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Assessment: Give me a place to stand, and I will move the Earth

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Abstract

The fundamental challenge of C2 agility is to increase the rationality of operations. An important vehicle for doing so is by increasing the rationality of assessment, from seeing rationality as a mere matter of "facts" and "objective analysis", to seeing rationality as a function of human cognition in relation to the structures of the environment. At the heart of C2 lies the problem of dealing with uncertainty, a problem that can to some extent be addressed by making assessments. Assessments however, cannot provide all the answers and expectations on assessment are in many cases unrealistic. The idea of armed conflict as a linear and predictable engineering problem has long been abandoned (if ever accepted at all). Planning and assessment however, are still conducted in a way resembling engineering. Planning is essentially a matter of choosing between alternatives and assessment is often described in terms of "objective analysis" of "facts".

Based on Herbert Simon's notion of bounded rationality we will in this paper offer an alternative view on rationality and show how a shift of paradigm and an altered approach to uncertainty can in fact increase agility in C2.

Assessment for Command and Control (C2) agility: a matter of rationality

The fundamental challenge of C2 agility is to increase the rationality of operations. An important vehicle for doing so is by increasing the rationality of assessment, from seeing rationality as a mere matter of "facts" and "objective analysis", to seeing rationality as a function of human cognition in relation to the structures of the environment.

Experimenting with levers, the Greek scientist and philosopher Archimedes reached the conclusion in a famous quote: "Give me a place to stand, I will move the Earth". In similar vein, we argue that assessment – as a firm basis for action and a solid place from where to move the world – certainly would be needed in today's operational environment, but cannot be reached in its classical understanding of a correct, unbiased view of the state of things, what actually happens and whether earlier actions have generated any results. But is "just the facts" too much to ask for? Or what else can be done about it? Answering the questions about assessment will firstly have to treat the issue of objectivity of facts and may secondly also address its contexts in the OODA-loop (observe, orient, decide, act) framework for C2. In times where C2 has to become agile, the very *notion of objective assessment* as well as the very *notion of one, centralized OODA-loop* may need revision to bring visions aligned with research on cognitive capacities and limitations. A fundamental consequence might be an adjustment of the very *notion of rationality* in C2 decision making, from seeing it as *optimization based on objective facts*, to instead seeing *the very act of adaptation* as an expression of *rationality*, in every part of C2 processes including assessment.

In the history of C2, while decisions have become the focus of discussion, assessment developed to become the perhaps most prominent aspect of the cycle, not least through the modern emphasis on high-tech warfare, lending observational powers promising a transparency of the theatre that has never been seen before. Indeed, *information superiority* was a key concept to modern warfare. Victories were won through the deployment of increasingly cheap sensors able to recognize any sensation, be it visual, acoustic or temperature, etc. By information fusion the detail of overview had never been achieved before. In his classic work, van Creveld (1985) described this information-

gathering as a *directed telescope*. Until the end of the 18th century, commanders could typically overview the theatre from a hill through direct observation. With Napoleon's reporting system, information flows were reduced to a minimum, but was still enough to inform his strategic visioning. Although it can be argued that this lead to a loss of strategic control, it still meant the introduction of a number of structural faculties to bridge time and space between himself and his dispersed armies (Hasselbladh, 2005). While this development was followed by von Moltke's scepticism against, e.g., a too heavy reliance on the telegraph, the general trend towards WW1 was the opposite. As van Creveld (1985) pointed out, the focus on information-gathering and computation was at its peak at the time of the Vietnam war, resulting in a directed telescope that simply got too strong to be useful.

