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USAGE OF ANTI-SATELLITE WEAPONS: THE PSYCHOLOGICAL ASPECTS

INTRODUCTION

This study is based on repeated observation. Occasionally in written texts, but more often in informal conversations, an opinion emerges that goes beyond mere optimism. This opinion asserts that the use of kinetic ASAT weapons by any state is highly unlikely or will never occur.

The dismissal of the possibility of kinetic ASAT use typically relies on one of two rationales at its core. The first centres on the resulting debris field from deploying such a weapon. As a cautionary example, proponents often cite the 2007 Chinese ASAT test, which created thousands of debris pieces, many of which remain in orbit due to the relatively high altitude of the defunct target satellite. This warning is frequently linked to the Kessler Syndrome. This forecasts a chain reaction in which debris collides with satellites, causing them to break apart into thousands of additional debris pieces. These, in turn, strike more satellites, continuing the cascade until assets in certain orbits are destroyed and humanity is effectively confined to Earth, making access to space impossible. The resulting catastrophe, losing valuable space assets integrated into critical infrastructure and the confinement of humanity to Earth is considered such a high cost that these stakeholders often compare large-scale kinetic ASAT use to nuclear war. They argue that it will not be used, just as nuclear weapons have not been used, because the cost would be too great. The chain reaction described by the Kessler Syndrome is a real possibility; the number of debris pieces is increasing, and experts urge stakeholders to address the problem.

The other argument against kinetic ASAT use concerns its utility. Stakeholders may argue that these weapons are obsolete because they

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can destroy only a single satellite in the era of constellations, and even if hundreds of such missiles were launched, they could not seriously damage constellation-based capabilities. In this line of reasoning, space debris is not the primary concern but rather an additional cost associated with using an outdated weapon.

In this paper, we will examine whether these claims and their underlying reasoning are valid. We will also discuss the psychological factors that may influence such evaluations, our current understanding of decision-making in high-stress situations, and how these factors apply to decisions about using ASAT weapons. Without careful evaluation, the risk of severe mistakes increases, and the likelihood of avoiding conflict diminishes with each error.

EARLY THEORIES ABOUT DECISION-MAKING

What is decision-making? According to the American Psychological Association (APA) dictionary, it is the cognitive process of choosing between two or more alternatives, ranging from relatively clear-cut choices, such as ordering a meal at a restaurant, to very complex ones.[1] Multiple theories and models attempt to explain how humans make decisions, especially under pressure, and how decision-making can be improved. This is one of the most significant questions not only in performance psychology, but also in military studies, political science, and for professionals seeking to educate others in these areas.[2] All the theories until today, and the research done to prove or disprove them, contributed to our body of knowledge and highlighted an important component of decision-making.

1 American Psychological Association 2018.

2 Needless to say, an individual or a group can also make a decision, but a group decision can still be broken down into multiple individual choices. In this paper we will use the term leadership to refer to decision-making groups, but also to individuals with sole authority or a disproportional weight in decision-making.

The rational approach

In the early stages of research, theories about decision-making emphasised the rational element. One of the earliest and most influential theories is expected utility theory (EUT), which has its roots in the work of Daniel Bernoulli, an 18th-century Swiss mathematician. John von Neumann and Oskar Morgenstern expanded on his ideas, and their 1944 book helped spread the concept into business and politics. EUT is still used for investment decisions, location decisions and risk management. Their key idea was that utility (value and satisfaction) dominates every decision, and this can be quantified to model behaviour.[3]

The mathematical framework of EUT was used to formulate rational choice theory (RCT) by William Riker, which was favoured for a period in economics and political science. This approach used economics and game theory to develop mathematical models of politics and essentially assumes that people behave as if they are calculating utilities, even if they do not do so explicitly. The theory postulates that the decision-maker is primarily a logical, rational actor in a situation and tries to achieve the best outcome. To do this, they weigh all options, estimate the outcomes of different courses of action, assign values to these outcomes, and choose the best conceivable option. However, rational choice theory also emphasised that all decisions occur within an institutional framework, and the structure of these institutions presents the opportunities available to politicians.[4]

EUT introduced the element of probability and claimed that a decision is made based on the different possible outcomes and the likelihood of each outcome. RCT also uses probability but emphasises the consistency and logic of choices, and it has a broader sociological and political framework.

When examining how EUT and RCT were applied, it becomes clear that both theories were used in multiple ways. First, they were regarded as descriptive, attempting to explain how people make decisions. Experts also tried to use them as predictive tools to forecast the future. Problems with these predictions became apparent, especially in the case of expected utility

3 Von Neumann – Morgenstern 1944.

4 Riker 1962.

theory.[5] Despite these inaccuracies, EUT and RCT were sometimes applied as normative guidelines for how people should make decisions.[6] The mismatch between what is and what should be, according to an individual, can often lead to errors in the evaluation of phenomena and in reasoning.

