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THE EFFECT OF HEURISTICS AND COGNITIVE BIASES IN MILITARY DECISION-MAKING

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The missions of the Romanian military are becoming more and more complex and difficult to execute. Much of the difficulty of these missions is due to the operating environment characterised by the fact that most decisions are taken under stress and uncertainty.

Under these circumstances, modern research has revealed that people may be prone to judgmental errors due to cognitive biases (cognitive errors). For this reason, it is essential for military specialists to understand how these biases work and to identify the methods by which the military can be educated and trained to cope with them.

Keywords: cognitive bias, heuristics, availability, representativeness, anchoring.

Introduction

The decision, and especially how to take it inside an organisation like the military, is of crucial importance to ensure the success in a conflict. The strategic and operational environment is now increasingly characterised by ambiguity and complexity, and professional militaries face a multitude of factors that can affect their decision-making capacity¹. Studies of cognitive psychology and behavioural economy have highlighted that the existence of an increasing amount of information to be analysed, the shorter time available to make a decision and the unusual dynamics with which some actions on the ground may lead to wrong decisions caused by cognitive errors (cognitive bias)².

Substantial resource allocations for purchasing next-generation military technology must be accompanied by investment in human resource training to successfully use this technique. In this respect, we need to better understand how decisions are made at the individual level and how the most important factors intervene and influence this process.

Where can the effects of heuristics and cognitive errors be observed in the military environment?

Human decision-making is a very complex mechanism. At present, there is fierce debate difficult to complete between the researchers of this phenomenon with regard to the fundamental character of the cognitive processes that influence and determine our intuitive judgment³. More importantly, there is a distinct lack of consensus on how best to address and establish the relevant investigation framework for these processes. These debates indicate that the vast majority

¹ Paul K. Davis, Jonathan Kulick and Michael Egner, *Implications of Modern Decision Science for Military Decision-Support Systems*, Rand, Project Air Force, Santa Monica, CA, 2005.

² Amos Tversky and Daniel Kahneman, *Judgment under Uncertainty: Heuristics and Biases*, *Science* 185, nr. 4157 (27 September 1974), pp. 1124-31, <https://doi.org/10.1126/science.185.4157.1124>.

³ Gerd Gigerenzer, "Fast and Frugal Heuristics: The Tools of Bounded Rationality", in *Blackwell Handbook of Judgment and Decision Making*, ed. Derek J. Koehler and Nigel Harvey (Malden, MA, USA: Blackwell Publishing Ltd, 2004), 62-88, <https://doi.org/10.1002/9780470752937.ch4>.



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Most cognitive psychology specialists think that people spend about 95% of time making decisions intuitively. While a comprehensive theory of human decision-making remains to be completed, the data provided by research on heuristics and bias significantly contributes to a better understanding of the wide range of variables that influence decision-making and lead to potential errors in court.

of people's decisions are intuitive. Most cognitive psychology specialists think that people spend about 95% of time making decisions intuitively⁴. While a comprehensive theory of human decision-making remains to be completed, the data provided by research on heuristics and bias significantly contributes to a better understanding of the wide range of variables that influence decision-making and lead to potential errors in court. This is essential for any organization interested in improving the decision-making process of its members. From this perspective, the military does not differ from civil organisations in the desire to optimise decision-making against the background of uncertainty and ambiguity.

A solid knowledge of the factors influencing decision-making can be used by the military to develop tools that improve individual and organisational decision-making and help identify, develop and promote staff capable of making good decisions. This will be particularly important because the operating environment is growing in complexity. In this environment, the effective execution of the mission command will be increasingly difficult and leaders are expected to rely more and more on intuitive decisions. In view of this, it is clear that a better understanding of heuristics and cognitive errors involved in decision-making has important implications for the future armed forces. For example, implementing the results of studies on heuristics and cognitive biases across the armed forces could help modify or adapt the working conditions and job posting requirements to take into account the cognitive processes involved in meeting them. Also, a more solid and widespread understanding of heuristics and cognitive biases could be used to better assess military and commanders to find better match between tasks and individual characteristics. In each of these cases, institutional and individual decision-making can be improved by an appropriate assessment of the heuristics and errors involved in these processes.