Until recently, information superiority seemed like a silver-bullet solution to a better understanding of the theatre, to speed up and improve decision-making through more correct assessment, ultimately making operations more rational. But then, one might ask: - What happened? Basically, adversaries changed strategy, to eliminate the advantage of high-tech solutions. As long as information fusion can be automated, i.e., registering, classifying, matching and summing up conclusions about what is going on, high-tech has a place. However, as soon as changes and uncertainties start to be qualitative (i.e., it's not that we don't know the frequency or exact timing of events, but we don't even know what kind of events to expect) human imagination is the only tool known so far to tackle the challenge. Furthermore, most things we would like to know are inherently hard to register or only at a high cost (including moral ones), such as people's sympathies, networks, loyalties, and dedications. Hence, the mixing of military business with the civilian sphere fundamentally changed the rules and forced military assessment into a field where rules, patterns and predictability are but memories of the past and the plethora of perspectives makes any information credible or doubtable depending on viewpoint and interpretation. Consequently, as C2 needs to become agile, assessment needs to adjust its tools, methods and thinking as to support decision-making in creating a new paradigm for C2.

The probably most fundamental aspect of this change concerns the very notion of rationality itself. In its everyday sense, rationality is seen as the true, objective representation of the environment along with the computational capacity to optimize decision-making, much in line with the economic-man notions of human choice. Rationality is seen as the optimal objective choice between clearly defined alternatives. None of these assumptions are scientifically trustworthy anymore and tools that are trying to make human decisions rational in this sense are fundamentally ignoring truly human ways of making decisions. Although the notion of *bounded rationality* and its associated theory rendered Herbert Simon the 1978 Nobel prize in economics, these insights are still to be digested among a broad range of academics as much as among practitioners. With the over 60 biases documented by recent research there is little doubt that any assessment will be biased, at least to some extent (Klein, 2009) and the limited processing power of humans, more information will rather make the situation worse than better (c.f. Kahneman, 2011).

Gigerenzer (2008) argued that we need a more balanced view on human rationality. Humans are limited within bounds. However, this has often been mistaken to mean that humans are irrational or still optimizing their choices through calculation, albeit be it under constrains. He pointed at a third way of seeing it, emphasizing the *ecological rationality* suggested by Simon (1990) through the metaphor of rationality as a pair of scissors:

"Bounded rationality is like a pair of scissors: The mind is one blade, and the structure of the environment is the other. To understand behaviour, one has to look at both, at how they fit. In other words, to evaluate cognitive strategies as rational or irrational, one also needs to analyse the environment because a strategy is rational or irrational only with respect to a particular physical or social environment." (Gigerenzer, p. 86).

I other words, instead of seeing rationality as a matter of optimization based on objective facts, ***rationality should be understood as the very process of adaptation*** to changing circumstances. Consequently, to opt for a more rational version of assessment also means to ***examine the both blades of rationality***: The character and structure of ***the task environment*** as well as the ***cognitive processes***. Hence rationality itself lies in the capacity to adaptation (Simon, 1990). In the following chapters, we will present and discuss these two main issues and thereafter sum up with conclusions. In chapter two, we take a closer look at the characteristics of the environment, to try to identify and derive the consequences of these characteristics for planning and assessment. Chapter three presents the current state in the research around cognitive limitations, also looking for the strength of human decision-making. In chapter four, "in the light of our findings", we discuss how to make the process of assessment even more rational. Finally some general conclusions are drawn and remaining challenges are identified.

Environment: What are we up against?

The task environment in armed conflicts can best be described as riddled with uncertainty, uncertainty about the present, future and past, uncertainty about other actors' intentions and actions and even uncertainty about our own actions and their impact on the conflict. Making assessments is a way of reducing that uncertainty, or at least reducing the perception of uncertainty in order to make the situation manageable. In most cases the future is especially uncertain but at the same time it is the only tense that can actually be affected. *The Uncertainty Triangle* (Dreborg, *et al.*, 1994) describes three different strategies for dealing with uncertainty about the future: predict, accept and control. Accepting uncertainty about the future represents an opportunistic approach and allows a decision maker to grasp at fleeting opportunities but might also render him reactive. Trying to control uncertainty on the other hand, involves investing great resources in shaping the future and represents a more structuralistic approach. While making predictions about the future is often necessary it is not feasible as a general strategy. These three strategies should not be seen as alternatives but rather as complementary approaches to deal with uncertainty.