Searching for alternatives to rationality

Another significant theory comes from John W. Atkinson. While related to rational theories, his focus shifts away from expected gain. His achievement motivation theory (AMT) identifies three components: motive, expectancy and incentive. Motive is the individual's desire or need that drives them toward a given action or decision. Expectancy refers to the belief in the likelihood of achieving the desired outcome. Finally, incentive consists of the perceived value of the outcome.[7] In this theory, motivation is more important than incentive (i.e. utility). Hope of success prevails over fear of failure, and sometimes a personal challenge is more important than maximising reward. This theory has been debated and revised multiple times over the years, but motivation remains a key component in current models as well.

Herbert Simon's research into decision-making is also important to consider when examining high-stress situations and the process of choosing options. Compared to the prevailing mathematical frameworks of his time, he focused on real-life observations. To support his bounded rationality theory (BRT), he showed that people are not perfectly rational agents as portrayed in economics. Due to limited cognitive resources, time and information, people do not always choose the best possible option and cannot always follow a slow, analytical, rational path. Instead, they aim for a minimum acceptable level. This is applicable to tense political situations as well, where politicians might opt for solutions that avert immediate disaster rather than seeking the perfect strategic step. Simon used the term 'satisficing',

5 Kahneman–Tversky 1982.
6 Briggs 2023.
7 Atkinson 1957.

created from the combination of satisfy and suffice. Bounded rationality is not necessarily irrational; it can also mean that decisions are made faster and can be more effective than becoming paralysed by analysis.[8] This already indicates that an analysis and the resulting conclusion made under normal, calm circumstances will be very different from a decision made under high-pressure circumstances. So even if a purely rational approach is possible when confronted with kinetic ASAT usage, the mental process in the actual situation will not be the same.

What utility or perceived benefit means during a space conflict highly depends on the conviction and motivation of the leadership. This can be illustrated by the question: "What is best for my country?" We can understand how vastly different the answers from leadership can be to this inquiry.

BEYOND RATIONALITY – OTHER FACTORS IN DECISION-MAKING

Atkinson and Simon have already shown that the strictly rational, logical model of humans is inaccurate. The various theories developed in recent decades may differ in details, but all agree that decision-making is not a strictly rational process. Logic, normative and rational models, acquired knowledge, and experience are very important, but they can be heavily influenced by emotions, heuristics (mental shortcuts that reduce decision-making time and save cognitive effort), and resulting cognitive biases.

Emotions

The role of emotions in decision-making is often downplayed or dismissed when strategic choices are on the table. The use of data, computing power, rational and scientific methods, and a calculating approach seemingly

8 Simon 1955.

ensures that emotions do not play a significant role in such decisions. This reflects the belief that rational decision-making is possible.

The first experiment to seriously challenge this assumption led to the somatic marker hypothesis. This hypothesis was formulated after Damasio and colleagues studied patients with damage to the ventromedial prefrontal cortex (VMPFC), a brain region involved in processing emotions and linking them to thoughts and memories. These patients retained all their intellectual abilities, yet struggled with even simple everyday choices, spending hours analysing pros and cons for decisions as trivial as choosing a restaurant. Damasio concluded that emotions, or emotion-based somatic markers, are necessary for decision-making; without them, paralysis can occur. He later expanded on this idea in his book, also criticising Descartes's mechanistic approach.[9]

Logical analysis can generate a list of options and deepen understanding of the situation by presenting arguments and outlining possible future scenarios, but the emotional state, previous experiences, and memories of the leadership will influence the final decision. The weight assigned to certain arguments and the selection of a specific course of action are only partly rational.[10] For example, when faced with a potentially catastrophic outcome, fear can lead to 'worst-case thinking', where even low-probability catastrophic events are treated as certainties, prompting disproportionate pre-emptive action. Applied to our topic, this could mean that kinetic ASAT usage might be justified to avoid an even greater perceived threat.

Biases

The theories may differ in detail, but they all agree that decision-making is not a strictly rational process. Logic, normative and rational models, acquired knowledge, and experience play a role, but decisions can be heavily influenced by emotions, heuristics (mental shortcuts that decrease decision-making time and save cognitive effort), and the resulting cognitive biases.

