An Organic Approach to Command and Control and Military Decision-making

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Abstract

Simply put, decision theory is concerned with identifying the best decision to take, assuming an ideal decision maker who is fully informed, and fully rational. In a highly complex, interdependent phenomenon such as war the number of decisions soldiers need to make is huge. With growing uncertainties everywhere it is increasingly difficult to make smart decisions. To understand what good decisions are and how to make them, it is important to understand the broader cognitive and social aspects of human decision-making in war.

There is an abundance of references, which emphasize that the internal working of war resembles similarities with complex adaptive systems. Far less ink has been spilled on papers expressing the need for a fundamental shift in the way we think about the inherent dynamics of war when see ingitas a complex and adaptive system. A conceptualisation of this kind stands rather for learning and adaptation than for planning and execution. In complex adaptive systems problems of unclear causality and lack of prediction are inherent features. Consequently, despite best intentions, results of military decision-making often represent far from optimum solutions (Macready/Meyer, 1999).

In military organisations decision is a function of leadership, which becomes manifest in *command and control*, also called *C2*. In this paper the author attempts to make certain generalisations on the options for decision-making, hence command and control, in a complex adaptive system such as war.

Feedback in War

War perceived as a complex adaptive system indicates that deductive thinking aimed at detecting clear causality only narrows options and does not address attributes such as emergence and self-organisation. Consequently, the traditional decision-making process needs to be extended to address those bottom-up possibilities that come from the continuous interaction with the enemy. Self-organising and emergent processes require constant top-down and bottom-up adjustments. Finding out precisely the way feedback routes are often difficult if not impossible, since any feedback loop can result in endless combinations. This is the very reason why complex adaptive systems can produce occasionally counterintuitive behaviour. Although such systems do behave over a long period of time dependably and reasonably, in a sudden they can equally show all sorts of surprising and unexpected effects (Kelly, 1994).

War has its own evolving dynamics and in their decision-making process soldiers tend to assume more oversight than they really have. Soldiers must be prepared to expect non-logical traits in which the result of one decision can become disproportional to the causes. A small variation in inputs can produce a huge variation in outputs since anything that registers input and generates output can be interpreted again as input in a complex adaptive system. Thus soldiers often need to adjust internal links so that they fit external demands over time as war is composed of a set of complex and dynamic interactions (Ibid.).

Napoleon at Jena
Commanders through all ages have made decisions in war and generally faced spatial and temporal limitations that allowed for two possibilities: *commanding all of the troops part of the time*, or *commanding part of the troops all of the time*. Having these two possibilities, successful commanders have realised that it is always possible to defeat the enemy, but never uncertainty. They knew that the greater the uncertainty the better it is to avoid tight control over subordinates. Instead of trying to control war's evolving dynamics they accepted unpredictability as inevitable and tried to make the best out of it in terms of decision-making (Wallace, 2005; Whitehead, 2005).

For this reason the battle of Jena fought in 1806 can serve as a good example. Although Napoleon achieved one of his biggest victories he *"had known nothing about the main action that took place on that day; had forgotten all about two of his corps; did not issue orders to a third, and possibly to a fourth; was taken by surprise by the action of a fifth; and, to cap it all, had one of his principal subordinates display the kind of disobedience that would have brought a lesser mortal before a firing squad"* (Creveld, 1985, p. 96).

It appears that Napoleon was not only able to tolerate a high degree of uncertainty and still exploit the situation, but also his subordinates were willing to accept responsibility and self-initiative. He realised that war requires a large safety margin and his decisions during that very battle ensured that mistakes did not accumulate into disasters. Similar to the trial-and-error mechanism found in complex adaptive systems, waging war equals making blunders and learning from them as best as possible. Emergence and self-organisation not only mean that planning should often not go further than the first encounter with the enemy, but indicate that centralised decision-making needed for subordinates to act at any given level should be reduced to a minimum (Ibid.).

Addressing Uncertainty
Whatever the command practices employed soldiers have always attempted to address the pervasive temporal and spatial uncertainty of war and the problem of insufficient information in their decision-making process (Jobbágy, 2009).

