and depth of information into a coherent and unified design.

Finally, it is worthy of note that if the principle qualities of a process are its ability to learn from complexity, then it requires the time necessary for such learning to take place. Despite the prevailing wisdom of much recent military literature, the quickest process, delivered at the quickest speed is not necessarily the optimal or even desirable product. Learning needs time for group and individual reflection. Compressing this process undermines the entire approach and introduces intuitive bias in place of informed thought. In addition, given the speed of action made possible by modern technology it is arguably unnecessary. The logical conclusion for military planners is that learning through contingency design is no longer beneficial on an annual, bi-annual, or even slower process. It must be constant and focused in areas of interest in order that designs during a crisis begin in the hands of those who are already learning from the problem. This advantage is significantly greater than any offered by faster design processes based on speed relative to that of an adversary, or instantaneous information distribution systems. In short, sustained learning from a design question of choice is a far more comprehensive route into an competitor's observation, orientation, decision, action (OODA) loop than speed of planning

relative to that of the enemy since it is far less likely to produce organizational culturally based predictable outcomes, and much more likely to produce a refined understanding of the competitors, including oneself.

Problems

No approach is free from potential pitfalls and the intellectual demands of augmentative thought based on learning from complex design is one such problem. As with a basic systemic approach, the designer is still left to judge the limitations, or framework, of a problem and in so doing invites bias stemming from organizational culture. Equally, the subsequent actions that are chosen still take place at the nodes in time and space that follow from the original conceptualization. However, unlike a purely systemic approach, a design process emphasizes continual learning, interaction, and re-structuring of cognitive understanding as the keys to high quality results. This departure has the potential to limit bias, but does so at the cost of time for the required learning to take place.

In addition, it should be noted that the type of continual contingency design prompted by this approach has the potential to become too theoretical. Abstraction is only useful when it has a basis in reality. The time and space to consider self-generated contingency problems is useful if it produces lessons which are first accepted by the prevailing organizational culture and second, inform an ugly reality when it emerges. If the abstraction and reality are not linked by more than names and basic information, in contrast to developing conceptual insight, self-awareness and potential competitor awareness, the process will be unable to produce the level of learning, which is its chief advantage, when time is compressed. Whether a closed military culture is capable of this type of learning is not yet clear.

Summary

It is already apparent that a systemic approach increases the effectiveness of operational planning, and that when combined with a rigorous concept of information it has the potential to represent a leap forward in operational capability. However, it is now evident that by considering an architectural concept of design, which actively promotes continual learning through the creative process itself, that the dual concepts of a more robust concept of information and a systemic approach can be improved upon still further. Any future military planning model must be capable of useful augmentative judgments regarding both the system in question as a whole, as well as the nature of the components, such as the principal populations, actors, and nodes. Far from importing such judgments from previous experiences and biased historical repertoires, such knowledge must be generated from a continual, evolutionary, learning dynamic that is at the core of the approach. In this way, future operational designers may achieve the potential to shake off the misleading quasi-scientific language of the prevailing military empirical models, gain an instructive understanding of information, a comprehensive concept of how to operate to advantage within a system, and an ability to generate better system awareness characterized by improved problem framing, multiple lines of thought, and constant learning and adaptation. Anything short of these essential qualities is unlikely to succeed in a networked world where the mechanics of many current, and older, knowledge processes are unlikely to be able to adapt to the demands of the future anymore easily than a steam engine to the internet.

BLENDING SYSTEMS AND DESIGN: SYSTEMIC OPERATION DESIGN

As the name suggests, the new paradigm of systemic operation design is a blend of general system theory, as espoused by Bertalanffy, and selected principals drawn from creative processes such as architecture.[49] It focuses upon the purpose and governing logic of a system as a way to understand the variables and interrelationships (or sub-systems) that operate within it. Put simply, in contrast to other military operational design concepts, it takes synthesis as its start point and subsequently utilizes analysis only if it is required and understood in terms of its relationship to the whole. Just as in architecture, and in contradistinction to purely planning models, the approach recognizes the central role and effect of a designer in setting the direction and vision for altering an environmental system in terms of time and space, as well as accommodating ecologically-inspired ideas such as the dynamics of an open and adaptive system.[50] In addition, and again as in architecture, design informs subsequent planning (and actions) and is revisited throughout the course of a campaign as new emergences develop and alter the dynamic system that connects the rivals. The cognitive model developed during the design process is structured and re-structured as necessary to learn about, and transform the system in question. Above all else, systemic operation design is principally a process centered on investigative learning through design, and the seven discourses that constitute the approach operate in support of this central function. It is this key characteristic of the model that has such important and potentially beneficial results for challenging organizational culture and the, all too

[49]Paradigm as defined by Paul Davidson Reynolds, *A Primer in Theory Construction,* (London: Allyn and Bacon. 1971), 26.

[50]Open system as defined by Ludwig von Bertalanffy, *General System Theory,* (New York: George Braziller, 1968), 141.

prevalent, unconscious use of an institutionally filtered, and sometimes irrelevant, institutional historical repertoire.

The Strategic Client and the Operational Architect

The issuing of a strategic planning directive by a state government, or strategic client, begins a process which is directly analogous to Lawson's architectural 'wicked problem.'[51] For both civil and operational architects, the first task must be to learn as much as possible about the open system within which the problem is likely to be placed. As this initial round of learning develops, the architect is obliged to return to the client and agree the terms of the chosen system, the qualities of the problem and, most importantly, if, how, when and under what conditions the project will proceed. This two-way process is critical, and will be instrumental in constraining the subsequent building actions that are possible for the architect to set conditions for, as well as managing the expectations of the client. The result is likely to involve compromise by all parties, but clearly the client is ultimately paying the architect and will own the final outcome.

For a military designer, informed by general system theory, the most significant initial challenge is to discern the purpose of the system that is chosen to engage with. Only in understanding the overall purposive logic will the system itself begin to be defined. This is not to be confused with the strategic directive, which will almost certainly remain unfocussed at such an early stage. The systemic purpose is the overall logic and direction of the system within which the problem will be understood and acted upon. In systemic operation design this is the subject of the first discourse, or system framing. Clearly, even this application of abstract intellect constitutes an action within the chosen system and begins to alter its variables and interrelationships.

[51]Lawson, 1.

In defining both the purpose and variables of the system, as well as negotiating the strategic problem it is arguable that systemic operation design invites organizational cultural bias at its earliest stages. However, this is balanced by a requirement for self-awareness on the part of the designer. Few architects labor under the illusion that their actions do not alter both the client's wishes and the wider open system that they seek to effect. This is in contradistinction to an analyst using the language of natural science, where independent observation and environmental control are prevailing theoretical foundations for knowledge. In an open system, such a theory is misleading since it allows the designer to import unconscious a priori biases and methodological assumptions into an adaptive environment that is altered by as little as even a competitor's overt interest. A design approach confronts this dynamic, welcomes client to architect or designer to designer discourse and intervention, and in so doing, demands a level of self-awareness that promotes, but does not guarantee, a reduction in early bias. This is in marked contrast to the organizational cultural preference of many militaries to be 'left to get on with the job', free from intervention, once 'politics fail.' General Westmoreland's memoirs of his command in Vietnam bear this fallacy out. He remarked that his initial impressions were that, "despite the military nature of my assignment in South Vietnam, it was impossible to keep my activities entirely separate from the political turmoil that soon gripped the country."[52] A designer could never assume such a narrow technical relationship with either a client or the system that constitutes the construction environment.

A more difficult problem is that even these first moments of design require learning to begin through discourse and research. However, the designer must heed the lessons of Venturi and sustain multiple lines of parallel thought.[53] If a system is allowed to become too narrow, too

[52]General C. Westmoreland, *Instability and Uncertainty: 1964-65.* quoted in U.S. Army Command and General Staff Course *A 534 Joint Force Command,* (Ft. Leavenworth, KS. 1 Nov 2004), 24-30.

[53]Lawson, 101.

early, it is possible that the designer will remain ignorant of important consequences of early actions since the self-defined system will focus on outcomes in a very specific area. Against the pressures of time, and organizational bias, that is predisposed to compartmentalization of both space and time, the breadth and general nature of early enquiry may be difficult to sustain for as long as is necessary. As has already been argued, at the operational level the OODA loop of an adversary is broken into by more than just speed. It requires the time to learn the complexity and systemic logical orientation that is a far better guarantee of a successful design.