9 Damasio 1994.
10 Newell–Shanks 2023.

A bias is essentially a heuristic gone wrong that becomes a fault in reasoning, leading to erroneous conclusions and potentially negatively affecting decisions. There are many biases, and although an exact number has not been identified, it appears there are over 100 different ways to make mistakes in reasoning. Nadurak offers a conceptual analysis and provides a broad definition of heuristics as simple methods of judgment, decision-making and problem-solving that, using little information and cognitive resources, generally enable the achievement of the intended goal. He defines cognitive biases as systematic, non-conscious errors in cognition that occur when we base our reasoning on irrelevant or partially relevant information and ignore what is relevant.[11]

In this paper, we mention only a few well-known biases to make the reader aware of their influence. Confirmation bias is one type that affects decision-makers. They may unconsciously seek out information that confirms their pre-existing beliefs about an adversary and ignore even meticulously prepared information that contradicts those beliefs. For example, they might interpret defensive measures by an adversary as offensive preparations. Examples include Soviet behaviour before Operation Barbarossa, U.S. assessments before the Chinese attack in the Korean War, and Israeli leadership before the 1973 Yom Kippur War, all of which show such biases in effect. There were many reports, estimates and information about what was going to happen, but these were disregarded, blocked, or explained away, and sometimes even whistleblowers were punished.[12]

Normalcy bias describes our tendency to underestimate the possibility of a major adverse event because it has never happened before.[13] This should not be confused with optimism bias, which refers to the tendency to overestimate the likelihood of positive events and underestimate the likelihood of negative events. The opposite of normalcy bias would be overreaction or worst-case scenario thinking, which can interpret every unusual or even insignificant change as a sure sign of a major negative event. Research has also established that even when presented with contradicting

11 Nadurak 2025.

12 Wirtz 2024.

13 The Decision Lab 2023.

information, humans actively sample evidence to support prior beliefs.[14] All of these can result in a decision to use kinetic ASAT weapons or can lead to shock, low resilience, and hasty reactions in the event of such an attack.

It is worth noting that it is well-known throughout history that no single person is infallible or omnipotent. This is why leadership, regardless of the power structure or concentration of power, always includes multiple people as advisors or in supporting or executive roles. The main idea is that they can compensate for each other's weaknesses and reach the best possible conclusion. For such a system to function, many requisites must be met, such as trust among participants, competency, and the absence of internal power struggles. Groups are also affected by different biases, such as favouritism (in-group bias), the homogeneity effect (viewing outsiders as inferior), conformity bias (groupthink and the tendency to agree with the majority), and false consensus bias (overestimating how many agree within the group). As we see, the group as a structural unit does not solve the problem; from a certain perspective, it can even complicate things.

Daniel Kahneman and Amos Tversky researched biases and, as a result, formulated Prospect Theory (PT). They established that people tend to focus on loss aversion, feeling more strongly about losing something than about gaining the same thing. This also leads to higher risk-taking behaviour when someone wants to avoid or make up for losses. They discovered that outcomes are not judged in absolute terms but are always compared to a reference point, usually the status quo. This also loosely connects to anchoring bias. The reference point plays a significant role in sensitivity to losses and gains; the further we are from the reference point, the more sensitivity diminishes. Leadership may also be prone to overweighting small probabilities and underweighting high probabilities.[15] This is why people play the lottery or have insurance against fire.

Another important result from Kahneman and Tversky is the framing effect. A crucial guideline for any analyst or intelligence officer is how information, choices and expected outcomes are presented. In the Asian disease experiment, participants were told that the disease was expected to

14 Kaanders et al. 2022.

15 Kahneman–Tversky 1979.

kill 600 people, and there were two programs to counter the threat. Program A would save 200 people, while Program B had a 33% chance of saving all 600 and a 66% chance that everyone would die. Risk aversion dominated the responses, with 78% choosing option A to guarantee saving 200 people. The second group received two options as well: Program C would result in 400 deaths, and Program D was identical to Program B. The results were the reverse; the certain death of 400 people was less preferred than a 66% chance that all 600 would die. To avoid a certain loss, participants were willing to take a risk. Mathematically, Programs A and C produce the same result, so the key difference was the framing of the expected outcomes.[16]

Experts agree that how information is gathered, analysed, presented, and received by key stakeholders and leadership is complex and affected by these biases and effects. Because of the complexity of the system and the persistent nature of these elements, experts know the process cannot function without mistakes, but there are ways to mitigate their effects.[17]

Biases and the framing effect also apply to the problem of ASAT usage. For example, the difference between losing 10 and 20 satellites feels larger than losing 1,010 or 1,020 units. Similarly, launching 10 versus 20 kinetic ASAT missiles feels more significant than launching 210 versus 220. If leadership is unaware of these effects, they can make mistakes, or if they are aware, they may actively use them to apply pressure on the adversary.