The act of command remains the main element that can validate or that can capitalise on any of the new approaches to decision-making. Masters have to combine the two types of intuitive and analytical approaches to make "timely and effective decisions". By appointing

⁴ Pat Croskerry, Geeta Singhal, and Silvia Mamede, "Cognitive Debiasing 1: Origins of Bias and Theory of Debiasing", *BMJ Quality & Safety* 22, nr. Suppl 2 (October 2013), pp. 58-64, <https://doi.org/10.1136/bmjqs-2012-001712>.

commanders, military leaders at all levels are empowered to make quick decisions, and often they are unable to perform detailed analyses or to seek top-level approval. Commanders and chief officers will, if they have not done so before, voluntarily try new approaches and experiment on the ground with new ways of responding to surprises, must critically examine heuristic decision-making and understand how this could lead to subjective and often wrong solutions. The institutional nature of the *Military Decision-Making Process (MDMP)*, organisational culture, and the individual mental processes involved in the way we make decisions lead to the use of these heuristics, and these, in turn, generate many errors (bias).

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Militaries consider *MDMP* as the standard approach to problem solving and decision-making. Complying with this template is refreshing for many of the military, primarily because they are familiar with it. However, what can be done when the enemy does not fight in accord to our assumptions? Recent missions in T.O. Iraq or Afghanistan, where Romanian troops still fight, have shown us that the enemy in the field has not acted and does not act as we wish! This has prompted us to change our initial ideas on how to lead military operations and, above all, how to make decisions.

A practical solution, identified by US military, is shortening the classic decision-making process, *MDMP*. They consider *MDMPs* to be inappropriate for issues of high volatility, uncertainty, complexity and ambiguity. The identified solution is called “*Design*”, and looks encouraging, according to Blair S. Williams in the September-October 2010 issue of the *Military Review*⁵.

Design is neither a process nor a checklist. It is a critical and creative thinking methodology that helps commanders understand the environment, analyse problems, and consider potential approaches

⁵ Blair S. Williams, “*Heuristics and Biases in Military Decision Making*”, in *Military Review*, October 2010, 14.



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Design is neither a process nor a checklist. It is a critical and creative thinking methodology that helps commanders understand the environment, analyse problems, and consider potential approaches so they can exploit opportunities, identify vulnerabilities, and anticipate changes during a campaign.

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As outlined in the new version of *FM 5-0, The Operations Process*, Chapter 3, instead of a universal process of problem-solving (*MDMP*), the *Design* approach considers that military leaders need to first assess the situation and accept that any solution chosen will be unique. Successful implementation of *Design* pursues four concrete objectives that, once achieved, provide the rationale and logic that will guide detailed planning processes. Each objective is an essential component that changes the conditions of the operational environment contributing to the desired final state. These goals need to be taken together to overcome the complexities that characterise the present conflicts, characterized by the prolonged confrontation between states, non-states, and individual actors who are increasingly willing to use violence to achieve their political and ideological goals. The design objectives are: *understanding of insufficiently structured issues; anticipating change; creating opportunities; recognising and managing transitions.*

With *Design*, the most important task is to frame the problem and then redefine it when conditions change. Framing involves on-site improvisations and experiments, especially when militaries are confronted with time and space constraints in the operating environment.

The decision-making and correction methods can be found along a continuum from analytic to intuitive. In intuitive decision making, we use mental heuristics to quickly reduce the complexity of the environment in which we operate. The use of these heuristics exposes us to cognitive errors (cognitive bias) and it is important to know them in order to reduce their negative effects.