From Abstract Whole to Permanent Contradictive Tensions

As Lawson argued, architecture is more than art, and negotiations about abstract ideas and their related values. Ultimately design must lead to a building that it is possible to construct and which the client deems as meeting their overall vision. So it is in military design and the delivery of a campaign that is practically achievable, and which satisfies the agreed strategic directive. As the military campaign designer unfolds the system they are engaged in, to discover its qualities and governing logic, general systems theory reveals that permanent contradictive tensions, rooted in the practical reality of physical actions, will be disclosed, the positive progress of the system is possible only by passing from a state of undifferentiated wholeness to differentiation of parts. This implies, however, that the parts become fixed with respect to a certain action. Therefore, progressive segregation also means progressive mechanization. Progressive mechanization, however, implies loss of regulability.[54]

General system theory identified a permanent and inherent dichotomy, or tension, in all designs. That is that as a system moves from a concept with a unified, dynamic, and abstract purpose to a series of interrelated actions, locked in space and time, in support of that purpose, it

[54]Bertalanffy quoted in Shimon Naveh, *In Pursuit of Military Excellence,* (London: Frank Cass, 1997), 6.

begins to contradict itself. In short, mechanistic actions lose the fluid flexibility of the abstract design and can even become random and counterproductive to the overall system object. There is a permanent tension between the segregation of increasingly less regulated, mechanized actions, with linked, non-linear causes and effects, and the overall purpose which defines the dynamic, adaptive system. It is the same tension that any designer faces in turning their ideas into reality. In broad terms, it is the expression of the tension between art and science. Systemic operation design was constructed to identify these very tensions, both to overcome the transition of abstract ideas to physical actions, and also to exploit the tensions in order to alter the system purpose, and thus components therein, for competitive advantage. It is at the operational level of war that Naveh argued such tensions would demand attention, or invite exploitation, and hence the overall logic of systemic operation design can now begin to be understood.[55]

As in the realm of early and purely abstract design, the possibilities for organizational cultural bias unarguably exist. Determining the value and predicting the likely causality of exploiting different tensions invites value bias caused by organizational culture, and tempts a routine application of empirical methodology. However, informed by a systemic approach, the model rejects the likelihood of linear causality and summative calculations of variables. Instead, it acknowledges the deep, parallel, chaotic, and often contradictory linkages of the components and effects caused by the tensions of the overall system. Using Bertalanffy's tools for criticizing and assessing a system, it emphasizes consideration of the quantitative parameters of variables, the matter that constitutes them, and a qualitative assessment of their relationships. None operate independently or in separate categories, and all are relative to one another, as well as to the overall system purpose. This 'organized chaos' is the focus of all the subsequent discourses of the model and the learning that is achieved through them is the ultimate safeguard against clumsy use

[55]Ibid., 7.

of information and the infusion of organizational cultural bias. In the challenges of extended discourse, Bacon's desired interventions are consistently applied to the 'seed-beds of fantasy', and routine applications of methodology are opened to questioning.[56] A design environment is created where Weber's inferences and interests, invested in any information, are explored, advocated, rejected, challenged and synthesized by the design team. In order to achieve such a design environment it is critical that any discourse must not be allowed to be dominated by the language and epistemology of any single discipline, for fear of investing the learning process with the organizationally preferred assumptions, approaches and actions that it embodies. Above all, designers must not mistake the approach for one that seeks to resolve the contradictive tensions of the system. Instead, as general system theory makes clear, they must be accepted as permanent. The function of systemic operation design is to creatively exploit systemic tensions through the learning process and through constantly assessing and re-structuring the designer's view of the environment, as well as changing the environment itself. The process is circular and continual, ending only when the designer decides to move on to a new project, or when the desired alteration to the function of the system has been achieved for the desired duration. Just as in architecture, nothing lasts forever.

Learning to Learn

None of the safeguards offered by the model's continual discourse will prevent organizational bias unless they are conducted by individuals with sufficient education and intellectual self-awareness to manipulate information effectively, and generate knowledge by interacting with, and learning from a dynamic system as it changes. Achieving such a capability

[56]Lawson, 39.

within the constraints imposed by organizational culture is not a simple task. It presents challenges for both the individual and the institution.

For the institution, operational designers and supporting knowledge workers are as much a requirement as infantryman or logisticians. Organizational culture must not be allowed to continue to impose artificial categorizations on both headquarters and functional planning areas, such as are applied by the Napoleonic staff model, or on military personnel with the skills to design and monitor campaigns.[57] The best design teams must be drawn from, and blend, all the military disciplines and specializations. Those who lead such teams must be identified by their skills as designers, not by their background tactical category. In addition, utilizing excellence at the tactical level as the primary medium for selecting future campaign designers is as illogical as choosing architects based on their skills at putting up scaffolding. Both are essential, both are different, and neither is useful without the other. It is instructive to note that until the end of World War Two, the selection and start of training for German Wehrmarkt operational planners occurred at the rank of Lieutenant. Paradigm changes require corresponding institutional and structural responses that challenge the prevailing organizational culture. How many Western militaries genuinely believe, at the cultural level, that extended periods of education, and not purely training in the classroom, have the potential to transform operational capability and success?

For the individual the challenges are no less significant. In a closed, consensual hierarchy there are few incentives for an individual to develop the intellectual skills that are required to utilize the learning tools within systemic operation design effectively. Individuals that can knowingly manipulate and make use of the strengths of their organizational culture and institutional historical repertoire are relatively few in number. Instead, all too often, military

[57]See Appendix II for details of developing headquarters structures for a holistic approach.

competence is judged through the consensual application of organizational cultural norms, even when they lack any apparent systemic logic. By way of an example, when Victor Davis Hanson pressed a US Marine Corps veteran about the tactics of head-on charges against entrenched Japanese infantry during the Pacific campaign of World War Two, the individual replied, "Who knows? But that was the Marine way and we accepted it."[58]

Learning to learn at both the individual and institution levels is a central requirement of the discourses of systemic operation design. The continual, and in some cases dramatic, improvement of these skills is a pre-requisite of the approach if it is to succeed in confronting organizational bias.

The Seven Discourses of Systemic Operation Design

Having gained an understanding of the theoretical origins, potential areas of organizational cultural bias, and the overall purpose of systemic operation design, the seven discourses shown in Figure 7 are a simple and logical guide to applying the approach. Before investigating each discourse attention should be directed to the text around the outer square that refers to useful tools to facilitate application of the model. First, there is the recognition of learning through design and through structured discourse. Second, a textualization process of recording conceptual or abstract variables within the system or systems for subsequent conversion to learning actions during planning. Third, the idea of converting text into maps that assists in revealing the linkages and conditional values within the system, and finally, the important emphasis on synergy, parallel lines of thought and deferring interpretations in favor of learning and discovery. In this way, systemic operation design applies Bertalanffy's systems assessment criteria in the form of recorded quantitative parameters, matter, and qualitative relationships.

[58]Victor Davis Hanson, *Ripples of Battle,* (New York: Simon & Schuster, 2003), 10.

Orientation: System Framing

As should now be easy to anticipate, the approach begins by examining systemic purposes, both of the overall system that brings competitors into contact, and sub-systems that exist within it. The aim of the initial discourse is to orient the commander and design team to the system in question through cognitive enquiry. The approach recognizes that at the operational level intuition and past experience are no guarantees of orientation in the present or future. Systemic operation design, in contrast to any other operational design or planning tool, assumes that the commander must cognitively define and orient himself to the system under consideration,

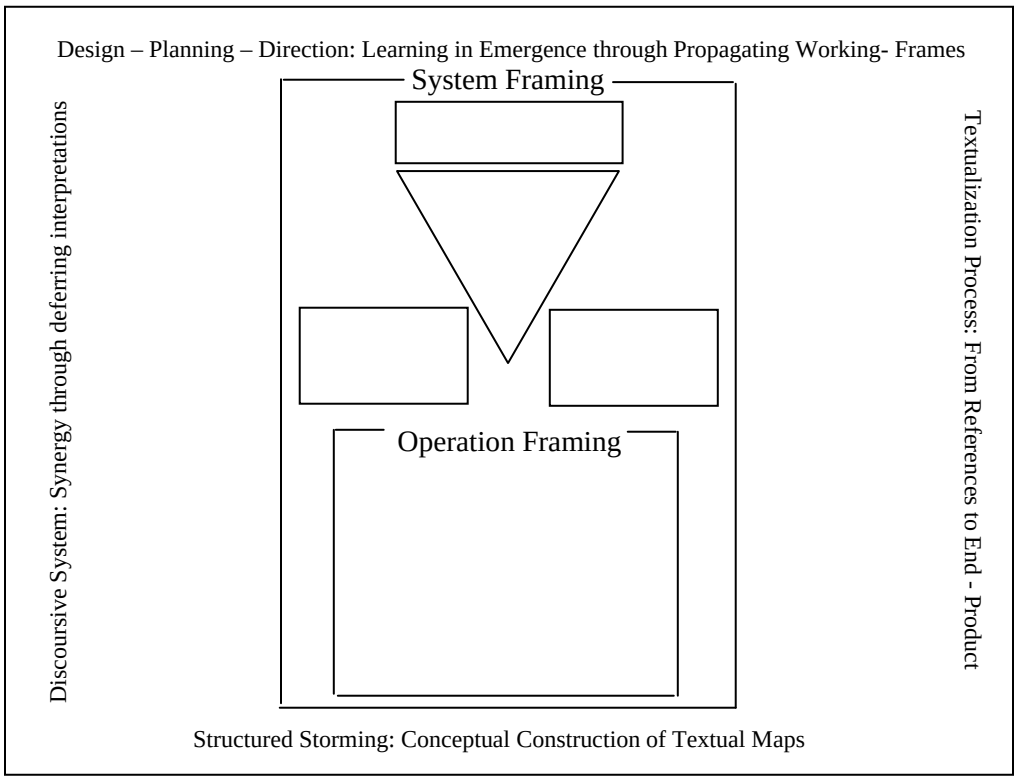

Figure 7. Diagram of Systemic Operation Design Model
Source: U.S. Army Training and Doctrine Command, *Systemic Operation Design: Designing Campaigns and Operations to Disrupt Rival Systems.* Fort Monroe, Virginia: Future Warfare Studies Division. Version 2.0, 1 March 2005, 2.

rather than relying on strategic ideological, political, economic, or even cultural assumptions. The first, and most important, question of the discourse is usually, 'what is the new purpose?' or 'what has changed?' As has been demonstrated, not only does this define the terms of the system or sub-system under consideration, it also establishes what has altered to create, or exacerbate tensions within it. By conducting this self-aware synthesis the designer then enters into the process of placing and negotiating the strategic problem, or directive, with their leadership. As discussed, this process is critical, and sets the terms, conditions and frame for the remainder of the design education. Because the terms are set in such a self aware way, which is itself the subject of negotiation, there is implicit recognition that sources for variables may exist outside the terms the designer perceives they are able or willing to interact with. Such sources need not be physical, and will probably be abstract, but they will be seen most clearly where they cause tension within the defined system. In fact, the answer to what has changed may well exist in such an external source but will be revealed as an operational problem at the point of tension within the system under consideration. As such, the process is not analytical because it never seeks to isolate or breakdown the whole. It simply recognizes that it is too large and complex to be dealt with, by even a sizeable coalition of competitors, without artificial logical boundaries.