THE QUESTION OF DUALITY

Atkinson and Simon already demonstrated that the strictly rational, logical model of humans is inaccurate. This idea was shared by researchers who proposed a dual approach. The notion that cognition and decision-making can be divided into two separate modes or systems is not new. Plato distinguished between reason and appetite; Aristotle theorised about rational and irrational parts of the soul; William James, a key figure in modern psychology, considered associative and proper reasoning; while Freud

16 Tversky–Kahneman 1981.

17 Wirtz 2024.

described the conscious and unconscious parts of the mind. Kahneman's Dual Process Theory is a well-known example of such systems.[18]

System 1 and System 2 – Fast and Slow

Kahneman identified two distinct systems for cognition and decision-making: System 1 and System 2 thinking. The first system is fast, automatic, heavily influenced by emotions and the subconscious. It relies on heuristics (mental shortcuts). System 2, on the other hand, is slow, effortful, logical and conscious. It is used to evaluate complex problems, perform calculations and check the impulses of System 1. In Kahneman's theory, System 2 is regarded as a domain-general processing mechanism, not focused on a specific task but capable of handling a wide variety of challenges.[19]

The theory has been widely debated, with evolutionary and cognitive psychologists emphasising different aspects and discussing the primacy of one system over the other. Currently, most cognitive psychologists agree that there are two mental processes and that these systems compete for dominance. System 1 predates System 2 on the evolutionary timeline, and a significant portion of evolutionary psychologists reject the two-minds theory, accepting only the modularity of mind hypothesis. This hypothesis suggests the existence of a network of specialised subsystems (essentially tools) rather than two broad, general systems (two operating modes). Yet, the same information is available to multiple subsystems, and humans must cope with various situations that were not present in evolutionary environments. Therefore, a meta-system must exist to regulate different mechanisms. There seems to be a growing consensus for the existence of System 2, but the exact relationship and mechanism by which System 1 and System 2 interact still require further investigation.[20]

How System 2, the rational, planning system, can give way to System 1 is an important question regarding human decision-making. System 2

[18] Zielonka et al. 2024.

[19] Kahneman 2011.

[20] Da Silva 2023.

requires significant cognitive resources, so whenever possible, it defaults to System 1. Under pressure or when fatigued, System 2 can be hindered, and ego depletion may occur. This means that more complex and demanding tasks might be oversimplified and delegated to System 1.

Similarly, under time pressure, System 2 does not have time to analyse, so it reverts to System 1 to provide a 'good enough' answer. If a task is performed often enough, it becomes routine and shifts from the energy- and attention-demanding System 2 mode to System 1. This underlies habits or automatic behaviour. A common example is driving: when learning, it requires concentration and conscious effort, but it can become a routine task over time. Decision-making is also delegated in low-stakes situations. Overconfidence in the initial intuition, the first answer suggested by System 1, might also inhibit System 2 analysis.

Critiques of duality

In recent years, researchers have suggested that the sharp distinction between System 1 and System 2 may be too rigid and arbitrary, and that both systems participate in decision-making. Therefore, a hybrid approach may be more reasonable. Hybrid models propose that people's intuitive reasoning performance is determined by the absolute and relative strength of competing intuitions.[21] Others have argued that the entire concept is flawed, that supporting evidence is merely confirmation bias, and that dual-process theories are unfalsifiable.[22]

However, regardless of opinions about dual-process systems, the surrounding debate has clearly established that emotions, automation and subconscious influences are crucial factors in cognitive processes. Emotions are no longer considered the opposite of rational thought but are recognised as vital components of both intuitive and deliberate processing, and thus as major factors influencing decision-making. Cognitive automation, when established through practice, can be an effective tool for reducing cognitive

21 Bago – de Neys 2020.

22 Grawitch 2024.

load, though it carries the risk of shortcuts when analysis is required. In addition, subconscious influences shape perceptions and decisions without conscious awareness.[23]

Gary Klein criticised approaches such as Kahneman's and claimed that experts have a different mode of decision-making. Klein's Recognition-Primed Decision (RPD) model argues that experts (such as military commanders, firefighters, etc.) do not compare options; instead, they recognise patterns based on previous experience, mentally simulate a single course of action, and adjust it as needed, without engaging in time-consuming analysis and comparisons.[24] A counterargument is that this working mode is essentially a System 1 process, since, according to Kahneman's theory, pattern recognition is a strength of System 1. The Somatic Marker Hypothesis (SMH) adds to this perspective, and experiments indicate that when choices must be made based on previous experience, a physiological reaction (often called a 'gut feeling') can help distinguish between positive and negative options.[25]

HIGH-PRESSURE ENVIRONMENTS

As we have seen, the interconnectedness and relationships among different systems further complicate the process, and this complexity exists even under normal circumstances. However, high-pressure environments have additional effects on leadership.

