

# Combating the Cognitive Trap of Mirror-Imaging: Pitfalls and Possibilities for the Intelligence Officer

by 2LT Philip Chan

## Abstract:

Intelligence has always been a crucial factor in the military, from decision-making to execution. As such, the intelligence officer or analyst constantly faces the challenge of filtering out ambiguous and incomplete information while making sense out of it within a limited timeframe. Under these circumstances, mental strategies such as mirror-imaging are used to accurately understand and predict the adversary's intent and possible courses of action. This essay addresses how mirror-imaging functions as a mental heuristic and discusses how it can lead to both success and failure of handling intelligence. The essay also provides examples of intelligence failures due to mirror-imaging and suggests adopting the Analysis of Competing Hypotheses (ACH) approach which will mitigate the disadvantage of mirror-imaging.

*Keywords: Intelligence, Mirror-Imaging, Heuristics, Mental Model, Psychology*

## INTRODUCTION

The accuracy of an intelligence product can never be taken lightly. Intelligence products play a key role in informing the decisions made by higher command, with significant downstream consequences for the ground-level execution. In developing an intelligence product, the intelligence officer or analyst has two primary preoccupations: (1) how to understand the adversary's intent and (2) how to accurately predict the adversary's possible behaviour, i.e. possible courses of action which results from this intent. He or she seeks to make sense of the events on the ground by building an accurate mental model—a story or mental framework which is able to connect and explain all the events on the battlefield in a consistent manner.<sup>1</sup> Moreover, the officer's deliberations take place amidst many challenges of the operating environment: (1) having to make sense of the incomplete or ambiguous information about an adversary's dispositions and intent, (2) having to separate the signals (and weak signals at that) from the noise and (3) having to work under time constraints.

In such adverse circumstances, simple mental strategies are used to enhance one's ability to build a mental model of the adversary's intent and possible courses of action.<sup>2</sup> One common strategy is to mirror-image the mind of an adversary commander—i.e. think like the adversary. The Intelligence Officer asks, "What would I do, if I am in the shoes of the adversary battalion commanding officer? Assuming that I am limited by the same constraints, how would these considerations drive my possible behaviours?" In this essay, mirror-imaging is defined as: "filling the gaps in the analyst's own knowledge by assuming the other side would (think and) act in the same way as us", "because that is how we would act under similar circumstances."<sup>3</sup>

The heuristic of mirror-imaging has had a mixed reputation. In some contexts, for example, the tactical and operational levels—see Cases One and Two in this essay, it leads to apparently successful outcomes. Yet, in other contexts, it severely compromises the accuracy of intelligence products and leads to

intelligence failure, particularly at the strategic and political levels of intelligence analysis and decision-making—see Cases Three and Four. Three observations about the heuristic of mirror-imaging which are worth noting: (1) it is widely acknowledged that mirror-imaging is one of the most challenging cognitive biases faced by intelligence officers and analysts,<sup>4</sup> (2) it is 'prevalent throughout the intelligence community' and (3) Heuer advances an even stronger claim that mirror-imaging is an "unavoidable cognitive trap."<sup>5</sup> This is because when the supply of hard evidence runs dry, the analyst tends to unconsciously project his or her own mental model and his or her own values, cultural understandings and assumptions, onto the adversary's possible courses of action. Consequently, the intelligence officer thinks that the adversary's behaviour is 'irrational' or 'not in their own best interest.'<sup>6</sup> Instead, the alternate explanation for the apparent 'irrationality' is that the analyst's own mental model is unable to accurately and consistently account for the events and courses of action the adversary undertakes.

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The objective of this essay is three-fold. First, to provide a clear idea on how mirror-imaging functions as a mental heuristic, examining the contexts where it is successful and others where it leads to intelligence failure. Two distinctions are made—between the forms of unconscious and conscious mirror-imaging, and the contexts of the tactical level, i.e. short-term battle procedure and strategic and political levels,

i.e. long-term intelligence analysis. The essay will show why the recourse to mirror-imaging carries a high risk of intelligence failure. Second, two methods of overcoming mirror-imaging are discussed—red team war-gaming and acculturation. The essay will emphasise that these two methods should be utilised with caution. Third, the essay suggests that the Analysis of Competing Hypotheses (ACH) approach be adopted, to mitigate the following difficulties: (1) different mental models that can be consistent with the same set of data points, (2) intelligence officers can suffer from confirmation bias and (3) that intelligence officers cannot readily reject the possibility of deception.