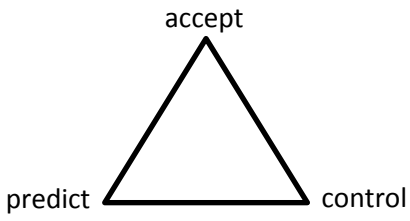

Figure 1: The uncertainty triangle: the three corners represent fundamentally different but yet complementary approaches to dealing with uncertainty. (Dreborg, *et al.*, 1994)

To device strategies for dealing with uncertainty and applying relevant methods, uncertainty cannot be treated as a unitary entity. There is no silver bullet to deal with all uncertainty. Rather there is a

whole range of different uncertainties with different qualities and properties. Eriksson (2004) uses dichotomies to elaborate on different dimensions of uncertainty and methodological approaches to addressing uncertainty. The main dichotomy is the qualitative vs. quantitative uncertainty. Whilst the probabilistic approach, or quantitative uncertainty, is certainly the one most developed regarding tools and methods such as statistical methods, Bayesian networks, etc., it is still limited in the respect that the alternative futures must follow the same logic and the same set of variables and equations. By applying qualitative methods such as scenario based planning, alternatives are not bound by logic and can be conceptually different. Intentional vs. stochastic uncertainty is another key dichotomy. Obviously there is a difference between uncertainty regarding the forces of nature and conflicts between human antagonists where intentionality has to be taken into account. Although a probabilistic approach works well with stochastic uncertainty, this is not always the case with intentional uncertainty. Though *game theory* has proven useful to understanding parts of intentional uncertainty it only works for simple and structurally stable cases where the players follow the same rules. In more complex, real life situations where human actors are involved, the "rules" tend to change over time and *gaming* is the analytical approach of choice. The third dichotomy is the dynamic vs. static uncertainty. Dynamic uncertainty changes over time and can be reduced or even resolved as more information emerges. Static uncertainty on the other hand remains constant, at least in a relevant time span. If the reaction time to new information exceeds the warning time, the uncertainty involved can be regarded as static. An earlier version of this dichotomy was the *genuine vs. resolvable uncertainty*. From a decision making point of view dynamic uncertainty situations can be seen as sequential while static uncertainty situations represent one-stage decisions. In principal, strategies for dealing with uncertainties can be divided into two groups, strategic commitment and strategic opportunism. Strategic commitment, or making a decision and sticking to it, might be the only option for political reasons or when dealing with static uncertainty. Strategic opportunism on the other hand allows for flexibility and pro-active decisions as more information and options become available but might also force a decision-maker to become reactive and adapt to other actors actions. (Eriksson, 2004)

Where does uncertainty originate and why is it so notoriously difficult to predict the future? When trying to describe the world we tend to do so in a linear fashion, i.e., there is proportionality between cause and effect and results are repeatable. However, while many phenomena in nature are linear this is not the case in most social systems. In fact, the problem of establishing the relationship between cause and effect in social systems is often not even of a quantitative nature but of a qualitative one and social phenomena that actually are repetitive tend to be trivial in nature, at least in a conflict context. It is commonly accepted that modern conflicts display more properties of non-linearity and complexity than linearity and simplicity and even though Ludwig von Bertalanffy showed in 1969 that complex systems display emergent properties and cannot be fully understood by linear means (p. 55), problem solving and analysis are still done in a very linear fashion. Sometimes warfare is compared to chess, but even such a simple game as chess with its 64 squares and only 6 pieces is fundamentally complex. To calculate all possible variations and identify the perfect game would require more operations than there are molecules in the universe. Expecting assessment to produce exact and reliable answers under these circumstances just isn't realistic, or as the baseball player Yogi Berra put it "-It is tough to make predictions, especially about the future".

