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Wargaming the use of intermediate force capabilities in the gray zone

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Abstract

This work reviews the development and tests of an intermediate force capability (IFC) concept development hybrid wargame aimed at examining a maritime task force's ability to counter hybrid threats in the gray zone. IFCs offer a class of response between doing nothing and using lethal force in a situation that would be politically unpalatable. Thus, the aim of the wargame is to evaluate whether IFCs can make a difference to mission success against hybrid threats in the gray zone. This wargame series was particularly important because it used traditional game mechanics in a unique and innovative way to evaluate and assess IFCs. The results of the wargame demonstrated that IFCs have a high probability of filling the gap between doing nothing and using lethal force. The presence of IFCs provided engagement time and space for the maritime task force commander. It also identified that development of robust IFC capabilities, not only against personnel, but against systems (trucks, cars, UAVs, etc.), can also effectively counter undesirable adversarial behavior

Keywords

Gray zone, hybrid threats, kriegsspiel, matrix, non-kinetic, non-lethal, wargaming

1. Introduction

Military operations in the gray zone (defined here as the space between peace and war where states are currently involved in a competition continuum) present a unique challenge for military planners. Often tactical actions can have significant operational, and even strategic implications. This makes traditional modeling approaches, such as wargames, of somewhat limited applicability. This limitation can be further exacerbated if the modeled systems are intended to address specific adversarial actions within the gray zone continuum across tactical and operational levels. A specific example of such a problem is modeling military capabilities at the force continuum between inaction and employment of lethal force. Whereas the tactical effectiveness of such systems may be lower than the effectiveness of lethal systems (e.g., if there is a requirement to stop an incoming threat, the use of lethal force is often more efficient than the use of acoustic or optical warning devices), the operational and strategic effectiveness of their use would likely be better.

In the summer of 2020, the NATO's Science & Technology Organization, System Analysis and Studies-151 (SAS-151) research group conducted a series of test wargames to evaluate whether intermediate force capabilities (IFCs) can make a difference to mission success in the gray zone. As described in the following, IFCs offer a class of response between doing nothing and using lethal force in a situation that would be politically unpalatable. This article reviews NATO SAS-151's development and tests of an IFC concept development wargame aimed at examining a maritime task force's ability to counter hybrid threats in the gray zone. It covers the strategic context and background of hybrid threats in the gray zone; the conceptual background and development of non-lethal weapons (NLW) through to IFCs; the design and development of the hybrid wargame methodology; and the implementation and execution of the test IFC wargame(s), with initial observations where applicable.

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This wargame series was particularly important for two reasons. First, it explored an operational challenge facing many Western militaries in the current strategic environment where opponents and adversaries are using hybrid threats (i.e., tactics and techniques) to deny traditional Western military freedom of action. However, rather than challenge Western militaries in head-to-head confrontations, these tactics aim to remain below the threshold of open conflict, and create strategic, operational, and/or tactical dilemmas for decision-makers. They blur the line between strategic, operational, and tactical, and exploit situations where tactical decisions/actions have strategic impacts.

Second, it used traditional game mechanics in a unique and innovative way to evaluate and assess IFCs. While the concept of using kriegsspiel and/or matrix wargames by themselves to develop and test concepts, inform decision-making, and validate capability requirements are not new, combining both into a single hybrid wargame is new. The approach described in this article was to execute a modified strategic matrix wargame to assess the outcome of an initial tactical level free kriegsspiel engagement game. Although the key components of a kriegsspiel and matrix game are retained, how they are set up, and how they are used together to approach the problem of assessing IFCs in the gray zone is a unique adaptation of these traditional games.

2. Strategic environment overview

2.1. Current security environment, hybrid threats, and the gray zone

In recent years, analysis of the international security environment have increasingly drawn attention to what is becoming understood as hybrid threats and the gray zone. (A quick review of the literature reveals terms such as irregular, asymmetrical, unconventional, unrestricted, non-linear, non-traditional, new generation, next generation, full spectrum, political warfare, lawfare, multi-nodal, multi-variant, and pan-domain.) A recent RAND study defined the gray zone[1] as ''…an operational space between peace and war, involving coercive actions to change the status quo below a threshold that, in most cases, would prompt a conventional military response, often by blurring the line between military and non-military actions and the attribution for events'' (Morris et al.,[2] p. 8).