Stress

The effects of extreme stress can be significant and can seriously alter decision-making. Stress has well-established and well-researched influences on multiple organs and systems in the body. The muscles, respiratory system,

[23] Zielonka et al. 2024.

[24] Klein 2017.

[25] Wright–Rakow 2023.

cardiovascular system, endocrine system and gastrointestinal system are all affected. Hormones such as adrenaline, noradrenaline and cortisol prepare the body to counter the cause of stress, but the long-term effects of stress can cause significant damage and decrease cognitive capabilities.[26] It has been known for more than a decade that sustained stress exposure in both humans and animals keeps the brain in a more primitive, reactive state. Existing cognitive disorders can worsen, and the brain can shift from a reflective, logical mode to reflexive control behaviour.[27] Stress can even affect the dopamine system, which plays a key role in stress coping mechanisms, selection and mood regulation.[28]

Sleep deprivation

In high-stakes situations, decision-makers often experience disturbed or shortened sleep. This can be caused by stress and can create a cycle in which lack of sleep makes recovery and mitigation of stress slower or impossible. Sleep deprivation (extended wakefulness for at least one night) or sleep restriction (insufficient sleep for at least one night), especially over a prolonged period, alters cognitive capabilities and results in suboptimal decisions. In multiple experiments, subjects became worse at risk assessment and were more likely to make increasingly risky choices. Subjects were often less able to weigh potential losses or gains resulting from an action.

Other results suggested that subjects favoured immediate, smaller rewards over delayed, larger gains, and prioritised actions requiring less effort, those that seemed simple, or those that could be delegated. Decision-making also shifted toward simpler, heuristic-based approaches.[29] Sleep deprivation not

26 American Psychological Association 2024.

27 Arnsten 2015.

28 Baik 2020.

29 Lim et al. 2025.

only hinders a person's ability to evaluate new information but also makes them more rigid and less receptive to feedback.[30]

Time and chemicals

A prolonged crisis period before deciding to use ASAT might be considered beneficial by some, assuming decision-makers have time to consider the use of these weapons. Hence, time constraints are not a serious factor. This might be true, but the crisis itself, exhaustion, lack of sleep, and other factors may work against restraint and de-escalation. As a side note, we must mention the age and general health condition of the leadership, as well as the possible effects of various chemicals they might take during the crisis period. Taking stimulants or medication can help suppress the worst symptoms of illness, stress and other problems, but side effects and long-term damage can also impair cognitive functions.

STRATEGIC AND TACTICAL CONSIDERATIONS IN ASAT USAGE

In deciding about ASAT usage, there are various strategic and tactical arguments both for and against the deployment of such weapons. How the strategic situation is assessed depends greatly on the context and the psychological mechanisms mentioned above. It is worth examining a few examples that could serve as the building blocks of a leader's cognitive architecture.

30 Whitney et al. 2015.

Deterrence

Strategic considerations suggest that deterrence may be an effective method to prevent kinetic ASAT deployment. In this context, actors must ensure that an attack either fails or that the retaliation or cost – including damage to the space environment – is so high that adversaries are dissuaded from attempting it. Classical rational deterrence theory assumes that no leader is suicidal; therefore, leaders will behave rationally and communicate clearly. However, there have been instances when leaders acted in seemingly irrational ways to shock and confuse their adversaries. The Madman Theory posits that this calculated 'rational irrationality' can be effective, but it also carries risks, such as an increased chance of misunderstandings and the possibility of encouraging the adversary to launch an attack. Identifying and analysing this strategy is challenging, and depending on the type and scale of deviation, it can have varying value in coercive bargaining.[31] In the case of ASATs, they could be used as a threat to gain an advantage, or deployed by the attacker as a strong signal to deter or coerce the other side.

A strong counterargument against using kinetic ASATs is the risk to one's own space assets, potential international reactions, and the possibility of triggering Kessler Syndrome. However, within a certain logical framework, this very risk and the capacity to inflict massive damage can be seen as an advantage rather than a drawback. Blackmail, coercion and terrorism can all exploit this potential, giving certain countries the option to introduce a modified form of Mutual Assured Destruction in space, which they might be inclined to use, especially when in a losing position. Additionally, the possibility of such damage occurring may not be fully recognised or may be downplayed. Previous ASAT tests have resulted in debris, but, as far as we know, there has not yet been a major accident caused by it, which could further weaken the non-ASAT argument through normalcy bias. Even if accurate assessments, information, or strong recommendations against using kinetic ASATs reach leadership, there is no guarantee they will be

31 McManus 2019.

considered. Leaders' perceptions of the best course of action may differ significantly from expectations due to numerous psychological effects.