Heuristic cognitive bias

Nobel Laureate Daniel Kahneman and Professor Amos Tversky were the first to thoroughly analyse the effects of heuristics and cognitive errors in making decisions. Unhappy with the discrepancies of the classical economy in explaining the human decision process, Kahneman

⁶ Department of the Army, "*FM 5-0 The Operations Process*", 26 March 2010, <https://fas.org/irp/doddir/army/fm5-0.pdf>.

and Tversky have developed the initial principles of a discipline now known as *behavioural economics*. Unlike the pre-existing classical models (such as the expected utility theory) describing human behaviour through rational maximization of cost-benefit decisions, Kahneman and Tversky provided a simple framework for analysing human behaviour observed on the basis of uncertainty choices, risk and ambiguity⁷. They have suggested that when faced with numerous sensory inputs, human beings reduce complexity by using heuristics. During these mental processes of simplifying an overwhelming amount of information, *cognitive errors (cognitive bias)* usually arise from unconscious errors generated by our methods of mental simplicity. It is important to note that the use of heuristics does not generate each time an error, but under these conditions we are simply more prone to make mistakes. “These errors also do not have a cultural or ideological conditioning, these being semi-conscious processes, and the phenomena identified by Kahneman and Tversky have resisted numerous experimental tests but above all resist the reality. They are considered robust, consistent and predictable.

In psychology, *heuristics* is a concept that refers to intuitive and rapid mental operations in certain personal or social contexts, decision making, probability estimation and value prediction. The most common and used heuristics are: availability; representativeness; anchoring.

A. Availability

When confronted with new situations, people naturally compare them to similar situations stored in memory. These comparison processes happen automatically “*in mind*”. These past situations are available for use and, most of the time, they are appropriate to make sense of new situations encountered in everyday life. However, the comparisons that are made are rarely produced by an intense deliberation process, especially when acting in an environment under pressure of time. These available memories have been predetermined unconscious by the circumstances we have experienced in our past. These past memories, which appear to us as similar circumstances, affect our judgment when assessing the risk and/or probability of future events. Finally, four cognitive errors can result from the use of heuristics of availability: *retrievability bias, search set bias, imaginability bias, and illusory correlation bias.*

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⁷ Amos Tversky and Daniel Kahneman, *op. cit.*



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A soldier will assess the risk of being injured or killed in combat on the basis of the occurrence of this event among his comrades. The availability of these past events with frequent occurrences helps us quickly judge the subjective probability of future events.

Particular attention must be paid to *retrievability bias*, this occurs when the frequency of similar events in our past strengthens preconceptions about comparable situations that occur in the future. For example, a soldier will assess the risk of being injured or killed in combat on the basis of the occurrence of this event among his comrades. The availability of these past events with frequent occurrences helps us quickly judge the subjective probability of future events. For example, the probability of subjective assessment of future attacks by using improvised explosive devices (IED) will most likely be higher for a military assisting in such attacks than for a soldier who has just read about it during preparation for the mission. The distortion in assessing the occurrence of such events takes place because the real probability of the occurrence of future attacks is independent of the personal experience of each military in such situations⁸.

Similarly, sustained attention to an event or a series of past events can also increase the availability of these events. Always, military pilots, after an airplane event, for example, stopping an engine in flight, will appreciate the greater the risks of this event occurring in the future. The actual probability of a future fly-off is not higher than it was before this event, but organizational efforts to avoid this incident will increase due to the subjective impression that the probability of stopping an engine in flight is higher. Individuals exposed to the outcome of a probability event give a higher post-eventual probability than those not exposed to this event. This is called *retrospective (hindsight bias)*.