Self-awareness of this type is only possible with an understanding of what constitutes information and how it comes to shape both one's own, and a competitors' view of the system. As described, this is more than a process of observation; it is a question of the application of individual and institutional reason and perception. To be effective it is necessary to abandon the child-like fallacy of the external world as little images displayed in the visual cortex of the human brain and think instead of how the symbolic representations of the outside world, both sensed, deduced and imagined, blend with the organizational (and other biases) of our a priori internal

world to produce thoughts and beliefs. Cracking this alien code is a world away from the empirical language of natural science and is the purpose of system framing.[59]

The Enablers: Rival, Command and Logistics as Rationale

The three rival, command and logistics as rationale discourses are related investigations into a rival's enabling sub-system as explained in terms with respect to one's own enabling sub-system within the connecting logic of the whole. The rival discourses seek to logically determine the form of the competitor (that facilitates their intentions) through critical discussion, including their sub-system purpose and its related components. The command and logistics rationale discourses, informed by the parallel rival discussions, then seek to develop and identify points of tension within these sub-systems caused by the stresses of physical command and logistics structures, or actions, and the driving requirements of their abstract logic within the rival system design. For example, the rival as rationale discourse may reveal a motive and related behavior that provide the governing logic for the form of a competitor's system in relation to one's own. In simple terms it is a relative examination of culture, social logic and values, goals and practices between the rival and oneself to identify logical relationships within the overall system that brings the two into competition. This is then developed further into an examination of the physical results (command and logistics), and tensions of the systems. Any given abstract concept, or motive must eventually give way to the less easily regulated demands of mechanistic enabling actions and the chaos they bring through interaction with time, space and competitors. By focusing on these points of tension the rival and one's own strategies may be further understood, and stresses may be protected or exaggerated in a rival system to the point of altering the laws that govern it, and its ability to continue in support of its purpose. As discussed, such a state is

[59]For an interesting investigation into the interaction of sight, belief, art and neuroscience see S. Vilaynur Ramachandram, *A Brief Tour of Human Consciousness,* (New York: Pi Press, 2004), 24-82.

unlikely to be permanent and will not necessarily produce a desired result. Actions against Ba'ath Party leadership in Iraq during 2003 are a clear lesson in this regard. For designing one's own system, understanding these points of tension can be assisted through simulations or wargaming the vulnerabilities of the tensions caused by different behaviors. Equally, it may prompt friendly system experimental actions to assist in learning how the system variables operate.

Once again, the same levels of self-awareness are a pre-requisite for success, and conclusions or reduction of the number of lines of investigation must be deferred for as long as possible. The questions that are asked are deliberately left to the designer to formulate within the intent of the discourse, in order to avoid the traps of applying routine methodology. As shown in Figure 8, the associated textual maps are generally, but not necessarily, shown as hexagons, each annotated with a question or textual conclusion of discourse intended to expose a systemic tension and point for action, or no action if preferable. In this way the commander and design team gain the benefits of the institutional historical repertoire, of their own experience, and comparison to previously understood systemic patterns, but they do so with a self-awareness that has a far better chance of preventing the insidious creep of organizational cultural bias and the prevalence of a single military, academic or other discipline with their own specific languages, cultures and biases.

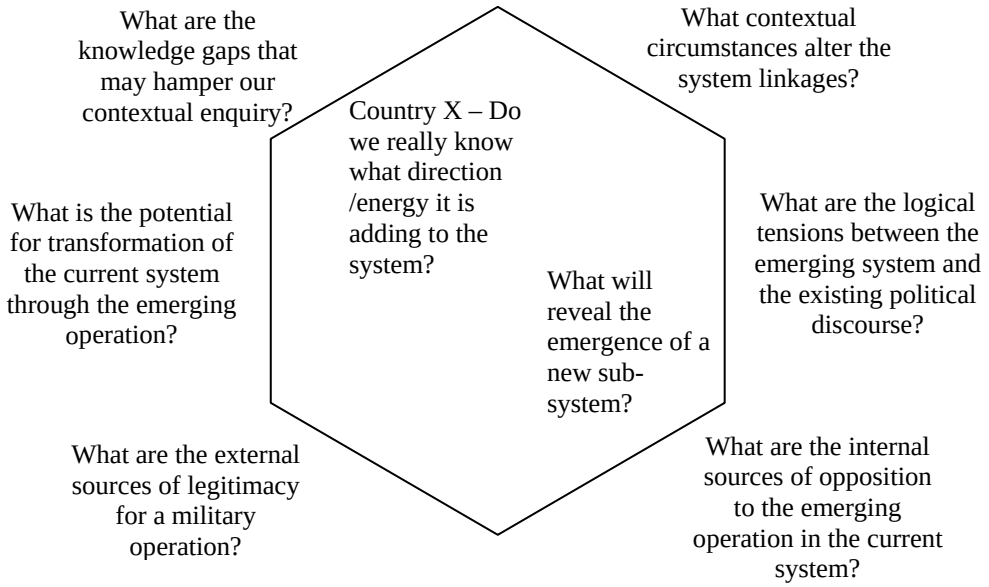

Figure 8. Generic Textual Map and Nonspecific Example Questions

The area that is much less easily understood is the perception of the governing logic of the rival. Even with an improved approach, which limits bias through discourse, it is not clear that it is possible to 'crack the alien code' that makes up a rival's view of a system. With infinite variables and value systems it is still arguably beyond the capabilities of a current operational designer, even with the benefits of a sustained education, a robust understanding of information, and the limited benefits an institutionalized concept of 'cultural awareness.' None of these necessarily reveal the questions that must be asked for the learning that occurs through discourse to be meaningful in identifying genuine rival points of tension. As will be discussed, systemic operation design is a step closer to addressing this quandary, but it is no guarantee of operational success.

Setting the Terms: Operation Framing

Operation framing seeks to continue the investigation into the tensions identified in earlier discourses by exploring the possible arrangements of forces in time and space in terms of their ability to act upon those stress points. In so doing it also increases the designer's understanding of the relationship between the function of one's own sub-system, the meta-frame of ideas about how the operation will unfold, and the possible effects on the competitor's sub-system. The focus of operational framing remains on the purpose of both the unifying system and selected sub-systems in order to understand the governing logic of how components can be arranged in time and space to exploit tensions. Just as in the original system framing discussions, the design team must make choices and draw conceptual boundaries that will ultimately set the logical direction and constraints for range of physical actions that are available to the planners of

the friendly force. However, the adaptive and increasing depth and breadth of knowledge encouraged by the ongoing discourses is intended to offset the impact of possible bias and keep as many parallel lines of thought actively balancing knowledge for as long as is practicable.

Logical Direction: Operational Effects

Having framed the operation, it is the focus of this penultimate discourse to enable the achievement of the end-state by examining the interrelated elements of the rival and oneself as a possible point for the initiation of learning through military actions. In short, this discussion, and its related actions, confirms that the systemic conditions and overarching logic of the design are compatible with the proposed sequence of future formative components, or broad effects that are designed to alter the purpose of the system for advantage. This is achieved through both continued questioning and conceptual development, and through the proposal of sequenced effects in time designed to prompt responses that either rearrange the structure of interrelated elements within the system to facilitate later actions, or simply to examine the systemic responses and interrelationships. In simplistic military terms, to ‘count guns’ and either cause or make necessary changes to the environment, a rival, or oneself. Since the effects are delivered within the cognitive boundaries set during operation framing, they act as feedback loops to counteract any misconceptions or bias introduced during this discourse.

The Transition to Planning: Forms of Function

The final discourse seeks to finally determine the shape and structure of the design through the lens of giving formative guidance to the planner who must take the system and operational frames, as well as the lines of logical systemic transformation towards broad end-states, and apply them in reality. In so doing the design team invites a final and important source of intervention that examines the results of the discourses from the perspective of planning and mechanistic application. The central challenge of this discourse is to unify all the parallel lines of

thought produced throughout the learning process of design and convert them into tasks in support of the purpose and governing logic of one's own system as it relates to the rival. It stresses the reasoning elements and delivers a logical structure that enables the planner as much flexibility as possible as the design is converted to locked actions designed to disrupt or alter the purpose of a dynamic and adaptive system. In the final analysis, the product of the design team seeks to identify and protect one's own systemic tensions and organize logically, physically, and educationally to exploit the tensions in a rival.