In most respects, the ''coercive actions'' that blend military and non-military actions are characterized as hybrid threats. Frank G. Hoffman[3] (p. 8) defines hybrid threats as:

> [A] full range of different modes of warfare including conventional capabilities, irregular tactics and formations, terrorist acts including indiscriminate violence and coercion, and criminal disorder. Hybrid Wars can be conducted by both states and a variety of non-state actors. These multi-modal activities can be conducted by separate units, or even by the same unit, but are generally operationally and tactically directed and coordinated within the main battlespace to achieve synergistic effects in the physical and psychological dimensions of conflict.

Hoffman's definition has gained wide appeal because it emphasizes not only the activities of a hybrid threat, but the potential actors and their intent as well. It is also consistent with definitions of gray zone in that it involves all elements of state power, actions aimed deliberately below the level of state-on-state use of force, and typically synchronized and coordinated toward objectives in an organized manner.[4-6]

Ultimately, the judicious application of hybrid tactics, techniques, and capabilities is to create strategic, operational, and/or tactical dilemmas for an opponent. As noted, the aim is to not so much to challenge an opponent in a head-to-head confrontation,[7] but rather to constrain the options available to them, thereby maximizing one's operational freedom of movement in the area between peace and war. Because the activities take place below the threshold of armed conflict, they paint opponents into a corner (i.e., tie a state's military, diplomatic, and political hands behind its back) by forcing it to either accept the emerging status quo, or use force to resolve the dilemma. Remaining below the threshold of the use of force and avoiding head-to-head confrontations with an opponent has enabled weaker states to challenge stronger states because they no longer have to engage superior adversaries in a head-to-head confrontation.[8]

Operationalizing hybrid threats involves using all elements of state power and controlling their escalation/de-escalation both vertically and horizontally.[9] The most prominent examples of these approaches currently being undertaken are by Russia, China, and Iran.[9-11] Russia, China, and Iran conceptualize state interactions as a ''continuum of conflict'' in which the area between peace and war is simply an area of conflict by other means. Russia and China combine different elements of state power (economic coercion, political influence, unconventional warfare, information operations, and cyber operations) in ways to advance their interests and in ways that their opponents do not have an effective response for.[12] Iran's approach focuses more on military and technological aspects, however, its overall strategic aim is the same: to constrain, deny, and challenge an adversary's access to geostrategically important areas. Although there are identifiable similarities between Russia's, China's, and Iran's activities in the gray zone, there are distinct differences as well.[2]

2.2. Russia: Gerasimov doctrine

Russia's approach to the gray zone has colloquially become known as the ''Gerasimov doctrine.'' In his 2013

article ''The Value of Science is in the Foresight: New Challenges Demand Rethinking the Forms and Methods of Carrying out Combat Operations,'' General Valery Gerasimov, Chief of the General Staff of the Russian Federation Armed Forces articulated that the very ''rules of war'' have changed: ''The role of non-military means of achieving political and strategic goals has grown, and, in many cases, they have exceeded the power of force of weapons in their effectiveness'' (Gerasimov,[13] p. 21). The focus of conflict has shifted ''…in the direction of the broad use of political, economic, informational, humanitarian, and other non-military measures…in coordination with the protest potential of the population…supplemented by military means of a concealed character, including…informational conflict and the actions of special operations forces'' (Gerasimov,[13] p. 21). The open use of force, usually under the pretext of peacekeeping, is resorted to only at a certain stage, primarily for the achievement of final success in a conflict.[13]

The Gerasimov doctrine highlights that modern ''conflicts'' are waged through the use of a combination of elements of state power in an effort to achieve political objectives without having to resort to the use of overt military force (though the use of covert and paramilitary force is permissible), and this includes the use and manipulation of the information and technology spectrum.[13,14] As noted by Supreme Allied Commander Europe (SACEUR), General Philip Breedlove, Russia's campaign in Ukraine was ''…the most amazing information warfare blitzkrieg we have ever seen in the history of information warfare'' (Wither,[11] p. 77).