Cognitive limitations – and possibilities

The view on decision making and decision makers is about to change. In the early 1970s, the pioneers Kahneman and Tversky initiated research that caught on quickly and the concept of decision biases is now embedded in psychology, economics and business. Their findings have also evoked public interest in the issues, generating a popular literature that generally has interpreted the findings as seeing humans as defective decision makers (Klein, 2009). As we will see, these conclusions may be premature. However, pure ignorance about such findings is even worse. Despite overwhelming evidence about the limits to objectivity and human rationality, high expectations on assessment still persist. In practice, expectations to deliver only the pure facts of reality pretty much reflects the kind of positivistic assumptions of a 'received view', suggesting that reality would speak for itself, without interpretation. That this view was explained as being dead by its last proponent Hempel in 1969 doesn't seem to make much impression upon the audience. Rather, as a myth and an ideal, the received view seems still alive and kicking, still praising physics as the paradigm of good science, adjusting analyses to fit these ideals and deploying them normatively in the evaluation of social sciences (Suppe, 1998). As this ideal of objectivity hasn't seemed viable even to its former proponents for over 40 years, it is time to abandon it also as an ideal for assessment in military C2.

There are plenty of reasons to doubt objectivity in human affairs. As many as 60 biases have been identified since the start of the decision bias research during the last four decades. Biases are often describes as traps that should be avoided to increase rationality in decisions, such as the traps of *anchoring* (giving disproportionate weight to the first information received), *status-quo* (bias towards alternatives that perpetuate the present state of affairs), *sunk cost* (make choices to justify past invalid choices), *confirming evidence* (seek out information that supports our existing point of view), *framing* (take on a perspective or definition of an issue or situation, also causing other biases), *overconfidence* (people tend to be overconfident about their own accuracy), *prudence* (overcautiousness when facing high-stakes decisions 'just to be on the safe side'), and *recallability* (forecasting overly influenced by historical dramatic or catastrophic occurrences) (Hammond, et al, 2011). Given all the alternatives and possible combinations, it would seem naïve to believe that any specific assessment would be neutral and objective, or that military endeavours would be an exception from the more general limitations of human beings. Rather, the future of assessment would need to take the *bounded rationality* of human beings as its very point of departure, however not only as biases to be avoided.

There has been a quite intense debate in connection to the ideas about the very *understanding* of what *bounded rationality* is intended to *mean*, i.e., in different interpretations of Herbert Simon's concept. Kahneman (2011), Klein (2009), and Gigerenzer (2008) agree that the interpretation of bounded rationality as only an *optimization under constraints* strips the very notion of every essential meaning. The economist Milton Friedman explained this understanding of bounded rationality: "The question is not whether people actually optimize, with or without constraints, but whether they *act* as if they were doing so" (p. 80). Hence, this *as-if* notion of bounded rationality in decision making is an important mark of a very specific understanding of how humans make decisions, i.e., exactly the one that will lead writers to publish books with instructions of how to restore the process of rational decisions, although research suggests that this is not the way people get along with the challenges of the practical world. Considering the conditions in real life settings may shed new light on the possible loss of rationality.

While research has generated massive evidence of the shortcomings of human decision making, it can also be argued that this partly is a problem constructed by the very methods of laboratory experiments and how the problems were defined: "The limitations in our strategies are easier to demonstrate in a laboratory than in the real world" (Klein, 2009, p. 54f). In relation to their earlier work, Gigerenzer argued that "Kahneman and Tversky see the glass as half-empty, whereas I see it as half-full" (2008, p. 19), suggesting that Herbert Simon applauded their demonstration of systematic deviations from the ideal of economic man, but rather overlooked their tendency to accept as normative the very optimization theories that he fought so fiercely against (p. 86). While this point of reference still persists, later contributions seem to have shifted focus towards more independent arguments for an optimal blend between rational analysis and intuition or more automatic modes of cognition. Hence, Kahneman's (2011) bestseller *Thinking, fast and slow*, as well as Dane and Pratt's (2007) Academy of Management award-winning article *Exploring intuition and its Role in Managerial Decision Making* both derive their arguments from a more independent position, focusing on the balance between the spontaneous and automatic System 1 and the voluntarily reflective System 2. Hence, slowly the paradigm is leaving the perspective on bounded rationality as *cognitive illusions* (c.f. Gigerenzer, 2008).