Astute commanders have tried to tackle uncertainty in many ways. They either prioritised, or centralised, or distributed uncertainty throughout the force they commanded. Given the problem of time, space and information available the author proposes four possibilities that indicate commanding *some* of the forces *some* of the time, *all* of the forces *some* of the time, *some* of the forces *all* of the time, and *all* of the forces *all* of the time. The four possibilities are *command-by-direction*, *command-by-plan*, *command-by-influence* and *command-by-evolution*. The first three possibilities can be described as follows (Czerwinsky, 1996):

- *Command-by-direction* – most commanders found that despite being positioned on a vantage point from where they directed the battle, spatial limitations often rendered them to observers rather than commanders. In order to offset this limitation they occasionally attached themselves to that particular element of their forces, which they assumed to be decisive. In the case the situation was favourable, they also moved from one unit to the other. Although they *prioritised* uncertainty depending on the unfolding dynamics of war, they commanded only *some* of their forces *some* of the time.

- *Command-by-plan* – stands for comprehensiveness and an attempt to plan everything in advance and as detailed as possible. It is a highly centralised approach that emphasises rules and procedures. Predefined plans guide actions that both promote inflexibility and address only the strategic/operational levels of war. Commanders focus on certain enemy centres of gravity in order to achieve victory. This approach attempts to *centralise* uncertainty in a top-down deductive hierarchy aimed at exploiting causality. However, this approach has also limitations since it makes it possible to command *all* of the forces only *some* of the time, mostly before the engagement with the enemy.

- *Command-by-influence* – means that only the outline and the minimum goals are stated in advance. This approach *distributes* uncertainty in order to influence subordinates behaviour, but not control events. Instead of a detailed and difficult to revise plan the commander's intent serves as a general guidance and assumes lower-level initiative coming from local knowledge. The approach relaxes decision thresholds and promotes semi-autonomous actions down to the

lowest level. However, despite its flexibility this sort of command tackles uncertainty only at the tactical level. It allows for adjustments downwards to changing battlefield conditions, but does not promote change upwards, which is so essential in complex adaptive systems. Consequently, this approach has also limitations since it allows only to command *some* of the forces *all* of the time.

Increasing Flexibility

The first three approaches can be regarded as variants of a top-down, one-way methodology. The biggest difference among them lies in the way higher-level interference is relaxed in terms of lower-level actions. Although there is a gradual change towards flexibility both in terms of the superior's requirements and the subordinates' actions, none of them promotes mutual learning and constant adaptation. Oddly, even command-by-influence, allows learning from the enemy rather than from the subordinate. The fourth and not yet introduced approach is based on insights coming from complex adaptive systems theory. It is most organic and makes it possible not only to live with, but also exploit uncertainty. War's dynamics require constant learning and adaptation since in omplex adaptive systems bottom-up information can often be more useful than top-down intent (Jobbagy, 2009).

Conceptualising war as a complex adaptive system requires an understanding of the mechanism of biological evolution. Similar to the evolution of biological species war is a phenomenon that seethes and bubbles as a result of constantly changing disorderly processes. In biological terms war is an open system that continuously evolves. Assumptions regarding direct causality, linear deduction, and analytical categorisation do not address the full band-with of possible perturbations. Consequently, *"in war … even the mediocre is quite an achievement"*(Schmitt, 1997; Creveld, 1985, p. 13).

To paraphrase Clausewitz war is evolution by other means as it deals with soldiers, who are living and animate beings. He rightly pointed out that we must *"always leave a margin for uncertainty, in the greatest things as much as in the smallest"*(Clausewitz, 1993, p. 97).

Managing Polarities

The origins of the term command and control can be traced back as early as World War II. Although there is no clear evidence that the term was already used, there is an increased number of various expressions closely resembling the current meaning. Over the years the term evolved in a way that now it can be treated both as a phrase and a compound word (Sproles, 2002).

Nowadays there is an abundance of definitions indicating that command and control is well-entrenched both in military doctrine and vocabulary. As written in the beginning, despite references to complexity theory and complex adaptive systems the way Western armed forces understand command and control, hence decision-making is still very much top down, deductive, analytic and linear. This however, does not take war's emergent and self-organising attributes into account. As an example Joint Publications 1-02 defines C2 as *"[t]he exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission. Command and control functions are performed through an arrangement of personnel, equipment, communications, facilities, and procedures employed by a commander in planning, directing, coordinating, and controlling forces and operations in the accomplishment of the mission"*(JP 1-02, 2001).