In this way, Russia does not have to match the West's military superiority. It only needs to be operationally effective in specific areas or domains, and maintain its presence in areas considered geostrategically important.[8] By integrating the different elements of national power Russia can control the preparation of the competition continuum (i.e., formerly ''preparation of the battlefield''), use deliberate escalation and de-escalation tactics, and exploit multiple domains of the conflict zone to its advantage.[15]

2.3. China: unrestricted warfare

China's approach to competition and conflict in the gray zone is ''unrestricted warfare.'' The concept of unrestricted warfare was first articulated by People's Liberation Army (PLA) Colonel Qiao Liang and Colonel Wang Xiangsui. Broadly speaking, unrestricted warfare proposes an approach for weaker countries (i.e., China), to use in a high-tech conflict with the United States.[16] Just like the Gerasimov doctrine, unrestricted warfare accepts that war itself has fundamentally changed, particularly as a result of the United States' overwhelming dominance during the 1991 Gulf War, a war the PLA acknowledges they would have been wholly unprepared to defend against.[16]

Beijing's aim is to pursue national goals through political maneuvering (diplomatic pressure, false narratives, and harassment) and displaying increasing levels of threats rather than engaging in risky and expensive head-to-head physical confrontations. Accordingly, the strategy involves the use of a multitude of means, both military and non-military, to strike at an enemy before and during a conflict.[17] It includes computer hacking, subversion of banking systems, markets, and currency manipulation (financial war), media disinformation, urban warfare, and even terrorism.[11,18] As Colonel Qiao is quoted as saying: ''…the first rule of Unrestricted Warfare is that there are no rules, with nothing forbidden'' (Erickson and Kennedy,[19] p. 2).

However, it must be noted that the development of military capabilities, both in terms of sophistication and reach, is still a fundamental element to China's activities in the gray zone. Conventional military power is essential for deterring external powers from interfering in the internal affairs of China (particularly its core interests) and maintaining the ability to threaten the escalation of the use of conventional military force. It is the interplay between the unrestricted nature of gray zone competition along with threats (implied or explicit) of the use of conventional military force that makes China's approach in the gray zone challenging. The most prominent example of this approach is displayed in the South China Sea where Beijing has repeatedly and effectively integrated conventional and unconventional units (military, law enforcement, and militia) and tactics (blurring the distinction between military and constabulary activities) to achieve synergistic effects.[16,17]

China has utilized ''irregular maritime forces,'' in this case state-sanctioned fishermen-turned-militia, that are neither ordinary merchant ships nor random fishermen. Erickson and Kennedy have termed these irregular forces ''maritime militia''.[19,20] These paramilitary forces operate in pre-planned roles and in close coordination with other Chinese maritime forces (coast guard, the Maritime Safety Administration, and/or the PLA Navy).[19,20] The use of maritime militia, acting as fishermen, creates a demand for the deployment of maritime forces (i.e., the threat of the use of force), in this case the PLA Navy, to come to their aid. Invariably China has demonstrated a willingness to threaten and use force, albeit constrained, in support of its maritime militia to harass civilian and military vessels.[21,22] Use of military and paramilitary organizations in this way in the gray zone makes it difficult for navies and coast guards in the region to respond to and/or counter China's activities in the region.[19]

2.4. Iran: anti-access/area denial

Iran's exploitation of the gray zone involves the use of an anti-access/area denial (A2/AD) strategy. A2 is defined as

preventing or restricting a military force's ability to move into a theater of operations. AD is defined as preventing or denying the freedom of action of forces already in theater from using bases (permanent, maritime, mobile, or otherwise) for operations.[23,24] If A2 strategies aim at preventing a military force from entering into a theater of operations, AD strategies aim at denying them the freedom of action necessary to conduct operations while there.

Within the context of this strategy, Iran uses its naval, air, and missile forces, as well as paramilitary and other clandestine units, in an attempt to either control or deny others access to the Strait of Hormuz. Iran has developed/is developing a variety of weapon systems including small boats (go fasts), fast attack/missile firing surface combatants, submarines, short-range unmanned aerial vehicles (UAVs), smart mines, long-range missile systems, precision guided munitions, shore-based anti-ship missiles (ASMs) and anti-ship cruise missiles (ASCMs), over-the-horizon targeting systems, long-range strike aircraft, coastal defense artillery, surface-to-air missiles, and even ballistic missiles to swarm, harass, interdict, control, deny, and attack military and civilian vessels.[25-27] Recent evidence indicates Iran may even use advanced technologies such as satellite technology, global positioning system (GPS) spoofing, and cyber-attacks to facilitate its A2/AD strategy.[28]