Calculation and escalation

If a leader's mindset is primarily defined by risk avoidance, as described in Prospect Theory, and they perceive a geopolitical situation as a significant loss (such as losing territory, influence, political legitimacy, etc.), they may become risk-seeking and statistically more likely to authorise an ASAT attack, even when there is potential for escalation or collateral damage to other space assets.[32] For example, when an adversary's military forces are suffering significant losses due to precision strikes guided by enemy satellites, the prospect of blinding the enemy's satellites – even at a higher cost – becomes increasingly appealing. This can, of course, trigger escalation, but as we have seen, under pressure, immediate gains often outweigh long-term consequences, especially if those consequences are not fully understood or are perceived as manageable later.

The fact that most space assets do not have human personnel on board also makes it easier to cross the ASAT threshold, since no human lives – especially civilian – would be lost. While the attack itself might trigger escalation and potentially lead to war on Earth or damage critical infrastructure systems so severely that people die as a result, there remains a psychological distance and several steps between this and directly ordering the bombing of a city. This calculation may not necessarily have a moral foundation; it could simply be a cold assessment aimed at limiting diplomatic or reputational damage while still inflicting serious harm on enemy capabilities.

When discussing conflict and escalation, we must consider Robert Jervis's observation that decision-makers tend to overestimate their own transparency and the clarity of their communication. They often assume that the enemy understands their intentions and interprets them as defensive or as a proportional response. For example, they might believe that a single

32 Kahneman–Tversky 1979.

kinetic missile launch is proportional to a cyberattack that temporarily disables hundreds of their satellites. They may also assume that other leaders will behave as they themselves would, which can lead to further miscalculations.[33] Despite the first edition of his book being published in 1976, this issue remains unresolved and continues to be a challenge. A 2017 space wargame exercise conducted by the Centre for Strategic and International Studies (CSIS) warned that actors interpreted the severity and meaning of the same action differently, depending on context and their role (attacker vs. defender). The players were more reluctant to use kinetic attacks, viewing them as more escalatory than cyberattacks, but a kinetic attack still occurred in all three scenarios played.[34]

Another escalation mechanism is the damage-limitation window. This concept, originating from nuclear strategy studies, refers to a window of opportunity that could close as the conflict progresses, either due to enemy actions or the degradation of one's own capabilities.[35] The same logic applies to space assets; combined with the fear of loss (i.e. losing an expensive, vulnerable asset without the chance to use it), this can be a strong incentive to launch a preemptive strike and attempt to seriously damage the opponent's ASAT and space capabilities.

Another factor is the entanglement between nuclear and non-nuclear systems, such as early-warning systems used both to locate and destroy the opponent's nuclear forces and to conduct missile defence operations. This can serve as a strong argument against using ASAT weapons, since harming these systems could be misinterpreted. Even a cyber espionage action could be perceived as an attack. On the other hand, the emergence of constellations and private actors providing Earth observation and communication capabilities – but not strictly part of any military system – means these assets can be considered valuable and legitimate targets, but their destruction may not be viewed as equally escalatory.

The following chart lists several possible reasons against and for the use of a kinetic ASAT.

33 Jervis 1976: 354–355.

34 Harrison et al. 2017.

35 Acton 2018.

Table 1. *Simulated list of reasons for kinetic ASAT attack*

For kinetic ASAT usage	Against kinetic ASAT usage
fear of loss in case of an enemy pre-emptive strike	negative international feedback
assumption that the enemy does not expect such an attack (surprise element)	possibility of a third country entering the conflict
readiness to escalate	ground stations are easier targets even for kinetic attacks
already low international standing	sufficient non-kinetic option (e.g. cyber zero-day attack vulnerability)
highly developed ADR technology	credible adversary deterrence
low congestion of target orbits (MEO) – lower chance of Kessler Syndrome	tendency for overreaction bias
strong advisor support for an attack	

Source: Compiled by the author.

Apart from imagining a situation where this chart would be accurate, the reader surely notices that the number of arguments is not the same. New elements could be added, or a list of pairs for each item could be provided. Changing the order of listed arguments or the side where pro and contra arguments are shown can also slightly influence the decision. However, the main takeaway is that despite the imbalance in the list, it is never a simple counting game. Each item will have a different weight depending on the context and the leadership's expertise, psychological profile, physiological state, biases and other factors.