The purpose, and therefore logic and structure, of a systemic operation design approach is to facilitate the learning environment that is capable of imparting the knowledge necessary to achieve this single objective.

Limiting Organizational Bias

Systemic operation design is an approach that is uniquely structured to limit bias resulting from organizational culture and a weak understanding of information. Whether these attractive abstract qualities can survive a large-scale mechanistic application to reality, dominated by a strong and pervasive organizational culture, is as yet uncertain. Four areas stand out as those that will determine whether strategic operation design succeeds on the scale that it merits.

The first key area is that of value judgments. Any approach informed by general system theory requires users to make relative or conditional judgments about the purpose, quantities, matter and qualities of a system. In competitive scenarios such judgments are critical for attaining advantage. As has been described, the model is structured to account for this requirement and demands self-awareness, and continual discussion amongst the users. It works on a system of deferred definitions, suspended categorizations, and constructive challenges to held beliefs through questioning. It is an approach that is based on identifying systemic change, discussing the most efficient form of intervention (accepting that any form of interaction is a form of intervention), and an acceptance by users that learning delivers advantage. The result should be

balanced judgments. The challenge is that in a closed military hierarchy, where consensus and loyalty are the primary virtues, as well as qualifiers for career advancement, that such an environment can be created to the level of intensity required. Perhaps, even more importantly, there is a serious question as to whether prevailing organizational cultures are yet ready to commit to the level and time in education that is a pre-requisite for the discourses to be anything other than culturally informed confirmatory dialogues that breed group happiness and operational failure in a single swoop.

The second key area is that of routine methodism and language. The advantage of systemic operation design is its ability to creatively shatter routine, and to actively seek change both in the systems it investigates and within the discourses of the users. It rejects the type of summative, linear causality that is often the institutionally preferred mode of thought. Its general application rides through artificial divides between disciplines, between types of understanding and even between organizational structures. However, systemic operation design can only achieve such promise if organizational culture permits it. There is no place for De Saxe's 'tactical generals' or Kennedy's 'military men' in an organizational culture that supports the needs of creative operational design. There is no place for easy checklists, or the unconscious application of individual or institutional experience. Design is about what is new more than it is about what is still the same. It is questionable whether all Western military cultures are really able to accept this consequence and its wide-ranging implications for the entire organization. Just as importantly, the prevailing epistemology and language of natural science that Western militaries all embrace must give way to a new interdisciplinary form of dialogue and communication that widens the scope and nature of possible actions.

Third, systemic operation design is almost a state of constant dialogue about change that is capable of providing the foundations and framework for planning on any given problem. It requires time to be at its most effective, as well as focus in chosen areas of interest and significance. It also requires interventions from multiple sources, both military, wider government

and private. Without this continual and meaningful discourse, it is difficult to assess how effective it could be in a crisis, especially with regard to considering an unanticipated rival with a dramatically different qualitative value system. If organizational culture is unable to accept the type of change required to deliver this capability, it will seriously undermine the potential of systemic operation design.

Fourth, systemic operation design must be utilized without falling victim to a false sense of security that places too much confidence in its evolutionary nature. Whilst a teleological approach is prone to bias and reductionism, an evolutionary one is prone to the misleadingly optimistic notion that, as a system continually re-orders, choices made in the past will not limit future options. Such a view is not necessarily true and could lead easily to an unconscious strategic and operational weakening of an actor over time. If organizational culture does not facilitate the egalitarian discourse required to guard against such developments, either through the social maintenance of hierarchy, or through evangelically embracing systemic operation design, then it has the potential to be as dangerous to those who use it as it could be to those it is used against.

Last, systemic operation design relies upon the continual involvement and intellectual leadership of the commander. In contrast to the current US Army decision-making process, it is not based on staff-generated options placed before a decision maker. Systemic operation design demands that the commander leads, generates and constrains discourse, maintaining focus and, where necessary, re-negotiating with the strategic client. When applying systemic operation design to a specific problem it is the commander alone who provides the bridge between innovative, intellectual thought and relevant individual and institutional experience and risk. Without this core leadership throughout the competition, the approach risks being diluted into another effects-based analytical, and mechanical, template.

Systemic operation design has the potential to limit the currently rampant levels of organizational bias in some Western militaries, but to do so it must first overcome the dichotomy

it so clearly articulated. The test will ultimately be whether it can overcome the tensions of transition from an abstract 'paper' intellectual concept, to application in a medium to large sized Western, expeditionary military force.

FUTURE ORGANIZATIONAL CHALLENGES

Systemic operation design is a proven approach that is capable of enhancing operational effectiveness, not only through driving better quality operational planning, but also through limiting the negative aspects of organizational culture. However, in order to realize its full potential it implies the need for future changes both to military structures and across wider government.

Education

As already discussed, education is the key to developing operational designers and planners with the skills to understand how their own, and other actors' perceptions of the environment and chosen systems are developed. Such skills should not be mistaken for creating cells within operational headquarters that are tasked to 'put themselves in an adversary's shoes.' Without the theoretical understanding, gained through sustained multi-disciplinary education, such a task is impossible, since the cell will merely unconsciously import its own individual and institutional theories into the task at hand and drape shallow 'rival' ideas across them. At best this constitutes a waste of time and at worse a new source of poor judgments.

Nor is such education a new six week theory course. It is both an individual and cultural commitment to value placed on education. For individuals it means placing mental fitness above or beside physical fitness as part of a professional routine. For the organization it means altering

structures and methods of advancement, and employment.[60] Those with the required skills must be identified early in their careers and begin to be developed for employment at the operational level of war. This does not mean abandoning the 'building site before the new worker has seen a brick', but it does mean from that moment on they are marked and developed for their future role. Nor does it mean becoming a full time staff officer, it simply means that the individual careers must serve the needs of the force for developing better operational designers and planners, capable of delivering the kind of synthesis that a digitally, networked world demands. It is only organizational culture that stands in the way of such changes, accompanied by an unfounded belief that until the rank of major there is no more valuable occupation for a junior officer than to focus exclusively on the tactical level. It takes seven years to train an architect to design a building. There are few soldiers who would argue that it is any easier to design an operational campaign, and equally few who would argue that any more career education is required or desirable. Organizational culture must give way to a re-evaluation of how we create individuals with the skills to manage knowledge and operational design in the future.

If Thomas Kuhn was right when he argued that new paradigms emerge as changes occur to the current world view, then accepting a new paradigm means adapting the entire organizational structure and modes of adaptation to ensure competitive advantage.[61]

Multidisciplinary Epistemologies and Language

In order to achieve the scale of operational capability that systemic operation design offers it is necessary to start to address the damage of years of analytical and single agency or disciplinary planning. Terminology, government structures, and a multitude of organizational cultures have diversified greatly over the years and even very similar entities are often denoted

[60]See Appendix III for a more detailed investigation into learning organizations.

[61]Thomas S. Kuhn, *The Structure of Scientific Revolutions,* (Chicago: The University of Chicago Press, 1996), 111.

and approached in dramatically different ways. A common language does not even exist internally between the military services of many states, let alone outside them, and no attempt is being made to find one. An approach to campaign design that is truly capable of investigating new areas through news questions, and which is capable of generating new modes of advantage must develop a new and common language of discourse that is free of the overbearing influence of any single epistemological view. Reductionist empiricism has value at the tactical level, and elsewhere, but it will continue to do more damage than good if it is not balanced by other approaches.

The Structure of Governance and Military Command

The future structure of both military command and wider governance is a central consequence of the changing world view that is characterized by new paradigms such as strategic operation design. The compartmentalized structure of military headquarters and career structures, as well as government is an obstacle to attaining future advantage in competitive systems. The structure of operational headquarters must reflect a creative design process that resists decomposition into categorized functional areas. Such a structure runs counter to the synthesis of knowledge and language, through continual discourse, that is a pre-requisite for future advantage. Compartmentalization of knowledge and the idea of building and executing plans by functional components along some form of ‘mechanistic production line’ are fast becoming a distraction and a disadvantage. Future headquarters must accept synthesis as a start point, multi-disciplinary discourse as the central mode of education and achieving advantage, and compartmentalization only as a friction introduced by the dichotomy of execution. There is no sign that this realization has been accepted fully outside of the Israeli Defense Force and discrete elements of the US forces.

Not only is the challenge one of cultural and structural change. It is also one of transforming command and control. A multi-disciplinary approach, almost certainly including

private enterprise, will demand new forms of co-ordination and communication. As general system theory so clearly indicates, by changing the purpose and context of a sub-system, it is necessary to re-evaluate the quantity, type, and interrelationships of the variables.

Perhaps most importantly is the requirement for changes to central governance, driven by the same purpose to adapt to a changing world. All Western governments remain bizarrely compartmentalized and locked into internal competition and power struggles. Actions such as these only serve to increase the vulnerable tensions in government and undermine the overall system purpose. Interchangeable language within government, or beyond it, is limited and breadth of experience at the individual level is increasingly eroding in comparison to historical precedents. Changing this structure to address the purposes of government in the context of a changed world view is a challenge of monumental proportions. Nevertheless, it is a vital component for competitive systemic adaptation, and those who do it best will disproportionately benefit while others cling to the slowly sinking status quo. Once again, small attempts are underway, such as the British development of a Post-Conflict Reconstruction Unit (PCRU) made up of seven government departments, as well as contractors. It will be used for the first time in Afghanistan during 2006.