Unlike the Gerasimov doctrine and unrestricted warfare, Iran's exploitation of the gray zone is more narrowly defined in terms of a military and technological solution. However, the combined threat posed by these layered systems can make transiting the Strait of Hormuz and conducting maritime operations challenging for naval forces.[25] In this way, similar to the Gerasimov doctrine and unrestricted warfare, Iran does not have to be the strongest force in a confrontation, it just needs to be strong enough to prevent an adversary from gaining access to the theater of operations and/or conducting operations from within the region.[29]

The important aspect of Iran's A2/AD strategy is that it interlaces traditional elements (go fasts and ASMs) with high-tech elements (GPS spoofing) with covert and clandestine elements (commercial ships/vehicles to launch ASCMs, use of proxy forces). Iran will pursue this approach that mixes advanced technology, ''maritime guerilla'' tactics, and traditional maritime warfare to deny, control, and threaten passage through the Strait of Hormuz.[30-32]

3. Enter IFC

Although exploitation of the gray zone (i.e., exploiting the space below the threshold of armed conflict) and A2/AD type activities are not new in and of themselves,[33] the prevalence of their use across a full spectrum of capabilities and domains by Russia, China, and Iran in recent years poses unique challenges for military planners. It is important to have and maintain traditional lethal military capabilities to deal with these situations in extremis. However, it is becoming increasingly important and necessary to develop capabilities that would enable Allied and coalition forces to respond to these situations short of an armed confrontation. Otherwise, coalition forces will be faced with a strategic dilemma of either doing nothing or employing lethal capabilities, along with the associated threat of strategic escalation. It would be desirable to develop a class of response options between these two extremes in a situation that would be politically unpalatable or might even allow an adversary to seize the initiative/moral high ground. This option is what has become known as IFCs.

IFC development began in the mid-1990s as a result of the US experiences in Somalia during Operation Restore Hope.[34] At that time, focus of the program was on joint non-lethal weapons (JNLWs). JNLW development focused on systems that decreased the risk of casualties.[35] Examples include pepper spray/tear gas, rubber bullets/bean-bag rounds, electro-muscular incapacitation devices (such as Taser™), water cannons, ''flashbang'' (stun) grenades, ''sting'' grenades, and even nets. However, many, if not most, of these systems were aimed primarily at crowd and/or riot control, and in some cases their use by militaries is legally restricted (e.g., although tear gas could be used by law enforcement, its military use is covered under the chemical weapon ban).[36] They are all still fundamentally physical (for example, rubber bullets and bean-bag rounds are still kinetic), and generally crude. Outside of force protection practices, they have limited applicability in the wider geostrategic context that gray zone competition is taking place.[37]

The importance of non-kinetic/non-lethal systems was highlighted again during the wars in Iraq and Afghanistan when civilian casualty (CIVCAS) mitigation efforts became a priority.[38] According to non-governmental reports at the time, although Coalition forces took precautions to spare civilians, significant casualties occurred not only during the air and land campaigns, but during post-conflict operations as well.[39] In a subsequent Joint and Coalition Operational Analysis (JCOA) report on CIVCAS, it identified that post-conflict ''...non-combatant casualties were primarily caused by escalation of force incidents,'' and that Multinational Forces – Iraq (MNF-I) identified the strategic importance of reducing CIVCAS, but lacked the ''available non-lethal capabilities'' to deal with the situation (Joint Staff J7,[40] pp. 2–3).

It was also identified that NATO-led International Security Assistance Force (ISAF)-caused civilian casualties had a highly detrimental effect on the populations'

perception of ISAF (i.e., decreased support for ISAF), encourage insurgent recruitment and subsequent attacks, and provided insurgents with a strategic narrative that was highly damaging to Coalition efforts in Afghanistan.[41]

In 2014–2017, NATO SAS-094 research group conducted a study to identify where NLWs could make operational contributions to mission success. What they identified was that adversaries' use of the civilian populations helped complicate Coalition targeting and engagement strategies, and reduced NATO's military superiority over insurgent forces. Most importantly, analysis of post-conflict operations identified opportunities for NLWs to provide additional engagement time and space for soldiers to make escalation of force decisions; a means by which to isolate and disable targets to be engaged; and a means by which to engage targets when the use of conventional force would not be possible or appropriate.[38] Furthermore, two NATO Non-Lethal Technology Exercises, executed in close collaboration with the SAS-094 study, showed that at the tactical level NLWs provided troops with extended time and space for decision-making, which led to more effective use of lethal force against *bona-fide* threats while preventing accidental casualties due to the escalation of force.[38]