FUTURE DEVELOPMENTS

Connected to our topic, we can theorise that opinions about kinetic ASAT assets can quickly become obsolete and change rapidly. This is due to ongoing developments and changes in space infrastructure and ASAT options. To counter kinetic ASAT threats, countries have developed the concept of satellite constellations, so even if an adversary destroys 100 satellites, enough may remain to provide service.

Possible change in targeting

The next logical offensive step would be to develop options that can damage an entire constellation or destroy a large number of units quickly. To counter a constellation of satellites, there are two logical options. The first is an attack that disrupts the entire system. A cyberattack could potentially disrupt the whole network, although this is difficult and requires time to identify vulnerabilities and prepare an attack.

The second option is an attack that eliminates a large number of units simultaneously. This idea, already seen in the 1960s, involves detonating a nuclear warhead at the right altitude to disable a significant portion of a constellation, creating a gap in global coverage that the attacker could exploit. Even if rapid replenishment or countermeasures can mitigate the effects, full recovery is unlikely, and there will still be a window of opportunity for the adversary.

For a space power that already possesses nuclear weapons, this capability is much easier to achieve than the precise targeting of thousands of units. There is a resurgence of ideas from the early Cold War, where detonating a nuclear warhead at the right altitude would indiscriminately disable a large percentage of satellites. A more advanced electromagnetic pulse weapon could achieve similar results. Leadership on the losing side of a conflict might feel existentially threatened. If they did not have many space assets to begin with, or if their assets are already useless or destroyed, the leadership might ignore all other warnings and resort to such an option.

It may seem that new debris fields would not be created, as with kinetic ASAT attacks, removing one counterargument against their use. However, this is faulty reasoning, because the hundreds or thousands of now-defunct satellites would become new debris. This could quickly become a major problem due to the crowdedness of the most popular orbits. These orbits are so busy that Starlink satellites had to conduct collision avoidance manoeuvres 144,000 times in the first half of 2025.[36] According to some estimates, if satellites became unresponsive, collisions would begin in just

[36] De Selding 2025.

2.8 days due to the crowded nature of key orbits.[37] As a result, the question changes: the issue is not whether a country will use kinetic ASAT weapons, but whether they will use any weapon from the expanding toolkit capable of causing damage on that scale.

New technologies – A blessing and a curse

According to numerous reports, new defensive measures are under development. France announced that it will use multiple R&D projects to protect its satellites. At the same time, it increased the budget for these programs and took steps to involve private corporations.[38] This can ensure deterrence and greater resilience for the country's space assets, but it also raises the level of threat perception and uncertainty among adversary leadership. It may also alter strategic calculations, and some could argue that in the event of an attack, all available ASATs should be used to overwhelm defence capabilities.

Co-orbital manoeuvring capability is another approach being pursued by both governments and private corporations. These capabilities are necessary for in-orbit servicing, can serve as versatile military assets, or be used for active debris removal (ADR) missions. However, highly developed ADR in the future might reduce the perceived seriousness of a kinetic attack because, in theory, debris could be cleaned up.

It is possible that the most advanced space powers may eventually reach a level of ASAT technology where current kinetic options are considered too crude and ineffective. However, technological advancement is not uniform worldwide. The level achieved by primary space actors is difficult to attain, and kinetic ASATs may still be valuable options for second- or third-tier space actors, such as rogue states or terrorist organisations. A similar example is the missiles and drones built by various terrorist organisations and rebels in the Middle East. Their technology is crude compared to current high-end

37 Pultarova 2025.
38 Desmarais 2025.

missiles, but they are inexpensive, relatively easy to manufacture, and the necessary technology has proliferated as the general technological level of the global population has risen.

SUPPORTING HUMANS

Regardless of how many new strategic considerations and technological developments emerge in the future, the human factor will remain significant for a long time. When discussing high-stress performance, including military operations or periods of intense conflict, the goal is optimisation: ensuring that people in key positions maintain executive functions and emotional regulation.

Artificial intelligence and training

In recent years, there has been hope that AI systems will aid decision-making to such a degree that it will become more effective, less prone to human flaws and much faster. Optimists even suggest that AI will become so advanced that it will surpass all humans, and keeping a human in the loop will only slow the system and reduce its effectiveness. This could be a key difference between losing and winning the super-fast wars of the future. The idea of removing the weak human link in the chain is not new; during the Cold War, similar suggestions were made for nuclear control systems, such as the Soviet Perimeter system. Others argue that this is too dangerous or simply too far in the future, and that, at least for now, a human must remain in charge. Therefore, every suggestion by the AI will be evaluated and judged by a human, with the same biases, emotions and experiences.