According to the definition command and control is understood as a one way process flowing basically from top to down. However, war as a complex adaptive system stands for polarities to manage, rather than problems to solve. Thus polarity must also be included in the way we understand command and control. Although the current unidirectional understanding can best be described as a *monologue*, a close and separate examination of the two constituent words makes it possible to discern this polarity and making a step toward a *dialogue*. Approaching command and control this way makes it possible to harness most, if not all possibilities complex adaptive systems offer (Jobbagy, 2009).

Compound Word

The inappropriateness of a top-down understanding of command and control becomes clear if one looks at the meaning of these two terms. Although command and control can both be seen as a phrase and a compound word, for a better analysis it is treated as the latter. Whereas command refers to the full range of human innovation and flexibility needed to solve unexpected and complex problems, control stands for a set of regulated procedures, which restricts flexibility and excludes alternatives. In normal English usage command can also be understood as the ability to readily call forth or evoke. Thus command also refers to creativity, which emphasises learning and adaptation that point towards emergence and self-organisation identified in the beginning as important attributes of complex adaptive systems. Although creativity is necessary for command, it is not sufficient in itself. It requires another characteristic such as will, which stands for motivation and opportunity. Control indicates either direction or restraints that emphasise proportion and appropriateness in terms of procedures, policies and guidelines aimed at certain end-states (Pigeau/McCann, 2002).

Thus the two end-poles within which command and control activities take place can be defined by the creative expression of human free will on the one hand, and various structures and processes on the other. Having these two end-poles the main functions that can be discerned are as follows (Gove, 1981):

- *Command* – means novel solutions to emerging problems since it provides for starting conditions that indicate a diligent purposefulness. It is the act of expressing will creatively in order to become able to accomplish. Command stands for creating new structures and processes that allow for unanticipated changes to plans.
- *Control* – makes it possible to express human will creatively in order to manage emerging problems and maximise the chance for a good-enough solution. It provides for the framework in the form of structures and processes. In sum, control stands for monitoring and in the case it is needed, adjusting existing structures and processes.

The two end-poles suggest that unlike the three possibilities, command and control can also be perceived as a mutually adjusting top-down and bottom-up process. Thus command and control are not exclusive alternatives, but fundamentally interdependent and interrelated perspectives. They stand for the fact that traditional military hierarchy emphasising a formal differentiation between superior and subordinate can often brake down as a result of unfolding situations and changing circumstances. This approach too indicates that it is important to differentiate between those who lead and those who are lead. However, successful command and control requires a mutual adjustment in order to find the narrow edge of chaos and dwell there successfully (Jobbagy, 2009).

Constant Dialogue

It appears that *MCDP 1 Warfighting* catches best the essence of command-by-evolution. It recommends an organic, evolutionary approach by emphasising the importance of implicit communication. Mutual understanding, coupled with a minimum of key phrases, the courage to anticipate each other's thoughts is the most efficient way to successfully address the co-evolutionary character of war. A constant dialogue between superior and subordinates creates an atmosphere that enables constant learning and adaptation, and promotes the readiness and willingness to learn throughout the ranks (MCDP 1, 1997).

Command-by-evolution means that bottom-up variety and rapidity leads normally to confusion and disorder if it does not accord with top-down harmony and initiative. However, it also indicates that top-down harmony and initiative without bottom-up variety and rapidity, can often lead to rigidity and non-adaptability. Whereas unbridled creativity can often lead to chaos, over-control can result in individual de-motivation. Simply put, command-by-evolution means that we become able to gain quickness and security. It does not stipulate that only commanders on the top exercise command and control functions. As emergence and self-organisation indicate, command and control is as much a top-down as a bottom-up process (Boyd, 1987).

In other words, every soldier is inherently able to express will and capability in the service of the operation. It is also important to take into account that finding the right balance does not always

mean finding the *golden middle way*. Dealing with a complex adaptive system such as war indicates that the situation itself defines which side of the polarity must be emphasised in order to address successfully the challenges that come as a result of a continuous co-evolution with the enemy. Command-by-evolution means that we are able to find a *"correct balance between encouraging creative command and controlling command creativity"*(Pigeau/McCann, 2002).