An important lesson learned from the experiences in Iraq and Afghanistan was that the traditional lines between tactical, operational, and strategic operations was diminishing. In many instances, tactical engagements (typically lethal engagements due to an absence of NLW capabilities) resulted in strategic repercussions. For example, escalation of force incidents routinely resulted in negative public opinion/reactions, negative media play, and strained political relations between the government in Kabul and ISAF because the incidents involved families, children, and passengers in civilian vehicles.[42] In one incident on 12 April 2010, for example, 5 civilians were killed and 18 were injured (including women and children) when military forces fired on a bus in Zhari district of Kandahar province.[42] In effect, operational success on the battlefield was no longer the sum of tactical engagements, particularly because the outcome of tactical engagements had the potential to undermine and/or unravel the mission.

In recent years, focus has shifted away non-lethal/non-kinetic weapons and in favor of broader IFC development in order to facilitate a better and more comprehensive solution set across the gray zone. The fact that adversaries are exploiting this zone, and that tactical engagements can have strategic effects and/or provide adversaries with a strategic advantage, is driving the need to develop, test, and implement IFCs. According to the Joint Intermediate Force Capabilities Office (JIFCO), ''gray zone'' competition dominates any conceptual ''spectrum of warfare'' and is ideally suited for IFC development.[34]

Despite superficial similarities between NLWs and IFCs, IFCs encompass a much wider concept. First, IFC development takes into consideration the wider strategic and doctrinal context; these capabilities are intended to enable effective escalation/de-escalation possibilities that could perhaps achieve an effective deterrence effect on potential adversaries. Second, IFC development explores technological advancements and include the use of capabilities whose intended effect is non-lethal, but that would also include anti-materiel options, cyber, and electronic warfare capabilities.[43] In other words, robust full-spectrum IFC capabilities target not only personnel (in a non-lethal fashion), but also systems (trucks, cars, UAVs, etc.), and the adversary decision-making options (in the cyber and/or information domain).

Most importantly, IFC investments do not come at the expense of lethality of the overall force. As noted by the Joint Non-Lethal Weapons Directorate (JNLWD), if defense planners focus too narrowly on ''enhanced lethality'' for capability requirements and acquisitions, they risk forgoing developing a set of escalation-of-force options that would be desirable between doing nothing and employing lethal force.[43] Therefore, IFCs are a strategic risk mitigation investment that provide warfighters the tools to seize the initiative while competing below the level of armed conflict and as such can enable more targeted and effective use of lethal force.

In that vein, NATO SAS-151 began a study on *Solutions Enabling Intermediate Force Capability/Non-Lethal Weapon Contributions to Mission Success*. The purpose of the research is to build on the work of SAS-094 and examine and determine whether IFCs make a difference, and to what extent they make a difference, to mission success. As a part of the overall methodology, SAS-151 elected to use a wargame to conduct the evaluation of IFC effectiveness in the gray zone. The following sections cover the design and development of the hybrid wargame; and the implementation and execution of the test IFC concept development wargame(s), with initial observations. However, because the IFC are intended as a tactical tool with potential strategic implications, this use of a wargame is non-trivial, as discussed in the following section.

4. Hybrid wargame: gaming strategic implications of a tactical engagement

To assess the utility of IFC within the broader geostrategic context of hybrid threats and challenges in the gray zone, the NATO SAS-151 Panel, JIFCO, and Defence Research and Development Canada (DRDC) elected to use a wargame. At their core, wargames are tools for exploring and informing human decision-making in an environment with incomplete and imperfect information.[44] They are

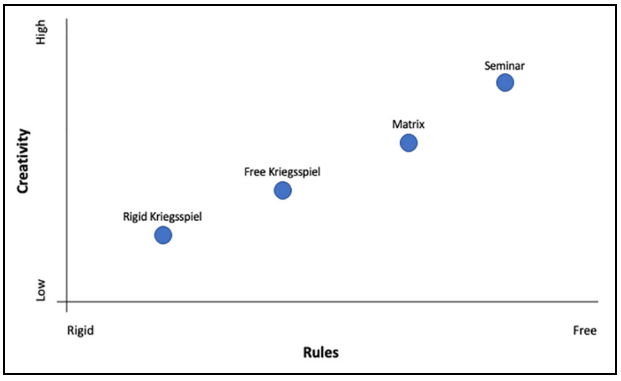

Figure 1. Wargame continuum.

beneficial because they can be used to leverage and generate innovative ideas, address defense problems of the future, and can be applied to all levels of warfare.