The notion of bounded rationality that is suggested to be closest to Herbert Simon's view on heuristics can be called *ecological rationality*. With this view, beyond the building blocks of heuristics and the evolved capabilities used for everyday decision making, heuristics also involves determining the environmental structure in which a given heuristic is successful and to design heuristics and/or (physical or social) environments for improving decision making (Gigerenzer, 2004 & 2008; Simon, 1990). This marks a more independent perspective in that it "directly analyses the decision process rather than trying to demonstrate violations of the assumptions underlying as-if models" (p. 90). Hence, the task of determining rationality of decision making is twofold, to determine the heuristic and its fit with the environment, as explained by Simon: "Bounded rationality is like a pair of scissors: The mind is one blade, and the structure of the environment is the other. To understand behaviour, one has to look at both, at how they fit. In other words, to evaluate cognitive strategies as rational or irrational, one also needs to analyse the environment because a strategy is rational or irrational only with respect to a particular physical or social environment." (Gigerenzer, p. 86). This also addresses "a deep normative controversy in the cognitive and social sciences, where one view always sees errors as negative, and the other view acknowledges that "good errors" can exist, as they express an adaptation of mental heuristics to the structure of the environment".

This ecological view is also prone to see the situation of decision making as unravelling, rather than being a static one, as with the example of the baseball player trying to catch a ball, who may seem like he is calculating the trajectory of the ball, but actually has a much more practical and flexible goal: "Rationality is said to be a means toward an end. … [T]he player's goal is not to predict the landing point, but to be where the ball lands. The rationality of heuristics is not simply a means to a given end; the heuristic itself can define what the end is" (Gigerenzer, 2008, p. 89). The ecological view on rationality also points at a deep normative controversy in cognitive and social sciences; whether errors are always negative or can be seen as "*good errors"* in the case where the limitations enable adaptive behaviour as new functions are being enabled through the error. Gigerenzer argued that the first version meant "content-blind norms" which "fail to provide a reasonable general definition of error and are inapt tools for unravelling the laws of the mind" (ibid. p. 78). An evident benefit of cognitive limits is that it allows for relying on small samples for early detection of

contingencies, which is beneficial as long as it outweighs the cost of false alarms. Hence, the perspective of ecological rationality may challenge the very notion of rationality through its emphasis on adaptation rather than prediction in static situations of decision making and further research may approach neurology and biology. Gigerenzer concluded: "It lies ahead to discover how much of human cognition can be usefully understood in terms of heuristics … cue orders may have as much to do with costs and accessibility of each cue as with validity." (Gigerenzer, p. 63f).

In similar vein, Klein (2009) questioned the actual relevance of the bulk of research into decision making by emphasizing the typical character of real life environments: while most of the research on thinking and decision making takes place in bright and clear conditions, the more typical environment in natural settings may be of the opposite character. Hence, the primary interest may be "how we think and decide in the world of shadows, the world of ambiguity" (p.6). Hence, making decisions under such circumstances is fundamentally intertwined with the need to *make sense* of events and *adapting* to ambiguous outcomes. In other words, while systematic analysis may be appropriate to tackle well-ordered tasks, it may provide little guidance in complex settings. Furthermore, in such settings to emphasize procedure over skills only sets "a standard for mediocre performance" (ibid., p. 31), rather than rely on a broader repertoire, including *tacit knowledge*, such as perceptual skills, workarounds, pattern matching, judging typicality and mental models. Some direct consequences of this more dynamic perspective has been testing of less analytical planning models, which, e.g., Thunholm (2005) found to render the same quality more rapidly than purely analytical approaches, as well as Klein's notion of *flexecution*, connecting decision making with adaptive planning.