### **MIRROR-IMAGING AS A MENTAL HEURISTIC: TWO DISTINCTIONS**

Mirror-imaging is an attractive mental heuristic for the intelligence officer or analyst. He or she is often confronted with this puzzle: starting from zero or little knowledge, how can we build an accurate mental model of an adversary? There are two broad approaches: (1) relying on information sources external to us, for example, intelligence collection via human intelligence, air and ground reconnaissance sources and (2) relying on sources internal to us and our organisations, for example, extrapolating from historical and international-relations theories and case studies, or generalising from our own planning norms and previous experience to what we would do if 'placed in the shoes of the adversary commander.' Crucially, when confronted with new and unfamiliar situations, in the absence of information sources external to us, Witlin observes that analysts tend to fall back on previous experience and what is familiar, to fill in the informational gaps.<sup>7</sup> So, the analyst fills the gap by assuming that the other side is likely to act in a certain way based on knowledge of how his or her own forces would 'rationally' act under similar

circumstances and constraints. He or she thinks, “If I were the chief of the adversary air force”, or “If I were running the adversary country’s Cabinet.”<sup>8</sup>

The next two anecdotal case-studies illustrate how the heuristic of mirror-imaging can lead to apparently successful outcomes.

### Case 1: Japan’s Next Target

After the attack on Pearl Harbour, the United States (US) knew that another Japanese attack was imminent, but did not know the intended target. As the volume of encrypted Japanese messages increased, US Navy Intelligence Officer Joseph Rochefort had a hunch that ‘AF’, appearing frequently in decoded Japanese messages, referred to the next possible US target, but did not know the location. Rochefort studied a map of the Pacific and thought that if he were the top Japanese naval commander Yamamoto and assuming he was going to stage raids on Pearl Harbour or on the

western coast of the US, Midway Atoll would be his target. As a test of his theory, Rochefort arranged for a unit on Midway to send a radio message describing a malfunction in their water-distillation plant. Two days later, a Japanese cable said that ‘AF’ was running low on drinking water and directed the ‘AF’ force to bring additional water desalinisation equipment. Rochefort now knew the next target was Midway. Admiral Nimitz reinforced Midway with three aircraft carriers. Now, with the knowledge of Japan’s order of battle, coupled with the knowledge of what ‘AF’ referred to, all previous messages about ‘AF’ were brought into focus.<sup>9</sup> This set the stage for the defeat of the Japanese forces at the Battle of Midway.

### Case 2: The US Marine Corps Reconnaissance Team

Klein observed a US Marine Corps reconnaissance exercise, where a reconnaissance team leader and his team were overlooking a huge area of desert. The fire team leader, a young sergeant, saw an enemy tank move along a trail and sent a situation report to the headquarters. A brigadier-general, highly experienced in desert-mechanised operations, also saw the enemy tank. However, he knew that tanks do not operate alone. Based on the position of the one tank, he focused his search for possible enemy tanks on the possible over-watch positions and found another tank. Next, based on the section’s position and his understanding of the effects of terrain, he looked at the likely positions for another section and found a well-camouflaged second section. He repeated this process to locate the remaining elements of a tank company that was well-camouflaged and blocking a key choke point in the desert. Given the size and position of the tank force, it suggested that there were other supporting elements in the area and before long he spotted “an otherwise superbly camouflaged” logistics command post.



*Midway Atoll, looking just south of west across the southern side of the atoll, 24 November 1941.*

### Comments on Cases One and Two: A Distinction between Conscious and Unconscious Mirror-Imaging

Both cases show how the heuristic of mirror-imaging can lead to successful outcomes, at the tactical (Case Two) and strategic (Case One) levels. In the first case, Rochefort built his mental model of the adversary intent and behaviour by engaging in conscious mirror-imaging of what the adversary commander's considerations might be and then subsequently tested his mental model. The mental model passed the test and this lent support to its likelihood. In the second case-study, without the intention to deliberately think like the adversary commander, the brigadier-general unconsciously engaged in mirror-imaging, in drawing upon his prior experience of tank doctrine, planning norms and possible courses of actions, to develop a mental model of the adversary's intent and dispositions.