There are a variety of different wargame types or formats.[45] The most common tabletop tactical games employ a kriegsspiel approach (either rigid of free) whereas strategic games generally employ a matrix or seminar approach.[46] As noted by Appleget et al., wargames flow on a continuum from rigid kriegsspiel, to free kriegsspiel, through matrix games, on to seminar games (see Figure 1).[47]

Arranging wargames according to their creative potential and associated rulesets, as depicted in Figure 1, is somewhat simplistic. However, important general characteristics of a wargame including the complexity of scenario development/context, level of adjudication, type of rule sets/procedures used, the use of exchange tabulations/calculations, level of player engagement, involvement, and interaction, level of creativity and original thought, and data generated are also closely associated along this continuum.

For example, rigid and free kriegsspiel games are more structured, adjudicated, and involve more preparation time. Rigid kriegsspiel games are rules based, have key components to a player's action, key steps to a gameplay turn, and involve exchange tabulations/calculations to resolve movements/exchanges. Movements/exchanges in kriegsspiel games are mathematically based, and figure more prominently in the play of the game.[47] Free kriegsspiel games can include components of a traditional rigid kriegsspiel game (rules/procedures, exchange tables, player actions, adjudication), but can also provide more player freedom of action, player interaction, and creativity/originality. In other words, in rigid kriegsspiel games, the rules/procedures tabulations/calculations are the mechanics that move the game forward. In free kriegsspiel games, the rules/procedures tabulations/calculations aid/assist the umpire in moving the game forward.

In their simplest form, kriegsspiel games involve three basic steps. The first is a round of moves. Players move pieces on a map in predetermined order (e.g., RED–GREEN–PURPLE–YELLOW–BLUE). Moves are followed by a round of actions. Players perform actions in the same predetermined order (e.g., RED–GREEN–PURPLE–YELLOW–BLUE). After the moves and actions, the conflicts/exchanges are resolved. Rigid kriegsspiel games use exchange tables/calculations for this step whereas free kriegsspiel games can use an adjudicator or umpire to resolve the conflicts/exchanges (usually also involving some form of exchange table). Moves (positions), exchanges, and outcomes logged by the adjudicator.

Further up the continuum are matrix games. The matrix game was developed by Chris Engle and predicated on Georg Hegel's concept of thesis/antithesis, in that arguments/counter-arguments allow exploration of ideas from different perspectives and generate new ideas.[47] Thus, matrix games are free form, include player development of the narrative, involve player debate/discussion and/or role playing. After players make their arguments and counter-arguments, either a collective consensus is reached or an adjudicator rules on the result. (Matrix wargames can use multiple adjudication methods. For example, stochastic for combat outcomes, expert panel for diplomatic outcomes.) From this perspective, there can be a large area of overlap between matrix games and free kriegsspiel games, especially when an adjudicator and other structured/rules-based components such as exchange tabulations/calculations are involved.

As matrix games are free and open and involve a greater player interaction/involvement, players are free to undertake a wider (almost limitless) variety of actions.[45] However, in their simplest form, matrix games involve players stating their action in a predetermined order (e.g., RED–GREEN–PURPLE–YELLOW–BLUE). The player presenting their move states their action (what the player wants to do), the result (what the player intends their action to achieve), and then up to three reasons or augments as to why their action will be successful. Other players are then given an opportunity to present arguments/counter-arguments (up to three) either in support or in opposition to the player presenting their move. After arguments/counter-arguments have been presented, the adjudicator rules on the result based on the strength of the arguments/counter-arguments, and conflicts/exchanges are resolved (usually involving a dice roll). Once an argument or action is won (resolved) it becomes part of the game and the adjudicator logs the moves (if applicable), actions, exchanges, and outcomes.