Summing up, the good news for assessment is that it is becoming increasingly evident that the traditional demands no longer seem credible, necessary or possible to live up to. Human actors engaged in assessment will tend to be as biased as anybody else, rendering all kinds of selectivity and distortions to observation. Seeing the deficiencies is rather a matter of time than of accuracy. Seeing assessment over time may also be a possible way forward to increase rationality in assessment. Rather than seeing it as a once-and-for-all occasion to clarify the state of things, assessment would need to be seen out of a processual viewpoint, where rationality rather lies in the process of refining and adjusting beliefs and doubts, as much as in claiming objectivity. Indeed, beliefs in objectivity as well as in the quantification and assessment of risk, has shown to be a contributing factor in underestimating the potential for disaster (Feldman, 2004). After all, the bottom-line of assessment must be that "it is safer to know that you are guessing than to believe that you know".

As shown above, while omniscience cannot be solved or delivered by assessment, the solution will have to rely on its interplay with other moments of the decision loop. The direct consequences of bounded rationality, bias and heuristics could be stated as an end point of ambitions of assessment. In complex environment, objectivity and truth is nothing even to be hoped for. Making sense of complexity, i.e., finding meaning in a non-exclusive way, may be the best we can come up with. Consequently, while beliefs will show to be true or false, the solution to assessment and decision making must lie not in any specific part of the decision loop, but rather in the increased interaction between different phases of the decision process, and the many different instants involved in that process.

Making assessment more rational

In considering the possibilities to make assessment more rational, we need to go back to Simon's (1990) metaphor of bounded ***rationality as a pair of scissors: the mind is one blade and the structure of the environment is the other***. In line with Simon's argument, statements about any degree of rationality cannot be made by looking at only one blade, i.e., looking at processes of cognition without considering the character of the environment. In many aspects, today's operational environment is a qualitatively new one, emphasizing the need for Human Intelligence (HUMINT) to grasp the more *holistic yet local perceptions of reality*. To a lesser and lesser degree, information needs can be satisfied with pure statistics or information fusion from technical sensors. To an increasing extent, we are not dealing with risk (i.e. quantitative uncertainty), allowing us to calculate percentages based on historical frequency and normal distribution of probabilities. Rather, uncertainties tend to be more and more of a qualitative kind, leaving open not only when or how often an event will happen, but also the very kind of events that could be expected. This qualitative uncertainty generally reflects evolutionary tendencies in the environment, and is specifically relevant when uncertainties are not stochastic but intentional and active from the part of adversaries, hence leaving probability theory without any explanatory or predictive power since the probabilistic methods and models are not agile enough to cope with this qualitatively uncertain environment, nor do they reflect the continual sensemaking due to interaction between the individual and the environment. Consequently, as *the logic of the evolution of conflicts doesn't follow any perceptible rules of nature or behaviour*, knowledge will not dissolve uncertainties in sufficient detail, but rather time itself will eventually possibly do so. However, in addition to uncertainties, *ambiguities as to what meaning to attach to past events may persist even in retrospect*.

According to Simon (1990) *strategy can only be rational or irrational with respect to a particular environment*. What, then, would be a rational response to such an environment characterized by incalculable uncertainties which can be dissolved through the elapse of time itself, at the very best, leaving matters of ambiguity aside. Modern cognitive research tells us that while human cognition and decision making may be described as deficient or irrational if compared to long standing ideals full information and optimization of utility (as with the *economic man*-notion of human rationality), this view of *bounded rationality as cognitive illusions* is not the one that best matches Simon's original ideas. Rather, as well as we might see the glass as half-empty, we may perceive it as half-full. An important conclusion of empirical studies of human cognition is that our limited span of attention, limited capacity of information processing and other factors inhibiting our calculative rationality is not the only thing that matters. Rather, for such ideals to be rational, they necessitate a well structured environment which lends itself to analysis and prediction of future utility. As the above descriptions of the environment have shown, this is exactly the opposite to what characterizes the challenges of today's operative environment.