These two case-studies suggest that there is a distinction between two forms of mirror-imaging: the conscious form of 'thinking like the adversary' and the unconscious form of generalising from one's own experience to the adversary's intent and behaviour. The latter illustrates the strong unconscious tendency to mirror-image, a consequence of a 'lifetime of enculturation' where we become habitually used to applying the logic of our own experience to understand and predict the intents of others and the adversary.<sup>10</sup> The intelligence officer is unable to shake off his own lens of perception. The upshot of this observation that mirror-imaging takes place in the unconscious form lends weight to Heuer's claim that mirror-imaging is unavoidable.

The next two examples illustrate the examples of how the heuristic of mirror-imaging can lead to intelligence failure, with large-scale consequences.

### Case Three: Strategic Assumptions of the 1973 Yom Kippur War

Aboul-Enein asserts that the "cardinal intelligence sin" of mirror-imaging was committed by Israeli military intelligence in the run-up to the Yom Kippur war. In the wake of the success of the Six-Day War, the "Conceptzia", a concept developed by Israeli military intelligence, held that an Arab-Israeli war could only occur if certain conditions were satisfied.<sup>11</sup> These Israeli assumptions were thought to apply to the

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Arab forces and that the Arab forces would not act in what the Israelis considered an irrational manner. The first condition was that the combined opposing forces must first possess the ability to simultaneously attack all Israeli airfields. 1975 was assessed to be the year of the attack, as Egypt was in the process of acquiring long-range fighter-bombers and estimated to have enough aircraft and pilots for the attack by then. A

second condition was that the Israelis believed that the Arabs would not attack unless they had enormous stockpiles of conventional weapons and equipment. Moreover, Israeli intelligence extrapolated from Arab performance in the preceding three wars indicated that they were capable of only guerrilla warfare, not conventional attacks. Amidst this backdrop, Israeli conclusions were further clouded by Egyptian deception on the economic and political fronts:

a flood of reports on Egypt's economic instability and public declarations of its "inability to afford another war", political deception which stressed the status quo under the guise of the "No War, No Peace" slogan and the public expulsion of Soviet advisors.<sup>12</sup> Overall, Israel's chief of military intelligence adopted the "*Conceptzia*", and quashed intelligence indicators which violated what the Israelis mirror-imaged to be Arab pre-conditions of war, even going to the point of labelling these pre-conditions as "rules."<sup>13</sup>



*Egyptian military trucks cross a bridge laid over the Suez Canal on 7<sup>th</sup> October, 1973, during the Yom Kippur War/October War.*

#### Case Four: Japan's Next Target (Revisited)

Returning to the case of Japan's Next Target, Rochefort, while correctly anticipating the target of Yamamoto's naval deployment (the adversary's course of action), had an incorrect understanding of the adversary's intent. With the benefit of hindsight, we know that Yamamoto's intent was not for the Midway Atoll to be the launching pad for Japanese attacks on the Western coast—which was the central assumption in Rochefort's attempt to mirror-image what Yamamoto would do. Instead, Yamamoto's intent was to lure the remaining US aircraft carriers to the Midway Atoll in order to destroy the fleet and gain naval supremacy in the Pacific theatre.<sup>14</sup>

#### Comments on Cases Three & Four: Distinction between the Contexts of Mirror-Imaging

Cases Three and Four illustrate how the same

heuristic of mirror-imaging can lead to inaccurate conclusions—at the strategic (Cases Three and Four) and political (Case Three) levels. In comparing Cases Three and Four with the preceding Case Two, here is a possible explanation for why mirror-imaging is successful in some contexts (Case Two) but not others (Cases Three and Four). Mirror-imaging is a heuristic more likely to be successful in the context of the tactical level than at higher levels because in the former, there are more constraints on the number of permutations of the adversary's courses of action. For example, there are similar assumptions about tank doctrine governing their deployment and there are a set number of tasks which can be expected to be completed in the course of battle procedure. However, at the higher levels, the number of permutations of courses of action increases significantly, incorporating factors such as the psychology of different decision-makers as a function of their workplace, social and educational backgrounds, the cultural assumptions, the influence of stakeholders from the political, civilian and defence spheres. The confluence of factors, in particular the different cultural assumptions which the adversary makes, makes mirror-imaging an extremely risky heuristic to adopt when intelligence officers and analysts attempt to predict the adversary's intent and courses of action.<sup>15</sup>