Modeling, Games, Technology and Rule Changes

Such changes need not be conducted with undue risk to current capabilities. There is a significant role for modeling, simulation, and the application of technology in support of limiting the tensions of application and in supporting the rate and effectiveness of learning from a dynamic and adaptive reality. As Arie P. de Geus, head of planning for Royal Dutch/Shell Group in 1988, recognized, “Institutional learning is much more difficult than individual learning . . . [and] the level of thinking that goes [on] in . . . teams is . . . considerably below that of the

individual. . . . The learning level of the team is often the lowest common denominator."[62] De Geus recognized that by applying technology and simulation in support of learning, and by creating risk-free environments or scenarios, with altered systemic rules, it was possible to generate enhanced institutional learning and flexibility. In contrast to current military doctrinal fixation on the speed of decision-making relative to the enemy as the highest form of advantage, he wrote that, "The ability to learn faster than your competitors may be the only sustainable competitive advantage. . . . Learning is not a luxury. It's how companies discover their future."[63] Applying technology, not just in support of tactics or operations, does not represent a luxury, but a way to discover how best to design the institution for the future.

Learning is the Only Form of Advantage

The future of operational design and planning is not about quantities of information, or even about how, and at what speed it is shared across networks. Such areas have merit, but are only enablers to a more central question. The world, and how it is perceived, is constantly changing. Exploring how to understand these dynamics is not a waste of time or resources. It is every bit as much a weapon as a rifle or a missile. The only truly competitive advantage of military organizations of the future will be their individual and collective ability to learn about the system, which they are transforming, more effectively than their rivals. The organizations that succeed will be those that demand and facilitate a constant revision of how their personnel view the world. The challenges laid out here are considerable, but failure is inconceivable.

[62]Arie P. De Geus, "Planning as Learning" published in *Harvard Business Review.* (March-April 1988), 70.

[63]Ibid., 74.

APPENDIX I – Glossary of Acronyms

ARRC	Allied Rapid Reaction Corps
AMSP	Advanced Military Studies Program
CSS	Combat Service Support
DPRER	Design, Plan, Refine, Execute, Re-structure
EBA	Effects Based Approach
NATO	North Atlantic Treaty Organization
ONA	Operational Net Assessment
OODA	Observation, Orientation, Decision, Action Cycle
OTRI	Operational Theory Research Institute (Tel Aviv, Israel)
PMESII	Political, Military, Economic, Social, Infrastructure, Information
PRE	Plan – Refine – Execute
SOD	Systemic Operation Design
SOSA	System of Systems Analysis
UK	United Kingdom
USA	United States of America

APPENDIX II – Structuring Operational Headquarters for a Holistic Approach

Between September 2002 and February 2003 HQ Allied Rapid Reaction Corps (HQ ARRC), a British-led NATO operational level headquarters, conducted a future headquarters structure review designed to plot the development of the organization out to 2025 and beyond. The paper was produced as part of an overall British attempt to define the future structures and requirements of headquarters from the brigade and divisional level (HQ 1 UK Armoured Division) through to the operational and strategic interface (Project ROBERTS 2).[64]

Functions in a Deployed Headquarters

Departing from the prevalent Napoleonic staff model, the draft Future Divisional Headquarters Structure Review, published in July 2005, referred to seven new integrated areas within an operational level headquarters:[65]

Command: The requirement for a divisional headquarters to be capable of combined, joint, tactical and operational level campaign or component planning.

Operate: Both decisive and shaping operations, direct intervention and peace enforcement missions. The activities of all staff domains must unify in support of the operate function. (In this context the Operate function acts as the systemic purpose, defining all supporting functions and linkages).

[64]It is important to note that the size of the formation does not necessarily determine the level of war at which it functions. This is particularly true for small military forces such as the UK, where divisional headquarters train and prepare to act as operational or component headquarters either alone or, more likely, within multinational coalitions.

[65]The Seven Components of the Defence Capability Framework quoted in 1 (UK) Armoured Division Draft Future Divisional Headquarters Structure Review ref G3/3800 dated 19 Jul 05.

Inform: The Command and Inform function combine to confirm the ability to direct operations. The Inform function is integral to all other functions and is not restricted to traditional ideas of intelligence activity. (Systemic Operation Design demands the same requirement for informed discourses. The US has developed and uses a 'reach-back' headquarters element to assist the Inform function. This is central to learning through design of operations).

Sustain: Just as the Inform function is wider than intelligence, so the Sustain function is wider than Combat Service Support (CSS). It implies linkages and coordination across the friendly sub-system to facilitate extended deployments and early identification of the problem framing and constraints.

Project: Identification, prioritization, and notification of the required forced package form a key part of pre-deployment planning. It is particularly important for combined, joint force where significant liaison and co-ordination is required both prior to embarkation, and in the theatre of operations.

Protect: The Protect Function includes all physical and non-physical defensive measures required to ensure freedom of action. Like the Project Function, the task becomes more difficult as the overall level of the headquarters is raised. It is achieved through a combination of physical protection, location, local interaction and procedures.

Prepare: The Prepare Function is at its most important prior to deployment. It extends beyond specific crisis actions into peacetime education and training. Facilitating the priorities, time and resources for peacetime education and training is a critical headquarters function.

Processes and Outputs

The HQ ARRC study argued that the core process in a deployed headquarters, at any level of war, is to plan, refine, and execute (PRE) operations. In order to perform this central process, it posited (like Systemic Operation Design) that a headquarters must maintain both external and internal orientation. External in the sense of constant interaction with the contextual

environment, superior and subordinate headquarters, and internal in the sense of continual knowledge enhancement across all the different expertise, as well as the integration of knowledge to inform and support the Operate function. Finally, it argued that all activity should be focused on the three outputs of developing plans, issuing orders, and ensuring the effective passage of information. Whether the study envisaged the interactive and dynamic relationships of the strategic client, the operational designer, and the tactical planner (required for Systemic Operation Design) is not clear. Perhaps more importantly, the headquarters structure and new terminology recognized the requirement to develop and refine the strategic directive and operational plan on a continual basis. Arguably, such a positive development can still be taken further and made still more effective. Systemic Operation Design would suggest that HQ ARRC's anticipation of constant refinement of the plan is not enough, and that an assumption that the logical design of the operation will always lead to system re-structuring (due to learning through tactical actions) is a more useful and effective assumption. In fact, it is more informative to widen HQ ARRC's approach to include a more comprehensive process of 'Design, Plan, Refine, Execute, and Re-structure' (DPRER). Ultimately, even if the HQ ARRC paper did not recognize fully the breadth and complexity of interactions within the design and subsequent planning process, as well as across functions of government, external organizations, and private enterprise that are required to inform a holistic campaign approach, it did create a new structure and organization that allows the simple addition of new areas of expertise, and the unification of parallel lines of thought, and learning, in support of the Operate function.

Summary

The UK is not the only force that has begun developing new headquarters structures to facilitate the demands of future operating environments. However, these draft proposals provide a clear example of the modernization and development of the prevalent functional staff model (at all levels of war) that is necessary for success in the emerging operational environment. New

conceptual approaches such as systemic operation design are assisted, but not delivered, by such developments. However, as described, these incomplete improvements will only limit bias caused by organizational culture if they are implemented as part of a wider process of change, the most important part of which is designing the capability to achieve advantage through better learning from the operating environment, or overall competitive system.

APPENDIX III – Learning Organizations

The Problem with Institutional Learning

Learning from military experience is not as simple as it would seem. As already discussed, what is allowed to enter the historical repertoire of an organization, and the lessons that are drawn from it, is a function of organizational culture. In a professionalized, closed, and strongly hierarchical military organization that places significant value on attributes such as conformity and loyalty, learning has the potential to be as biased as any other form of information to knowledge conversion process. No amount of recent, and much flaunted, innovations such as widely accessible internet databases feeding off real-time operational experiences are capable of addressing this fundamental problem without first acknowledging the basic elements of information and equipping personnel to deal with them. Institutional learning requires the same deliberate, rigorous, continual and wide-ranging discourse that is a feature of Systemic Operation Design if it is to generate genuine operational level advantage. Despite this clear requirement, military education rarely achieves the level of self-aware discourse that is required, and personnel are left to unconsciously proceed with little understanding of how their perceptions of the world shape their understanding of it.

Institutional Learning Processes

In *Counterinsurgency Lessons from Malaya and Vietnam. Learning to Eat Soup with a Knife,* John A. Nagl utilized Richard Downie's model of institutional learning from his book *Learning From Conflict.*[66] Downie described how organizational learning is a process of utilizing

[66]John A. Nagl, *Counterinsurgency Lessons from Malaya and Vietnam. Learning to Eat Soup with a Knife*, (Westport: Praeger, 1996), 220.

information from shared experience (the historical repertoire) and then adjustment of institutional norms (organizational culture), doctrine and procedures (formal expression of organizational culture) to address gaps in performance. When considered with an enhanced understanding of the elements of information and how they interact with knowledge creation, it is clear that Downie's model highlights significant limitations. First, the interaction of the historical repertoire and organizational culture, unless mitigated by a developed use of information, is both biased and predictable. As a result, the quantity of doctrinal publications and updates is not an indication of the learning ability of an organization if those publications are so imbued with by the prevailing organizational culture that they only change the dynamics of the force superficially. For example, a light force supported by greater joint fire support is not necessarily fundamentally different to a heavy force supported by its own fire support if it is still utilized within a single mental construct. Despite any number of new doctrinal publications it will differ little from an enemy perspective and will not necessarily prompt changes to their operations.