Instead of clinging to old notions of rationality as optimization without consideration of the structure of environments, adopting the "as-if" assumption of human cognition and decision making, researchers increasingly conclude that it would be smarter to accept the way the human brain seems to work. Consequently, rather than seeing biases and heuristics as weaknesses in decision processes that ought to be fully informed and analytically rational, we ought to welcome these insights as explanations of why these deficiencies don't seem to be such a big problem in practice. The key to understand this dynamic is that complex environments don't lend themselves to analysis and prediction. Consequently, applying such norms would be inefficient compared to the application of

heuristic devises such as rules-of-thumb, standard operating procedures and intuition, or rather recognition, based on earlier experience. Looking at decision making from an evolutionary perspective means that an error is not only the final point in a decision making process, but also the point of departure for the next decision. Hence, Gigerenzer's "good errors", errors that enable adaptive behaviour and new functions, may help us to refine our understandings and activities to better match the environment. With such an ecological view of rationality, rationality doesn't reside in the single analysis as much as it resides in the repeated attempts to make sense of the environment *together with* practical adjustments to new insights. Consequently, discussing assessment without relation to the rest of C2 arrangements would make little sense.

As with the example with the baseball player, the practical point is not to calculate the exact trajectory of the ball. Rather, the very point – and the only point that really matters – is to be where the ball is once it approaches the ground. Hence, perception, analysis and movement may be hard to distinguish – or not even meaningful to fully separate – in attempts to establish such processes of ecological rationality. One such example may be Klein's notion of flexecution, operating not only on the level of instructions, but also on the level of conceptual understanding through the coining of a new term. The very point of flexecution may not lie in the exact instruction about how to establish such C2 processes, as much as it tells us something about what we ought to learn and what we ought to forget. It may tell us to forget execution as separated from analysis, or to think about assessment as an isolated phenomenon which can be deemed rational or irrational without regard to the character of the environment and the rest of C2 processes in the face of uncertainty and ambiguity. Hence, in times where C2 has to become agile, the very *notion of objective assessment* as well as the very *notion of one, centralized OODA-loop* may need revision to bring visions aligned with research on cognitive capacities and limitations. Hence, we may need to revise the very *notion of rationality* in C2 decision making, from seeing it as *optimization based on objective facts*, to instead seeing *the very act of adaptation* as an expression of *rationality*, in every part of C2 processes including assessment.

As we have seen, in the history of C2, assessment developed to become the perhaps most prominent aspect of the cycle, not least through the modern emphasis on high-tech warfare, lending observational powers promising a transparency of the theatre that has never been seen before. However, *information superiority* as a key concept to modern warfare did not render the envisaged advantages. Hence, a central task for developing C2 into a more rational practice of adaptation may lie in the very view of assessment. And assessment should not be deemed to be rational or irrational based on the specific tools of analysis or by its information processing capacities alone, but to what extent this matches the character of the environment and to what extent assessment *supports C2 processes to become more adaptive and agile*, as in the following suggestions as to how to make assessment more rational: through a culture of non-objectivity, pro-active strategies for managing uncertainty and a distributed notion of assessment.

Assessment as a structural process using pre-defined variables or measures can only be regarded as rational in a well-known and structurally stable environment.

A culture of non-objectivity

As Feldman (2004) showed with the example from the National Aeronautics and Space Administration (NASA), a culture of objectivity creates false feelings of security, which in turn leads to unaware risks. Hence, an overly reliance on analysis and conviction that analysis will bring

phenomena under control may lead to an attitude of *overconfidence*, which in turn is a well-documented phenomenon in the research on biases and heuristics. There are few reasons to create settings and cultures that reinforces such shortcomings. Instead, we suggest the encouragement of an attitude of non-objectivity to stimulate attention to detail and potentialities that may or may not materialize. Focusing assessment on such potentialities would accept some degree of speculation which will only partly be referring to evidence of statistical nature. However, if communicated with this degree of uncertainty, the identification of critical potentialities might help focusing attention on potentially critical factors in the environment, without predicting their development or prescribing how they should be treated. The most important aspect would perhaps not be the instructions themselves, but the attitude conveyed by communicating such potentialities. Communicating about uncertainties rather than information and instructions on how they are handled or should be handled may encourage a more active attitude towards uncertainties and over time foster a culture of non-objectivity.