In another variation of a basic matrix game, all players present their action in a predetermined order (e.g., RED–GREEN–PURPLE–YELLOW–BLUE). The players present their move using the same basic action/result/reasoning

(up to three supporting arguments) format. Once all actions and arguments have been presented, the adjudicator rules on the result based on the strength of the players' arguments presented. Conflicts and exchanges are resolved (usually involving a dice roll) if required. Once an argument or action is won (resolved) it becomes part of the game and the adjudicator logs the moves (if applicable), actions, exchanges, and outcomes.

Finally, at the far end of the continuum are seminar wargames. Seminar wargames are generally easier to design and conduct, focus on understand/exploring a problem or concept in a structured fashion, and encourage creativity and original thinking. Whereas matrix games attempt to explore a problem through a structured and adjudicated argument/counter-argument process, seminar wargames explore a problem through a structured discussion aided by a facilitator. The aim is to discuss what has happened, what is happening, what might happen, and why.[45]

4.1. Why a hybrid wargame?

From this perspective, Figure 1 highlights that different wargames have applicability in different situations, with different aims, objectives, and results. However, as Appleget et al. comment, the most useful wargames are not kriegsspiel games or matrix/seminar games in of themselves, but rather hybrid wargames that employ different aspects of the wargames together.[47] In a strategic situation such as that described here, where coalition forces have to respond to hybrid threats in the gray zone, and where gaming tactical effects of various capability mixes can have dramatic strategic consequences both in terms of success and failure, neither a kriegsspiel game nor a matrix game will work in isolation.

Kriegsspiel games are generally effective at the tactical level. However, one challenge with kriegsspiel games is that owing to their normally compressed time scales, and often limited scope, they preclude the development of strategic considerations because the game typically ends before the strategic effects become apparent and/or relevant. Even large scale operational kriegsspiel games that typically take place against a strategic backdrop do not consider changes to the strategic environment in of itself.[48] In some simple cases it might be possible to assume the strategic impact of various outcomes, and thus set the game up to measure or reflect those outcomes. For example, in gaming a tactical engagement within an existing conflict, the implications of improper use of force can largely be estimated. However, in more complex situations where there are multiple stakeholders with competing agendas, this is generally not the case. Outcomes may differ and cannot be pre-set because of the various red lines and risk tolerances of the various actors. For example, doing nothing may encourage further provocation or outright attack, but it may also help defuse an otherwise tense situation.

Gaming the complex and competitive activities taking place in the gray zone can be challenging as well. Between 11 September 2001 and the end of Operation Iraqi Freedom (2011), wargaming had come under scrutiny for failing to effectively prepare the warfighter for combat in an insurgency and in scenarios other than war.[48] Some analysts questioned whether force-versus-force wargames were relevant in a post-9/11 world. Nevertheless, work focused on making the wargames more relevant to activities and actors in the gray zone. From this perspective, failure was not because of the game's inability to prepare warfighters for combat in the gray zone. Rather, it was because wargames had not effectively incorporated the irregular, asymmetric, competitive, and complex nature of hybrid threats.[48]

As a result, recent wargaming techniques have sought to fill this gap in the discipline by introducing the effects of social and political factors that could impact military operations to matrix games. Several recent high-profile strategic games have been successfully executed utilizing a matrix game approach to address these issues.[49-51] According to the UK Ministry of Defence *Wargaming Handbook*, open-ended matrix and seminar wargames can be utilized for precisely this reason because they tend toward the full range of political, military, economic, social, infrastructure, and information (PMESII) events.[46]

Unlike tactical kriegsspiel games, matrix games can accommodate more complex strategic scenarios with multiple competing agendas because they normally have a high-level focus. Therefore, they are generally unsuitable for gaming tactical level engagements or considering tactical engagements with any level of detail. In effect, matrix games do not provide the option to compare different capability mixes since they do not provide the level of tactical fidelity needed by SAS-151 to wargame and assess various IFC mixes.

Taken together, kriegsspiel games are effective at addressing different capability mixes, but they do not provide the ability to determine strategic outcomes. Matrix games provide the ability to explore strategic developments and outcomes, including incorporating hybrid threats and activities, but are limited in their ability to assess different capability mixes. Therefore, for the purposes of this wargame DRDC proposed an alternative approach, a hybrid wargame that takes advantage of the individual strengths of both a kriegsspiel and a matrix game, while simultaneously limiting their weaknesses.