Much more instructive is an examination of the organizational culture of the force, and whether it encourages and prepares personnel to examine a problem utilizing an approach based on timely discourse from multiple perspectives. Such an approach almost certainly involves including close allies and different professional groups, including academics, different government agencies, corporate interests and the media, to generate new understandings of the contemporary operational systems within which a force must act. Such an approach runs completely counter to many prevailing Western military cultures of closed professionalism and widening gaps with civilian life, yet is a clear requirement for future success. A globalized world demands global education.

Lieutenant Colonel Leonard Wong identified some of these problems in his unpublished US Army War College thesis *Developing Adaptive Leaders: The Crucible Experience of Operation Iraqi Freedom*. Wong revealed the product of the prevailing organizational culture of the US Army by citing the established US institutional examples of leadership such as Generals

Robert E. Lee and George C. Marshall. Instead Wong looked to junior US Army leaders in Iraq as the pinnacle of leadership experience and openly questioned whether their experiences will be encouraged or crushed by current doctrine and decision making processes. However Wong's question is answered is not relevant to this argument. What is critical is that Wong's thesis leads to the unmistakable logic that while doctrine is important, perhaps the atmosphere for debate and learning is still more important. It is only through continual discourse from all perspectives, within an organization that is open to new ideas that an institutional learning process can function effectively.

Peter M. Senge, director of the Center for Organizational Learning at Massachusetts Institute of Technology's Sloan School of Management, acknowledged these dynamics in *The Fifth Discipline Fieldbook*. Senge's "wheels of learning" (individual and team) recognized the importance of the individual and institutional learning environment rather than focusing principally on the products of education, such as the publication of new doctrine. As shown in figure 9, Senge argued that people learn in a cyclical pattern, passing between action and reflection.[67] Creating the environment to encourage and access this cycle, he argued, is a function of management.

[67]Peter M. Senge, *The Fifth Discipline Fieldbook*, (New York: Doubleday, 1994), 59. See also *The Fifth Discipline. The Art and Practice of The Learning Organization,* (New York: Doubleday, 1990).

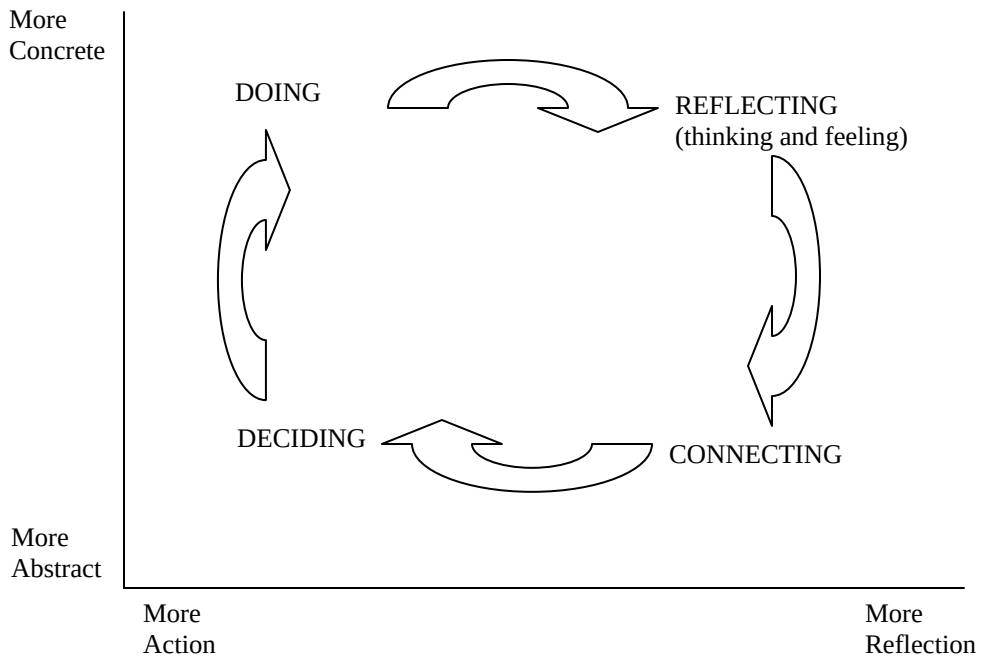

Figure 9. Individual Learning Wheel
Source: Senge, Peter M. *The Fifth Discipline Fieldbook.* New York: Doubleday, 1994, 60.

Senge argued that in any project each stage demanded deliberate attention and management before moving on to the next. *Reflecting* begins with a determined attempt to observe ones own thinking, beliefs, assumptions and acting. Just as in the Systemic Operation Design model, it takes as its start point the question of "what has changed?" It demands that the user reflects upon why they thought and interacted with a system as they did, and then evaluates whether new possibilities exist. *Connecting* is the process of creating and developing new ideas for action. Senge recognized the systemic qualities of such new ideas and actions when he stated that, "[i]n this stage, you look for links between your potential actions and other patterns of behavior in the system around you. . . . What did our last action suggest might be a fruitful path to follow? What new understandings do we have about the world? Where should we be looking

next?"[68] *Deciding* and *Doing* involves thinking through the justification, variables, effects and linkages associated with a given choice before executing the action with, "as much of an experimental frame of mind as possible."[69]

Senge argued that the wheel of learning cuts out low-level frenetic and unproductive activity by instituting programmed time for reflection and discussion. Practiced regularly it brings to those who use it a state of mind that produces calm, self-aware and informed clarity. Even under the most stressful conditions, it produces individual that when action is demanded can respond both innovatively and instantly. Far too often, he pointed out, reflection is left until action is already underway, rather than coordinated around it. The result is an inherent mismatch because reflection requires thoughtful attention and discussion, which is completely incompatible with the mental and physical engagement required for the execution of complex actions.

Senge suggested that the benefits of managing individuals for learning are amplified still further by applying a similar model to team environments. Figure 10 illustrates how in group a setting, reflection becomes public through challenge and discourse and connecting evolves into a shared meaning and insight, that stimulates joint planning and coordinated action. Operated by individuals capable of systemic thinking, Senge's model has the potential not only to produce varied actions, but also to maintain the level of self-awareness necessary to ensure organizational cultural and structural change. This critical component is far less likely operating under other approaches.

[68]Ibid., 60.
[69]Ibid., 61.

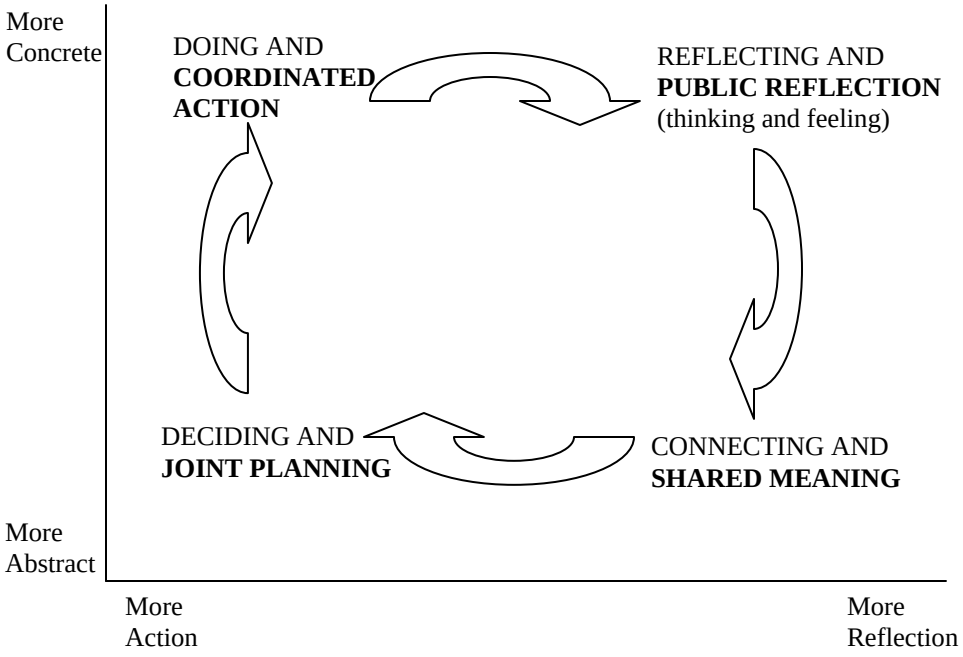

Figure 10. Team Learning Wheel superimposed over Individual Learning Wheel. *Source:* Adaptation of Senge, Peter M. *The Fifth Discipline Fieldbook.* New York: Doubleday, 1994, 62.

Learning Advantage

Instituting a self-conscious and dynamic learning environment that makes use of, and constrains, organizational culture is an important element in setting the conditions for Systemic Operation Design to generate distinct operational design, planning, and adaptive advantage. In addition, it has information and knowledge benefits across the force. To become a leading learning institution many militaries will be obliged to alter their organizational culture to one that can accept both internal and external thinking, even from unpopular sources, and which have the self-confidence to allow constant questioning and challenges to the views and beliefs of the chain of command. Cultural values created to develop physical tactical loyalty and courage must not be allowed to prevent open operational and strategic debate and learning. It is never enough to preserve what is already achieved. An effective learning institution utilizes every opportunity to question what it thinks it knows, and how it views the world in an effort to gain and sustain

advantage. Such an organization does not worry about correctly predicting the future, it simply ensures that it is so open and receptive that it will always adapt more quickly than its rivals.