Any approach that emphasises centralisation on all levels can de-motivate subordinates to exercise initiative and make decisions on their own based on changing circumstances, and superiors to listen to subordinates carefully. Another danger comes from the reliance on advanced technology that easily allows superiors to bypass subordinates and relegate them to information administrators. Centralised uncertainty means that independence, trust, rapidity in terms of decision-making and taking risk deliberately into account, are suppressed. Unfortunately, these are the very factors without which wars cannot be won. It appears that a top-down, mechanistic and linear approach resembling a monologue does not take into account situations in which commanders must deal with a thinking enemy who reacts and adapts to every move (Vego, 2004; MacGregor, 1998-99).

Command-by-Evolution

Command-by-evolution takes mission command a step further and assumes that not only subordinates have the freedom to realise the superior's intent, but also the superior is ready to learn and adapt his intent to the battlefield realities that come as the result of a continuous co-evolution with the enemy. This way it will be possible to exploit emergening opportunities nobody could imagined in advance, but can serve equally well or even better than those, which were planned and formulated in terms of desired effects. This two-way process of constant adjustment in terms of decisions means that results come in a way that exploits both effectiveness and efficiency. In order to elaborate on command-by-evolution in detail the author proposes three different options for C2 such as (1)*confidence and competence*, (2)*copingandco-evolution*, and (3)*creativity and change*.

   Option One

Armed forces have two distinct characteristics in terms of command and control. The first is a formal separation between those who lead and those who are lead, which is expressed in a strict pyramid-like hierarchical design. The second comes as a result of the first, since it is supposed that those on the top are more important than those serving below. However, war as a complex adaptive system requires that much of command must be delegated to lower levels in order to detect, track and exploit emerging opportunities in a self-organising fashion. Conceptualising war as a complex adaptive system requires see ingit in terms of networks in which the emphasis shifts towards a horizontal focus. Power must be distributed in a lateral way in which each boundary, cluster, and node interacts. It was mentioned that it is impossible to control complex adaptive systems; therefore there must be a refocus from command and control in traditional terms (Atkinson/Moffat, 2005).

Confidence and competence mean that both superiors and subordinates are able to work in an autonomous and asynchronous way in which boundaries are neither fixed nor controlled, but adapt according to the requirements. Decisions are the result of a consensus, which does not come as a result of a top-down monologue, but as a stop-and-go process resting on trust and confidence. Both superiors and subordinates know that despite the errors and blunders committed, everybody wants to achieve the right thing. Soldiers must become willing to learn and change views in order to adapt to constantly changing circumstances. Confidence and competence come out of collective experience that helps exercise disaggregated and asynchronous command procedures. Thus information can find its way to those who need it even if they do not want to know it. War as a complex adaptive system stands for a constant change with often surprising opportunities that require rapid and immediate actions often carried out in novel ways. Armed forces have to move from a formal and vertical to a more informal and horizontal organisational structure in which the emphasis is on people who tend to become better subordinates and better superiors. Only those can learn from their mistakes who have been allowed to make them (Storr, 2003).

Option Two

Command-by-evolution exploits uncertainty in a novel way and calls for freedom and adaptability at all levels. It acknowledges that waging war successfully requires only general statements in advance in order to start activities rather than a detailed plan. Thus only guidelines must be laid down in order to put the system into gear. As soon as the co-evolutionary process with the enemy gains momentum, details that cannot be anticipated beforehand will emerge anyway. A good example for emergence and self-organisation was the 1967 Arab-Israeli war in which for the Israeli side *"only the first [day] was planned in any detail; the rest was pure improvisation"*(Creveld, 1985, p. 200).

Israel achieved one of its most stunning victories over its neighbours at a cost of roughly 680 soldiers killed, 2,600 wounded and 15 more becoming prisoners. In contrast, according to various estimates the numerically superior combined Arab forces suffered 21,000 casualties, a further 45,000 soldiers were wounded and 6,000 became prisoners. Confronted by a much larger coalition and facing a three-to-one imbalance of forces, Israel managed to win within six days. A successful mix of surprise, intelligence, guile, gamble, determination and courage backed by a maximum independence of subordinate commanders, mutual trust and appreciation in the form of an implicit brotherhood throughout the ranks resulted in communication and comprehension, which are so necessary for flexibility in war (Harbaki, 1967; Gallois, 1988; Khan 1967).