When we combine the retrospective matching error and the recall error, we are unable to protect ourselves from the occurrence of a popular euphemistic event as a black swan. Nassim Taleb describes the black swans as historical events that surprised humanity because they were considered as nonexistent or extremely rare. We all suppose that all the swans are white; this information is in our working memory⁹. For example, looking back on the terrorist attacks of September 11, 2001, they could now be fully imagined only that at that time there were numerous intelligence agencies in the US government who were publicly responsible for something that was not even plausible that it can be produced. In addition, memories of some past disasters bring

⁸ Blair S. Williams, *op. cit.*

⁹ Nassim Nicholas Taleb, *The Black Swan: The Impact of the Highly Improbable*, Random House, 2007.

us an upper limit to the perceived risk today. Many of the preventive security measures to be taken by each state are now based on the cessation of another type of attack 09/11, when in fact the next attempt may take a completely different form that cannot be imagined at present. (Because our searches in the memory of previous experiences are limited).

Given the possibility of occurrence of black swan events, we should constantly ask ourselves whether we have memories available when we are confronted with new situations. And if so, do these memories help us or not? Do our decisions become more or less risky? Can our opponents exploit this phenomenon?

B. Representativeness heuristic

Representativeness is a heuristic that people use to assess the likelihood that an event, person or object falls into a larger category of events, people or things. To quickly classify a new situation, we will examine it according to the characteristics of the category of events with the most occurrences, if we find that it is in line with the features of the broader category, we place it mentally in this class of events, or category of persons or objects¹⁰. This heuristic is a normal part of ordinary mental processing, but it is also prone to errors. Representativeness leads to five potential cognitive errors: *insensitivity to prior probability of outcomes, base-rate neglect, insensitivity to sample size, misconception of chance, and the failure to identify regression to mean.*

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Misconception of chance, one of the cognitive errors generated by heuristics of representativeness, occurs because many people understand wrong items of chance. For example, suppose you watch the roulette game in a casino. The following three red and black sequences could appear: RNRNRN or RRRNNN or RNNNNN. Which sequence is more likely? The answer is that all of these sequences are equally probable; however, if you were like most people in similar experiences, then you most likely chose RNRNRN¹¹. This sequence is the most popular because people expect the fundamental features of the equilibrium sequence (50% black and 50% red) to be equally present

¹⁰ Amos Tversky and Daniel Kahneman, *op. cit*

¹¹ Daniel Kahneman and Amos Tversky, „*Prospect Theory: An Analysis of Decision Under Risk*”, in *Handbook of the Fundamentals of Financial Decision Making*, Volume 4, World Scientific Handbook in Financial Economics Series, Volume 4, World Scientific, 2012, pp. 99-127.



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– if we did a simple mathematical calculation, we would get for each variant a probability of 1.56% ($0.5*0.5*0.5*0.5*0.5*0.5= 0.015625$). If the sequence was NNNNNN, then you will probably hear people saying that “Red is definitely coming” – this is the error of the players. Many people expect the equilibrium pattern to return after a long black period; however, random laws have not changed. Probability of the appearance of the red ball is equal to the probability of the black ball. The result is that we unconsciously judge future events based on the representation of the sequence, not on its likelihood.

Next, if we should consider the following issue:

Which scenario is more likely: 1) “North Korea will test a nuclear weapon in 2019” or 2) “North Korea will have internal troubles and test a nuclear weapon in 2019?”

Probably many would choose the second scenario as the best answer, but they will be wrong. The reason is that the more specific the description, the less likely the event is. The two events occurring in the same year are less likely than a single event; however, many people tend to judge an event as more likely because it is described by more specific information. This human tendency has potential implications for military decision-making, as knowledge of the situation improves with the help of technology. Adding new details in a situation can make the scenario seem more plausible, yet the mere discovery of additional information does not change the likelihood that the situation actually occurs¹².

Another cognitive error generated by representativeness heuristics is *insufficient identification of regression to mean and the root cause of its occurrence is because people mistakenly attribute the cause and effect of a phenomenon because they do not know or do not recognise the effects of normal statistical distribution*. It says that: the maximum performance is usually followed by results below the maximum performance (i.e. tending to average) and the minimum performance is followed by better performance than the minimum performance (i.e. they tend to average).