Case Three is a straightforward demonstration of how mirror-imaging can lead to intelligence failure. Crucially, mirror-imaging can blind the intelligence officer to the possibility of deception. As Heuer points out, analysts often reject the possibility of deception because they see no evidence of it.<sup>16</sup> However, if the deception is well-planned and properly executed, one should not expect to see ready evidence of the deception, for example, the elaborate Egyptian deception on the economic and political fronts. Therefore, if the analyst sees no evidence of deception when trying to fit the events of the battlefield to the mental model of the adversary commander he or she



is trying to mirror-image, it is not a good reason to reject the possibility of deception. Davis notes that rejecting a plausible but unproven hypothesis, i.e. the possibility of deception, too early tends to bias the subsequent analysis, as the analyst does not systematically look for the evidence which might support it.

*Overall, given the human tendency to unconsciously mirror-image, coupled with the fact that we cannot rule out the following—that there are too many associated factors and cultural assumptions of the adversary we cannot account for in our mental model, the fact that many mental models can be consistent with the observed data points and the tendency to engage in confirmation bias, intelligence officers and analysts must be wary of mirror-imaging in the light of the potential high risk of intelligence failure.*

Case Four is particularly interesting. It illustrates how an apparently successful outcome from mirror-imaging, as presented in Case One, was actually founded on inaccurate assumptions. In a different situation, this could have led to intelligence failure. Two observations about Case Four illustrate the difficulties of achieving accuracy: (1) two or more different intents—Rocheffort's postulated adversary course of action and Yamamoto's actual course of action, can be consistent with the same course of action, (2) Rocheffort's positive result in the confirmation test of his mental model was consistent with both his incorrect understanding of Yamamoto's intent and Yamamoto's actual intent and yet, was taken as support for his (incorrect) theory.

The first suggests different mental models, i.e. Yamamoto was going to lure the US carrier fleet to the Midway Atoll or Yamamoto was going to attack the Western coast of the US, can be consistent with the same set of data points—for example, data point one: the picking up of increased volume of 'AF' signals and data point two: the correlation between the malfunction of the water distillation plant and the Japanese instruction to bring water distillation equipment to 'AF'. The upshot is that mirror-imaging does not distinguish between the multiple mental models which are consistent with the same set of data points and this can lead the intelligence officer to make inaccurate predictions about the adversary's courses of action.

Second, the positive result of Rocheffort's 'test' was taken to confirm his mental model of the adversary intent and course of action. The new information was assimilated to the existing mental model, instead of using it to disprove, or challenge, how it could be consistent with alternate hypotheses of Yamamoto's intent. This illustrates how an earlier judgment affects the formation of future perceptions, in the natural human tendency to confirm our existing perceptions, instead of disproving the perceptions. Once an analyst thinks they know what is happening, the initial perception tends to resist change.<sup>17</sup> Thus, confirmation bias is a potential source of intelligence failure.<sup>18</sup>

In this section, a distinction is made between the forms of mirror-imaging and the contexts where mirror-imaging is more likely to yield successful outcomes. Overall, given the human tendency to unconsciously mirror-image, coupled with the fact that we cannot rule out the following—that there are too many associated factors and cultural assumptions of the adversary we cannot account for in our mental model, the fact that many mental models can be consistent

with the observed data points and the tendency to engage in confirmation bias, intelligence officers and analysts must be wary of mirror-imaging in the light of the potential high risk of intelligence failure.