Israeli units were able both to self-organise and exploit emergent windows of opportunities despite the many blunders they committed during the operations. They probably did not achieve what we would describe as desired effects, but were able to exploit those opportunities sufficiently to be victorious in the end of the day. Command-by-evolution is an organic concept that does not over-emphasise the role technology plays in war. Whatever the level of sophistication of technology employed, it equally opens up and shuts down possibilities. It is as important to exploit advantages it offers as to understand the limitations it has. The very process of co-evolution indicates the enemy to be composed of intelligent human beings who are always ready to exploit vulnerable niches in order to turn initial disadvantage to their favour (Jobbagy, 2009).

Option Three

Conceptualising war in the framework of a complex adaptive system requires seeing command and control in terms of polarity. Even the proposed organic approach allows for conducting command and control functions in a traditional top-down fashion resembling a monologue. The closer to the state of stability, the higher its value. However, it must be equally taken into account that as the dynamics of war unfold the co-evolutionary process with the enemy will shift towards the chaotic area. Consequently, command and control in traditional terms become increasingly vacuous. Approaches attempting to prioritise, centralise or distribute uncertainty cannot cope with all the conflicting requirements and constraints soldiers face. Thus soldiers must take advantage of the emergent and self-organising patterns displayed by war as victory in war requires the harnessing of everyone's intelligence throughout the ranks (Wheatley, 2005).

It is probably too far to state that if one orders a soldier to do something, he/she has already failed as a leader, but it must be acknowledged that people are in general, ready and willing to work well, contribute their ideas and take responsibility. War demands everyone's contribution to solve emerging challenges and crises. Command-by-evolution indicates that self-managed and autonomous teams can come up with smarter solutions to problems and achieve a higher level of adaptability. The higher the risk, the more the need for the commitment and intelligence of everybody. Emergence and self-organisation mean that people often get together in order to achieve more and not less. This way they develop a shared understanding and behaviour to take required actions. Decisions made this way are simpler and more localised. They require a constant search for solutions, which come as a result of intimate and local experience that can turn into system-wide coherence (Ibid.).

Although these activities indicate that organisations are able to tolerate a high level of messiness, they can provide for an atmosphere in which freedom and creativity are the driving forces for achieving sufficient local solutions. As the 1967 Arab-Israeli war showed if people can develop trust for each other they also establish an atmosphere that is more creative and forgiving. Consequently, local responsiveness can turn into higher general adaptability and agility (Jobbagy, 2009).

Intelligent Command

The three options for command-by-evolution show that proper information coming through an emergent and self-organising mechanism can successfully limit, but never eliminate the complex and adaptive reality of war. Although the fog of war can occasionally be reduced to mist, information for making proper decisions will never be complete or absolutely perfect. In war soldiers always deal with the likely rather than the true. More information might create more predictability, but the bigger its amount the greater the uncertainty, hence the unpredictability it contains. In any case in their decision-making process soldiers must deal with war's inherent unpredictability that often hinders both the formulation and achievement of desired results. In the last two decades there was a steep increase in the performance of information technologies Western armed forces can field. However, the tempo of operations and the demand for making split-second decisions has also grown. It appears that the weakest link in this process is still the speed at which humans make decisions. Uncertainty of war indicates that despite the amount of information available, it is often *"trivial in quality and overwhelming in quantity"*(Ferris/Handel, 1995, p. 9)

Contemporary commanders are confronted with two sorts of uncertainty in their decision-making process. The first type is due to the lack of accurate, useful and timely information, which has always been part of the business of war. The second type is due to the overwhelming amount of information as advanced technologies can both collect and communicate nearly anything and everything (Ibid.).

Current military involvements of Western armed forces have increasingly become asymmetric wars in which official channels of command and control can brake down and superiors are often unable to guide their subordinates who have to carry out actions with little time to assess and prepare. Fleeting and unique military situations require a constant adaptation based on local information harnessing individual initiative and responsibility. Information must often be generated and exploited through a decision-making process on a local level in order to achieve results that are not always predictable, but are good-enough to become both effective and efficient at the same time.

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