APPENDIX IV – The Social Life of Military Thought

Military thinkers, like any academics, are those who specialize in the production of abstract ideas and theories. The unifying link between all the different products of these constantly ongoing intellectual processes is that they all claim to be true, or significant, apart from any need for testing or application in reality. The products of intellectual military thought claim veracity in and of themselves because they are the yield of a higher realm of reflection, where validity is tested through independent observation and logic, unconstrained by the frictions, biases, and hustle of everyday military activities. For better or worse, military communities acknowledge intellectual products as an important contribution to their professional discourse precisely because of this very dynamic. Where credibility for an idea is not based in an organizational culture that prizes direct military experience, it draws on its status as an "elevated" idea from a reflective intellectual realm that is inaccessible to practitioners of military art and science for most of their careers.

For the thinkers themselves there is also a unifying motivation for their contributions to an organizational culture that is often hostile to new or external ideas; they all seek to identify the truth. Whether it is presented in the unifying, reductionist traditions of the empirical sciences, such as Antoine-Henri Jomini, or using conceptual symbolism such as of Sun-Tzu, identifying the truth of war and conflict remains the sacred object of almost all military scholars. The quest for truth has attained a quasi-religious quality, and has come to demand a permanent organizational cultural respect in Western militaries. Certain theories and ideas have achieved this cultural iconic status to differing extents, depending upon both the organizational culture and historical period in question. For example, Jomini and Carl Von Clausewitz are today arguably still to the US Army what George Fuller and Basil Liddell-Hart are to the British.

The realization that different organizational cultures accept different truths at different times can lead to only one conclusion. There must be a sociology, or social life, to military thought and to how it comes and goes from pre-eminence. Why is it that something so widely accepted by an organizational culture for long periods of time as a basic and fundamental truth, irrespective of application in reality, is later rejected, altered or replaced? Admittedly contexts change, but abstract truths sought by military academics gain validity from their independence of the mechanics of context. The logical answer to this problem is provided by an understanding of information as composed of human, data, and technical elements. While the data and technical means of transmission used in an intellectual discourse may not change, the human element such as the elective affinities selected by a receiving group (or organizational culture) from a given thinker's set of ideas does change and is subject to historical context.[70] In short, there are constantly changing sets of social and cultural conditions which generate the platform for different military academics to rise to prominence within an organization, or to remain so due to new and altered elective affinities with their work. It seems that military truths really do have a social life.

The Capital of Tactical Situations

The types of combat situations experienced at the tactical level of war penetrate the individual and the consequences spread outwards across social networks and military organizational cultures like ripples across a pond. Randall Collins recognized this dynamic in his construction of the theory of interaction rituals in *The Sociology of Philosophies*. He argued that, "the whole of human history is made up of situations. No one has ever been outside of a local

[70]Elective affinities need not reflect the intent of the author of the intellectual product that has gained prominence in a given organizational culture.

situation; and all our views of the world, all our gathering data, come from here."[71] In a military context there is no more penetrating type of individual situation than that experienced on operations at the tactical level. In the US Army, for example, individual experiences at the tactical level in Vietnam shaped the organizational culture of a generation, finding expression in national policies such as the Weinberger/Powell doctrine of the 1980s and early 1990s. Operations in Afghanistan and Iraq today seem likely to have the same kind of impact on both the US and British militaries. A permanent fixture of Western military organizational cultures is arguably that individual operational experiences at the tactical level are the capital of organizational change. In informational terms they arguably drive the elective affinities that determine how the human elements of intellectual ideas are selected by a given military cultural, or social, group.

Understanding the Dynamics of the Whole

As Bertalanffy made clear in *General System Theory,* the purpose and characteristics of a system are more than the sum of its parts. In contrast, he argued for an approach that confronted the complexities and interrelations of the whole rather than a focus only on the components. Collins also recognized the systemic nature of academic change when he acknowledged the importance of the macro-level (society or organizational culture) as well as individual situations,

> The macro-level . . . should be conceived of not as a vertical layer above the micro, as if it were in a different place, but as the unfurling of the scroll of micro-situations. Micro-situations are embedded in macro-patterns, which are just the ways that situations are linked to one another. . . . What happens here and now depends on what has happened there and then. We can understand macro-patterns . . . by seeing the macro as the dynamics of networks, the meshing of chains of local encounters that I call 'interaction ritual chains.'[72]

[71]Randall Collins, *The Sociology of Philosophies. A Global Theory of Intellectual Change,* (Cambridge, Massachusetts: The Bellknap Press, 2000), 20.

[72]Ibid, 21.

Intellectual groups and chains of network contacts, Collins argued, face both inward and outward. Inward because different groups of thinkers meet frequently to share or debate their work (for example Systemic Operation Design development at the Operational Theory Research Institute (OTRI) at Tel Aviv in Israel) and outward because chains of network contacts are a way of making long-distance links across both time (present, generational, or wider historical) and space. From this perspective it is now much easier to conceptualize how the sociology of military thinking operates over time and space, and how different truths are accepted, modified or rejected for more reasons than simply the context of the historical period. A complete understanding of information based on its three constituent elements becomes an incisive tool for understanding military organizational culture and accepted theoretical truths when it is blended with a sociological systemic understanding such as that proposed by Collins. Together they provide an alternative cognitive map of how military thinking develops and an explanation for why, where and when it emerges in the forms it does.

Rituals and Symbolism

Collins also observed a ritualistic element to the interactions that created the philosophical groups and chains of networks that he examined. Utilizing Erving Goffman's phrase (interaction ritual) he quoted Emile Durkheim's famous observation of the ritualistic element of religion.[73] Collins quoted that, "religious rituals are archetypes of interactions which bind members into a moral community, and which create symbols that act as lenses through which members view their world, and as codes by which they communicate."[74] The same

[73]See Emile Durkheim, *The Elementary Forms of the Religious Life*, (New York: Collier, 1961) and Erving Goffman, *Interaction Ritual*, (New York: Doubleday. 1967).

[74]Randall Collins, *The Sociology of Philosophies. A Global Theory of Intellectual Change*, (Cambridge, Massachusetts: The Bellknap Press, 2000), 22.

ritualistic interactions and symbolism both consciously and unconsciously dominate military organizational culture. In an effort to generate the 'espirit de corps' and teamwork necessary for tactical success the closed organizational culture of the Western militaries, to a greater or lesser degree, demands social solidarity based on shared rituals and symbolism. The result is a singular view of the world that powerfully suggests what is assumed by members of the group, what is considered and what is left unasked or of no interest. In a broad spectrum of interactions, most military exchanges would fall to the centre and left of the diagram in Figure 11:

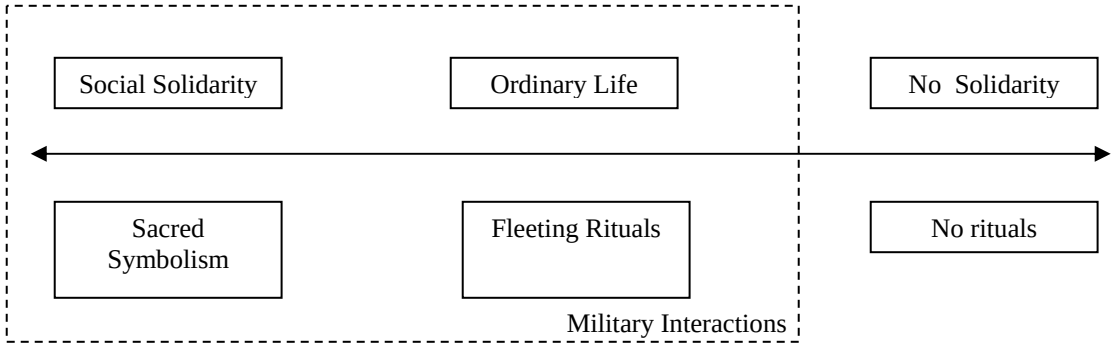

Figure 11. The Spectrum of Interactions in Social Encounters

The key output of such interactions is that participants leave with their group identity reinforced and a renewed sense of moral obligations to the whole. The symbols used in different interactions enter the organizational culture of the whole group and act as a constant reminder of group membership. They are charged with social meaning for as long as they are frequently used by the group. The most sacred of the symbols, for example a regimental or specialist affiliation such as a US Ranger tab become emblems beyond open discussion and to be defended against outsiders. They are the boundaries of what is open for debate and the markers of precedence within the wider organizational culture. Finally, they can also act as requirements for entry into the innermost chains of network contacts. For example, membership of either combat or combat

service support arms might offer differing access to the most powerful chains of networks and so alter the ability of an individual or sub-group to affect the discourse of the whole.

Prevalent Military Truths as Social Barometers

It is now clear that there is a sociology of military thought, which operates through a combination of the dynamics of the passage of information and the systemic nature of social structures and interactions within different organizational cultures, both in the present and across the generations. Therefore, it is equally true to assert that the characteristics and networks of interactions that define a given organizational culture can be traced from the fundamental military truths to which it publicly adheres. These systemic dynamics are a vital level of self-awareness and a precondition for understanding oneself in relation to coalitions, and rivals in a competitive system.