### COMBATING MIRROR-IMAGING: THE LIMITS OF RED-TEAM WAR-GAMING AND ACCULTURATION

In this section, two methods are discussed—the proposed means to combat the tendency to mirror-image, which purport to do so by replicating key elements of the adversary's decision-making process and representing their cultural and political assumptions: red-team war-gaming and acculturation.<sup>19</sup> The essay aims to show that contrary to popular belief, these means are not always successful in yielding accurate intelligence insights.

#### Red-Team War-gaming

In red-team war-gaming, the aim is to accurately model the adversary's decision-making dynamics, intents and possible courses of action, by assembling a diverse team which represents the various decision-makers and stakeholders of the adversary country. The team often comprises military experts and subject-matter experts, like anthropologists, political scientists and historians with time on the ground and familiarity with language and culture in the region of interest.

However, red-team war-gaming should be treated with caution. First, in a red team, there may be numerous academic experts on the military affairs, politics, anthropology and geography of the region, but not all may have first-hand knowledge of the dynamics of the situation at hand. As Johnston observes, nuanced understanding is achieved by spending significant time or one's formative years in the country.<sup>20</sup>

Second, the 'specialised first-hand knowledge' of 'experts' might be less relevant than claimed in certain scenarios. For instance, in a wargame about



*Planning for success – Exercise participants from different backgrounds working together as a combined force on the execution of missions.*

leadership change in an adversary country, a member of the red team, a humanitarian aid worker in the country for many years with some transactions with military authorities of that country, might claim to have knowledge of the internal leadership dynamics of the military, even though his or her area of specialised knowledge is in humanitarian operations on the ground. In addition, because of the person's supposed 'relevant' ground experience, compared to the other members of the team who have no ground experience, the rest of the team will have a tendency to defer to his or her viewpoint, despite all-round recognition that there are limits to how much his or her ground experience should be valued.

Third, in choosing who to invite, the panel forming the red team already implicitly assumed certain themes, for example, the race or class-based politics of a country, or cultural differences, are serious enough to matter and that the themes should be made explicit in the analysis and so warrant representation on the red team. It is important to be aware of the downstream implications and pitfalls, of choosing which themes to prioritise in wargaming. In the case of Johnston's experience, the scenarios developed by the red team tended to reflect an adversary "whose behaviour and decision-making resembled those of educated, white, middle-class Americans."<sup>21</sup>

### Acculturation

Johnston suggests that an effective way to overcome the tendency to 'think like them' is to acculturate—by gaining first-hand ground experience in the country of interest, living in the country and interacting with its people on their own terms for an extended period of time. This compensates for the three to five years of back-room analysis experience which most analysts have and their tendency to resort to mirror-imaging when information is incomplete or ambiguous. The ideal standard of successful assimilation is that of the children of first-generation immigrants, who have assimilated the local and national languages and values through shared school-going experience, to the point of sharing many of the same cognitive filters as the locals. Through this, intelligence officers and analysts better grasp the rituals, norms, taboos, kinship systems and social networks, giving accurate insights into intents and possible courses of action.

However, the strategy of acculturation is accompanied by a few caveats. First, time on the ground is not necessarily representative of the foreigner's context. Security reasons may make it difficult for intelligence officers and analysts to continually go out and mix with the population in order to gain an accurate picture of the ground situation. Time spent on a foreign land which takes place within embassies, military bases or hotels owned by the officer's own country is a 'virtual' form of their own country, an approximation of domestic life on foreign soil.<sup>22</sup> Second, the people we meet, i.e. the foreign individuals such as academics, military personnel, aid workers, civil servants, we deem to be key to our information collection endeavours, form a stratified sample of the population.<sup>23</sup> Most individuals in a foreign country only develop knowledge of a small sample of people, which they generalise to represent the total society.