Pro-active strategy for managing uncertainty

The above suggestion on the side of analysis and cognition may also be reflected by its counterpart in terms of action. Accepting that uncertainties will not be dissolved through analysis also means accepting greater amounts of aware uncertainties than previously. However, there are more things to do about this decision situation. In many cases, decisions are taken prematurely as a consequence of notions of strategy as-a-plan, which may be practical for logistical or motivational reasons, but in uncertain contexts may show unnecessary and inefficient. If knowledge and analysis was a way to increase precision in decision making, adaptability of decision making may be a useful substitute in uncertain environments. The trick is to convert static uncertainties into dynamic ones by adjusting the own delay of reaction. In consequence, rather than making passive once-and-for-all decision prematurely, based on uncertain prediction, some decisions may be postponed, divided in smaller decision steps, made revisable, etc. through a combination of prediction and acceptance of the evolutionary character of the environment. However, key to allowing this is to manipulate and shorten the own delay of reaction, which transforms static uncertainty into dynamic uncertainty, which lends room for increased adaptability.

Distributed assessment

An even more challenging thought that might improve the rationality of assessment has its worst enemy in our typically tacit assumptions of organizing and organizations, viewing them as large individuals, where different members of the body have specialized in different tasks, emphasizing the isolation of the intellectual capacities from the practical ones: the head makes the thinking, while hands and feet make the doings. In real life, organizations are made of individuals in different constellations, however every one of them typically having both heads and hands as well as feet. Such a more concrete view opens up for more distributed notions of C2 in general and also assessment more specifically. Indeed, already the shift from sensory data to increased importance of HUMINT means a more distributed assessment, as HUMINT typically provides more meaningful compound statements about the state of affairs, rather than only informing about the colour of a vehicle or the frequency of a sound. Allowing for more distributed assessment at different levels of the organization may be an important source for increased rationality, better reflecting the distributed and uncertain character of environment. Different and partly contradictive analyses will not decrease the general human tendencies of biased information and decision processes. However, not all actors will have the same kind of bias although they might make the same mistakes but with

reference to different contexts, hence leading to a situation where big mistakes can be avoided and instead allowing for the distribution of “good errors” throughout the organization, leading to adaptation and thus increased rationality.

Assessment and C2 agility: stop dreaming!

As illustrated above, assessment may become an important vehicle for C2 Agility. Although, we would agree with Archimedes claim “Give me a place to stand, and I will move the Earth”, there doesn’t seem to be any such fixed place to stand. Consequently, we will not move the Earth. Instead, survival will depend on the own capacity to adjust to movements in the environment. With a modern view on rationality in cognition and decision making, rationality can only be judged in the matching between cognitive capabilities and the structures of the environment. Hence, under conditions of uncertainty and ambiguity, human heuristics may seem more rational than traditionally rationalistic models of decision making as optimization of utility based on objective data. Consequently, making assessment more rational would mean adjusting our views on rationality as much as it means refinement of procedures of assessment and C2. Taken together, the greatest challenges to assessment for C2 agility seem to be pedagogical in nature. Following our suggestions, such a development would necessitate a re-thinking of risk management and the tensions between perceived certainty and actual certainty, as well as between claimed objectivity and actual subjectivity, such as in claims of quantification of risks in environments that only lend themselves to qualitative uncertainty and subjective estimations, i.e., guesses.

To handle modern environments, we need to rethink our relation to certainty and uncertainties both practically, intellectually and perhaps even emotionally. Clinging to quantification, prediction and static planning also in environments where such approaches are illusive will not increase rationality. Nor will traditional notions of organizing assuming organizations to be big individuals, where some members of the organization represent the head and do the thinking for others, and where adaption primarily depends on centralized decision making. As long as we’re still dreaming of a fixed point to stand, we will not move the Earth.

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