From the flight training pilots’ discussions with experienced flight instructors, they noted that an exceptionally smooth landing, which is smoothly executed, is usually followed by a poor landing, and after a hard landing, heavily criticised, landing is much improved.

¹² Blair S. Williams, *op. cit.*

The instructors have concluded that verbal rewards are detrimental to learning, while verbal punishments are beneficial, contrary to what the psychological theory of learning supports¹³. Awareness of the regression to the mean is similar to the understanding of the learning curve where we have the so-called plateau where the progress of the pupil decreases after a period of growth.

In other words, we often fail to correctly identify the conditions that lead us to the regression to the mean, because we expect, intuitively, that future scores are representative of previous scores. Moreover, we attribute causal explanations to obtained achievements that are actually irrelevant to the activity itself.

C. Anchoring

When faced with a new problem, most people make an initial assessment. As time passes, they correct this initial assessment, but often this adjustment is usually inadequate and does not match the final situation.

The British in the Second World War exploited the human mental errors that could be made by their enemies. They exploited the cognitive errors vis-a-vis the German anchors, preparing and implementing a deception plan called the *Cyprus Defense Plan*¹⁴. Following the capture of the Crete Island by the Germans, the British were worried that the approx. 4,000 Cypriot soldiers were insufficient to reject a German attack. By creating a fake division headquarters, barracks and specific buildings along with a whole system of false messages and telegrams, the British tried to convince the Germans that they are actually on the island 20,000 soldiers. A fake defence plan, with maps, charts, and orders, was passed through double agents in a lost briefcase, directly into the hands of the Germans. The Germans and the Italians fell into this net. This deception anchored the Germans in the belief that there are over 20,000 soldiers on the island for the next three years of war. Despite their own analysis that the number could be too high, the interceptions of information and post-war documents revealed that the Germans thought without doubt that the number was the real one. This exhibits another negative effect of anchoring: excessive confidence intervals. The Germans were more confident in their basic

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¹³ Amos Tversky and Daniel Kahneman, *op. cit.*

¹⁴ Chris Chant, "A Successful British Deception of WWII – The «Cyprus Defence Plan»", Chris Chant's Blog, 4 July 2016, <http://www.cmchant.com/british-cyprus-defence-plan-wwii>.



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assessment than in subsequent assessments of the contradictory information they had obtained. In short, the Germans were anchored at an incorrect initial value and made insufficient adjustments in the coming period.

Exceeding this anchoring phenomenon is difficult. Even when the subjects in a test task are informed of the existence of this error, research has shown that anchoring persists. As for the highly volatile, uncertain, complex and ambiguous environments in which military professionals work, they need to improvise and experiment with a variety of new methods in order to have the desired success. In order to avoid anchoring, it may be necessary for the problems that have arisen to be reincorporated again, however, this could be a difficult solution in an environment under the pressure of time.

The approaches initiated by the Romanian Armed Forces specialised structures to prevent or mitigate the effects these cognitive errors cause during military actions

In the Romanian Armed Forces, the measures to prevent or mitigate the effects that cognitive errors may cause during the decision-making process are developed by the *Center for Social and Behavioural Investigations* and put into practice together with psychologists specialising in the military units subordinated to the Defence Staff.

The intervention of military specialists takes place on two levels, one of drawing up manuals, brochures, guides dealing with such subjects and another plan, that of specialized interventions, where the psychologists of the unit carry out concrete actions to train the military participating in missions in theatres of operations outside the national territory or complex international exercises.

On the first level of the specialised work, the Centre for Social and Behavioural Investigations has developed, during the 4 years since its establishment, a number of 5 specialised papers that are used by military psychologists during the preparation for the fight. These are:

- *Manual for psychological training and operational stress control* – this manual is meant for all military personnel, but especially to group, platoon and company commanders, participating in missions in theatres of operations, as well as structures set up to support the families of these militaries. The information contained in the manual and their practical

relevance for high-risk missions are strengths of military training and, implicitly, for the maintenance of mental health of the military, for organisational health and for improving professional performance¹⁵.