APPENDIX V – Military Jargon and Linguistic Problems in a Digital World

It is no great surprise to observe that the world is more densely populated than ever before. Not only is such a statement true in the physical sense, but also in terms of the dynamic impact of digital information and communications technology. For example, at just less than 1.4 billion people China is the world's largest population. However, with a much more limited communication infrastructure than the United States of America (US), it is arguably far less densely populated than the latter in terms of information. The impact of digital networks is literally changing the physical world and the nature of time and space. Communications are spreading organically around businesses, over institutions, and will eventually seep into every social group on the planet. In each case messages, symbols and information are exchanged with an expansive speed previously only achievable in the heart of the most densely populated areas of the globe. The inevitable spread of digital technology is driving a new kind of information-based population density that is constantly enveloping new groups, for better or worse creating new interrelationships, and is intensifying the impact of permanently fluctuating global dynamics. For the reader to verify such a bold claim there is no need to leave the house, or even to look out of the window. Just log-on to the internet, drift over the oceans, into some chosen corporate boardrooms, through a couple of international crises, check your savings account, and then somersault through space, all before breakfast.

Knowledge, Organizational Structure, and the Means of Communication

It is that very digital informational experience that raises the central question of this paper. Digital communications are unquestionably creating new language and informational experiences, but are they really different from previous non-digital experiences such as print and speech? If there is a difference, what does it mean? Are digital communications, and the

associated military languages used in and on them merely a tool for serving the purposes of trained actors, or do they demand far more fundamental institutional changes than new training programs, more bandwidth, and different frequencies? Does changing the medium for the exchange of information potentially change the message itself and the associated way in which organizational knowledge is generated?[i] For example, the introduction of a staff planning, networked computer system called Command Post of the Future (CPOF) by US forces in Iraq during 2004 was intended to streamline and enhance collaboration amongst a dispersed force. The system has, in fact, given rise to far more significant changes including new staff procedures, altered community practices, an adjustment of those consulted during planning, and alterations to those with imbued with trust and authority by the chain of command. The system has even begun to be used to monitor logistics, the movement of casualties and to execute operations. Even in this admittedly limited example, changes to the technical methods of preserving and transmitting information sent a ripple of change through the organization.

The changes instituted by altered means of sharing information are more significant than simple adjustments to organizational interrelationships and institutional procedures. Although important, the latter are not the focus here. Critically, alterations in the technical means, and accompanying data, symbols and language, of information alters the very way that individual and organizational knowledge is created. This in turn frames the actor's perception and understanding of the operating environment, as well as the way that the institution must then structure itself to best exploit its own knowledge for relative advantage against a rival. The central importance of this relationship between knowledge, organizational structure, and the means of communication is clearly revealed by a more detailed examination of military institutional language, and the way it interacts with digital networks to ultimately shape cognition, actions and learning.

The Development and Challenges of Non-Referent Military Language

Traditionally language has always been representational and anchored in a subject. For example, the military order to ‘open fire’ dates back to the gunpowder age and the task of igniting a weapon. An instruction to ‘open fire’ therefore represented the physical task with little or no ambiguity. As time progressed and weapons developed, the need to personally light a weapon fell away and the order came to designate the mechanical process of discharging a weapon of any type. The correspondence between the word and the physical task ceased in favor of a purely representational relationship. Today the word need not even relate to a mechanical action, but instead can signify the initiation of digital commands sent via satellite to an unmanned weapon system on the far side of the world. The order to ‘open fire’ now often refers to digital codes transmitted between processors. The connection between the order and the chain of tasks it now sets in motion is arbitrary and reveals more about military organizational culture than the weapon, operator, or type of target. The representational nature of the word is sustained only through language, its original referent being so remote as to not even occur to the average military user. Of course, this example is a simple one and rarely leads to confusion, but it illustrates well the elastic nature of military language and the way that words can refer to things that are almost completely removed from them.

The elastic nature of military language begins to become a more serious problem when it comes into contact with the complex institutional linguistics of doctrine. In this context words have ceased to have any connection to things at all and have, in fact, replaced them. In short, doctrinal language refers not to a subject but to itself. Referents have all but faded into obscurity, leaving only a fragile, technical framework of shifting organizational meanings. Nor is there significant commonality between different institutions. For example, despite their close operational relationship, the British and US armies have literally hundreds of different doctrinal terms. Worse still, they have almost as many words with small but important differences in

organizational meaning. These frictions, while troublesome and unnecessary, are surmountable between close military allies. Where the differences are not so easily overcome is when, as is now commonplace, the military is merely one government department or agency working as part of a broad multinational crisis resolution. In these circumstances, doctrinal language has the capacity to become an obstacle to action both because it is not understood (often by both military users as well as outside agencies) and because language understood by a select few is a form of power, and thus becomes 'contested terrain,' resented and challenged by those it excludes. Perhaps most importantly of all, in the knowledge creation process a cultural dependence on a specific institutional language can lead to a premature reduction in understanding through the imposition of narrow linguistically-fuelled intellectual boundaries. This is particularly important if the language and its institutionally selected meanings do not easily describe a new type of situation. For example, almost three years after invading Iraq, neither the British nor the US army have any comprehensive, refined or confirmed doctrine for state reconstruction operations. There is a void in the chosen organizational languages of both institutions in the exact area of their most pressing operational challenges. Nor is this problem likely to end, because as fast as a given institutional language adapts, new problems will unfold. In many cases, institutionally chosen exclusively military language, with narrow meanings, will be made irrelevant by new problems with no such cultural or bureaucratic constraints. The result is that non-referent organizational language ultimately limits both thinking and actions. In short, the medium becomes the message.

Combined with the rapid expansion of digitized information networks the problems of language are magnified still further. Constantly changing, institutionally selected, non-referential language flooding into a large group, only some of whom are linguistically competent leads to

saturation and confusion, or put simply, the unconscious loss of common understanding.[75] The constant drizzle of information communicated by such a language, far from ensuring clarity, begins to make it difficult to separate meaning from background noise, and makes it still harder to take effective and relevant action.

In addition, the collapse of enormous distances between the sender and recipient, such as those envisaged in a headquarters 'reach-back' from a forward deployed team, to a larger support team in a safer environment allows a reconfiguration between the self-referential message and its changing contexts. Loss of the sender's intended meaning is all too easy. For example, during the height of the Hurricane Katrina crisis in Louisiana and Mississippi between August and October 2005 the US Army School of Advanced Military Studies (SAMS) sent forward a planning team to support Joint Task Force (JTF) Katrina, as well as providing a 'reach-back' capacity in Kansas for research and detailed problem-solving. Despite the currency of the members of the two teams with shared US Army institutional language (taught at the school), time and again superfluous or irrelevant work was generated by misunderstanding and loss of common ground between the deployed and supporting groups. Despite the best efforts of skilled and current personnel, the linguistic bridge, delivered by digital technology, was not as robust as had been assumed by all concerned before the task began.

The Cognitive Impact of Technology

Nor is the problem restricted only to language. Electronically generated symbolism of any kind tends, especially over long distances, to replace the material world with itself. It becomes increasingly difficult for staff to distinguish the 'real' existing 'behind' the signifiers.

[75]Winston, Morton. *On Chomsky*. Wadsworth: Belmont, California. 2002, 23. Chomsky defines 'competence' as not only the linguistic knowledge of a speaker, but also their ability to, "produce utterances which are new both to him and other speakers, but which are immediately recognizable as utterances belonging to that language." In short, competence refers to linguistic competence and the ability to be creative with it.

This problem was particularly evident to the author in Iraq during 2003.[76] Staff officers often leapt to believe icons over logged verbal reports, or underestimated the impact of space and poor terrain when selecting locations and sites on maps. A centimeter on a screen was sometimes overlooked as an hour of driving over difficult ground. The medium became the message.

Future Research

In summary, the combination of non-referential, institutional language, the complexity and multi-agency nature of contemporary and future conflict, and the collapse of time and space caused by digital information networks demands much more than superficial organizational structural change. Left unaddressed, linguistic problems have the potential to undermine and erode effective governance, and the capability of a state or organization to compete effectively against rivals. Those who must deal with this dizzy cocktail of information and rapid change can no longer remain effective while locked into stove-piped organizations and departments, working on the false presumption that they are required to deal only with a certain breadth of options from a fixed point in time and space. On the contrary, information pours through every institution in a continuous torrent of multiple non-referential languages from the military to the media. Individuals must contend with this complex dynamic, not from the luxury of any single organizational view of the world, but as adaptable information nomads, wandering every type of global network from their de-contextualized office space.

The case for fundamental change is pressing. That is not to simplistically argue that doctrinal language must simply be discarded, but to posit that where defense joint capabilities were once the great challenge, today central government (and not necessarily defense led) must reform interagency cooperation, unity of effort, and interoperability. Despite creating the

[76]HQ 7th Armoured Brigade, 1st (UK) Division.

opportunity for productive tensions and discourse, stove-piped language and information techniques work against effective systemic design at the operational and strategic level. A common ground, not dominated by the language of defense, delivered in a common medium must be developed where different cognitive models, knowledge, and understanding can clash and creatively develop into a unified approach. How such a language and common discourse should be developed, used and subsequently translated into institutional mediums is the subject of future research. However, it is already clear that military jargon is not the answer, or perhaps even part of the answer, and must give way to a more creative and unifying language and approach, driven by the highest levels of central government and able to contend with the dynamic nature of a changing world.

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