De-biasing training, advanced stress training through exercises, cognitive red teaming, institutionalised roles for disagreement and fault detection (such as the Devil's Advocate role) to counter groupthink, simulation exercises, and wargames are all valuable tools to help decision-makers, their advisors, and the military general staff address these challenges.

One exercise type could be cross-domain wargaming, where multiple risk levels, domains and problems are presented. A built-in overreaction from an adversary team, or one announced by the game-coordinating white cell, could highlight the complexity of the situation and the mismatch between the enemy's mental construct (how they 'should' behave) and their actual reaction. Other exercises could focus on attribution, differentiating between an attack and other causes, technological capabilities, risk assessment and long-term consequences.

Machine support and human augmentation

Because humans will remain a constant and crucial component in decision-making, augmenting human capabilities makes sense. There is a will to find tools to achieve optimisation, not through training but via external aid. One approach is Non-Invasive Brain Stimulation (NIBS), a technique that aims to achieve results by peripheral nerve stimulation, essentially making neurons more likely to behave in ways associated with cognitive control.

One type of NIBS is Transcranial Magnetic Stimulation (TMS), which delivers a transient magnetic field to the scalp. This creates a brief electric impulse in the brain, and with different frequencies, it can inhibit targeted brain areas or increase cortical excitability.[39] Regarding performance under severe stress, researchers have experimented with targeting the left dorsolateral prefrontal cortex (DLPFC), a brain region associated with stress responses and attentional control. Stimulating the DLPFC with TMS has shown promising results for target processing under stress.[40]

Transcranial Electrical Stimulation (tES) does not cause neurons to fire like TMS; rather, it primes them. One type of tES is direct current stimulation (tDCS) or alternating current stimulation (tACS). The tDCS techniques applied in experiments have produced mixed results, but they remain an interesting research direction. According to a 2017 study supported by DARPA, skill acquisition appears to be up to 40% faster with tDCS

39 Carrarini et al. 2025.

40 Qi et al. 2025.

support.[41] More recent results suggest that tDCS can enhance military multitasking performance and reduce cognitive overload in different roles.[42]

A different method is transcutaneous vagus nerve stimulation (tVNS), which affects the parasympathetic system to counterbalance the sympathetic (fight or flight) response and related effects such as panic and muscle tremors. As such, it can aid tasks that require a steady hand. A 2025 experiment with elite shooters showed a significant reduction in cognitive and somatic anxiety, depression and stress.[43] The use of such devices could transform decision-making, training and warfare. However, it also raises certain moral questions, and extensive research must be conducted to ensure users do not suffer any long-term damage.

CONCLUSIONS

Various theories of decision-making and their supporting evidence reveal that the 'rational actor' is a myth, especially in high-stress environments with all the uncertainties and pressures of conflict or war. Humans are complex, and multiple systems and factors shape our decision-making. Motivation, emotions, heuristics, biases, automatism, experience, strategic and tactical considerations, institutional and political environments, physiological traits, and even the amount of sleep all impact the decision-making process and its outcomes. Rationality and logic have their place, but the weight assigned to a particular argument, the choice of the best course of action, and the definition of a valuable outcome are only partly logical.

This also applies to those who declare that one course of action will never happen. This is basically a claim, that regardless of emotions, biases, physiological state, strategic situation, inter-group dynamics, etc. leadership will always come to the same conclusion and not use a capability. Such assumptions are unrealistic and can be very damaging in a real crisis situation.

41 Krause et al. 2017.

42 Nadler et al. 2025.

43 Park et al. 2025.

The advocates of the "they would never do X" approach, have an evaluation and decision-making processes affected by the same flaws and factors discussed in this chapter. For example, using the absence of nuclear war as an argument against the possibility of kinetic ASAT use can be linked to wishful thinking, confusing an ontological 'should' with an 'is', could be an attempt of normative regulation, maybe it is a form of normalcy bias or a combination of all the above. It may also reflect expert projection bias, when a highly experienced person assumes a decision-maker will have the same knowledge and assessment as they do.

All these errors can lead to mistaken or delayed responses, decreased resilience, and unpreparedness to defend against certain types of threats. Training and supporting leadership, high-ranking officials, and advisors is an essential, above all, continuous task. Psychology has decades-old findings about decision-making, but the problem of bias and fallacies persists due to changing circumstances and the rotation of people in key positions. Avoiding the use of kinetic or mass-damage ASAT weapons is a goal worth pursuing, but disregarding the complexities of human decision-making and strategic factors will not help achieve it. Instead, a nuanced view and tailored tools may be more effective.

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