Third, the first impressions of a foreign land are crucial in forming the cornerstone of our picture of the situation in the land, since all later encounters are viewed, using the initial encounter as a reference point. This can be deceptive for two reasons: vivid images, such as anecdotes and meetings perceived directly by analysts, may be new insights, but studies show that when a theoretical report, for example, statistics, is contradicted by personal observation, the latter is assigned more weight as evidence. Evidence in the form of a single, vivid, personal testimony such as "I have never been to Windemere but just last week I met a man who had, and he saw the situation on the ground as..." tends to outweigh a much larger body of statistical evidence or conclusions reached by abstract reasoning, which lack the rich, descriptive detail. This is also known as the 'man-who' syndrome, as observed by Nisbett and Ross.<sup>24</sup>



*An officer briefing his men on the upcoming mission; thorough situation analysing skills can lead to greater success of mission.*

### POSSIBILITIES: THE ANALYSIS OF COMPETING HYPOTHESES

The considerations of the preceding sections suggest:

- (1) It is difficult for intelligence and analysts to escape from mirror-imaging when faced with new and unfamiliar situations—in particular, the unconscious form of mirror-imaging.



(2) Intelligence analysis is challenging and the risk of failure is high. Intelligence officers find it hard to accept that different mental models can be consistent with the same set of data points. Intelligence officers can suffer from confirmation bias, i.e the tendency to confirm rather than disprove existing hypotheses, as new information becomes available. Intelligence officers cannot readily reject the possibility of deception until a systematic search for evidence of deception has been conducted.

(3) The strategies of red-team war-gaming and acculturation run up against several possible dangers which are difficult to mitigate.

Given these considerations, an alternate approach, as opposed to 'mirror-imaging,' is needed to understand the adversary's intent and predict possible courses of action. Three things are required: (1) alternate hypotheses need to be carefully considered, especially those which are consistent with the available data points, and cannot be disproved, (2) alternate hypotheses should be subjected to testing each time new evidence becomes available, instead of the new evidence confirming existing hypotheses and (3) the possibility of deception must be made explicit in intelligence analysis and not rejected until the last possible instance in time.

Heuer's concept of ACH is an important contribution to intelligence analysis methodology.<sup>25</sup> The central idea is the notion of competition between a list of plausible hypotheses in a matrix analysis, to test for: (1) compatibility with available information, (2) diagnosticity of evidence, whether a certain piece of information is valuable in influencing our judgements or, whether a certain hypothesis is more likely than another, (3) unproven, i.e. there is no evidence but, yet it is correct, and disproved hypothesis, i.e. strong positive evidence that it is wrong, such that the unproven hypothesis, for example, the possibility of deception, should be kept 'alive' as long as possible.<sup>26</sup>

Given the sensitivity of this topic, interested audience are referred to the following resources: "Structured Analytic Techniques for Intelligence Analysis" (Heuer, J. and Pherson, R., 2010, CQ Press) and "Psychology of Intelligence Analysis" (Heuer, 1999, Center for the Study of Intelligence, Central Intelligence Agency). Importantly, the ACH method does not promise to be fail-safe in overcoming all the pitfalls of mirror-imaging, but its advantages are two-fold: (1) it leaves a black-and-white audit trail for how conclusions are drawn and (2) it helps intelligence officers and analysts mitigate some key cognitive limitations of the approach of mirror-imaging.

## CONCLUSION

*"A great part of the information obtained in war is contradictory, a still greater part is false and by far the greatest part is of doubtful character."*

*Carl von Clausewitz<sup>27</sup>*

The intelligence officer is faced with the challenge of sifting through the ambiguous and incomplete information at hand, making sense of it, in an effort to accurately understand and predict the adversary's intent and possible courses of action. This essay, by distinguishing between conscious and conscious mirror-imaging and the contexts of intelligence analysis, has built a case for why the heuristic of mirror-imaging should be treated with caution. Despite the limited contexts in which it can lead to successful outcomes, it still carries a high risk of intelligence failure. In addition, the essay has also shown that traditional methods of combating mirror-imaging, i.e red-team war-gaming and acculturation, lack the accuracy they purport to possess. The pitfalls of existing approaches can be partly mitigated by the adoption of the ACH approach. More importantly, the ACH adds value because the methodology explicitly accounts for the possibility of deception. 🌐

## ENDNOTES

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**2LT Philip Chan** is an Infantry Officer by vocation and is Company 2IC, Motorised Support Company, 5<sup>th</sup> Battalion Singapore Infantry Regiments (5 SIR) . He was a member of the Oxford University Strategic Studies Group at All Souls' College, Oxford and holds a Master of Physics and Philosophy from Balliol College, University of Oxford, United Kingdom.