- *Developing intercultural competencies: a guide for Romanian soldiers participating in missions outside the territory of the Romanian State* – this guide provides both military officers participating in missions outside the territory of the Romanian State and those involved in training them for mission important milestones for acquiring skills a cultural invoice to facilitate contact and good cooperation with all actors involved in this type of mission¹⁶.
- *Knowledge and support of subordinates in the context of high-risk assignments. Practical Guide for Commanders* – this paper provides, in a systematised and intelligible manner, information, recommendations and exercises specifically designed for the commanders to better understand their subordinates, how they might react in demanding contexts which involves a high-risk mission and the most appropriate ways in which they can act to reduce these effects¹⁷.
- *Crisis intervention and psychological first aid: operational guide* – this guide provides psychologists in the military system as well as other people interested in providing psychological support to those affected by traumatic events, the main theoretical milestones behind this kind of psychological intervention as well and concrete patterns to achieve it, accompanied by examples of documents that can be used (worksheets, leaflets) in these interventions¹⁸.

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¹⁵ Vasile Marineanu (coord.) et al, *Manual pentru pregătirea psihologică și controlul stresului operațional*, Editura Centrului Tehnic-Editorial al Armatei, București, 2015.

¹⁶ Cristian Popescu et al, *Dezvoltarea competențelor interculturale: ghid pentru militarii români participanți la misiuni în afara teritoriului statului român*, Editura Centrului Tehnic-Editorial al Armatei, 2015.

¹⁷ Vasile Marineanu (coord.), Elena Pîrlitescu, Ilona Voicu, *Cunoașterea și sprijinul subordonaților, în contextul misiunilor cu grad ridicat de risc. Ghid practic pentru comandanți*, Editura Centrului Tehnic-Editorial al Armatei, 2014.

¹⁸ Ilona Voicu, Vasile Marineanu, *Intervenția în criză și primul ajutor psihologic: ghid operațional*, Centrul Tehnic-Editorial al Armatei, București, 2016.



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learned) and career (Strategic Leadership in Defence Information), but also in Information Systems and master's degree courses (Project Management). Students also use concepts of heuristics and biases in military applications conducted within the military leadership discipline. They are based on the excellent book written by Marinel-Adi Mustață, PhD and Cristina Bogzeanu, PhD, *The Heuristic and Bias Program. Applications and Implications in the Military Field*, published at the "Carol I" National Defence University Publishing House in 2017¹⁹.

Far from being enough, these papers address some aspects of the importance of making a good decision for the present and future success of military action and have the merit of bringing attention to the need for expertise in this area.

Conclusions

The volatility, uncertainty, complexity and ambiguity of the military operating environment require military professionals to make quick decisions in situations where standard military decision-making procedures are either too specialised or inefficient. The speed with which the operational decisions are made may make it impossible to develop an elaborate approach, such as *MDMP* or *Design*. Consequently, commanders, sometimes the entire military personnel, can find themselves in the situation where they will make decisions predominantly intuitively.

In this article, we presented the most used heuristics that people use to make intuitive decisions and we analysed some of the cognitive errors generated by their use that can lead to mistaken decisions. When subjective evaluations, ego and emotion are interconnected with cognitive processes, intuitive decision making is full of dangers. We have to constantly strive to avoid these cognitive conflicts and to propose to compensate them when they occur.

Militants could improve decision-making by incorporating the results of applied psychology research. These results can be found not only in the area of research, education and instruction, but also in the operational area by accepting procedural and organizational changes.

¹⁹ Marinel-Adi Mustață, Cristina Bogzeanu, *Programul euristicilor și biasurilor: aplicații și implicații în domeniul militar*, Editura Universității Naționale de Apărare "Carol I", 2017.

By doing so, the soldiers will be able to avoid some mistakes in the future and thus increase their ability to successfully carry out the combat missions they have received.

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