The approach is to execute a modified/shortened version of a matrix game to assess the outcome of an initial tactical level kriegsspiel engagement game, itself set up within a strategic and operational context of the matrix game.[52] Although the basic components to a player's

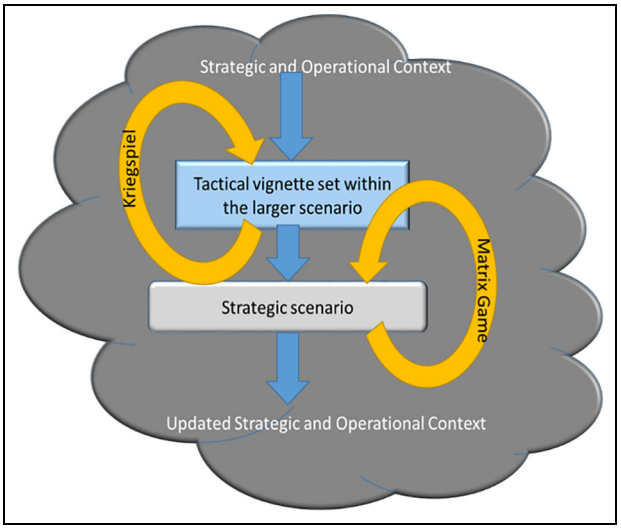

Figure 2. Kriegsspiel matrix game: hybrid set within specific strategic narrative with both components changing this narrative.

action and the key steps to a gameplay turn are retained from a typical kriegsspiel and matrix game described previously, the specific components to a player's action and gameplay turn for the SAS-151 hybrid wargame are elaborated on in the following (see Figures 3 and 4). As will be discussed, how the key steps and gameplay turns are set up, how they are used together to approach the problem of assessing IFCs in the gray zone is a unique adaptation to these traditional games and is displayed in Figure 2.

Specifically, the tactical vignette is set within a wider and more detailed strategic and operational context than is normal for a kriegsspiel game.[52] The matrix game is not played before the kriegsspiel game, but the tactical matrix vignette is set up in a strategic and operational context that could be conceived to be the end-state of a turn in the matrix game. This wider scenario includes not only tactical level systems and capabilities that need to be evaluated, but political and strategic interests and objectives, the political state and intent of various actors, risks, and predefined force composition levels of the players.[53]

The important part to recognize in this game is that once the tactical level kriegsspiel game is resolved, the results of the kriegsspiel game are applied within the strategic level matrix game to explore the outcome of tactical effects that have dramatic strategic consequences. Once the game is finished, the tactical and strategic outcomes of the different force compositions and capability mixes are analyzed.

4.2. Kriegsspiel game: resolving the tactical

In terms of game design and mechanics, the following description is how NATO SAS-151 played the kriegsspiel game to resolve the tactical level component of the hybrid game. In a free kriegsspiel game such as the one used by SAS-151, players execute a round of moves in a predetermined order (in this example RED–GREEN–PURPLE–YELLOW–BLUE). Players can move any, all, or none of their pieces. The move must be uncontested, in that the move itself must not confront or challenge one of the other players. The move does not constitute an action, but it can be used to position assets for the action phase. Movements must reflect actual time scale movement distances reflected in the game, as well as the capability limitations

1. **Round of moves.**
   - Players move pieces in predetermined order (e.g., RED-GREEN-PURPLE-YELLOW-BLUE).
   - Moves must be uncontested moves.
2. **Round of action cards.**
   - Players play Platform-System-Action cards in same predetermined order (e.g., RED-GREEN-PURPLE-YELLOW-BLUE).
   - Players provide reason for Platform-System-Action card play. Cards tell the story.
   - If no engagement, move goes to next player's action.
   - If engagement, opposing (defending) player permitted counter action.
3. **When complete, Action cards referenced to Engagement Table to determine Exchange Rate (ER).**
4. **Adjudicator rolls dice to determine randomized outcome.**
5. **Conflicts are resolved.**
6. **Moves (positions), exchanges, and outcomes logged by White Cell.**
7. **Move continues to next player's action.**
   - Repeat steps 2-7 as necessary.
8. **Next turn.**

Figure 3. Structure/flow of the kriegsspiel game.

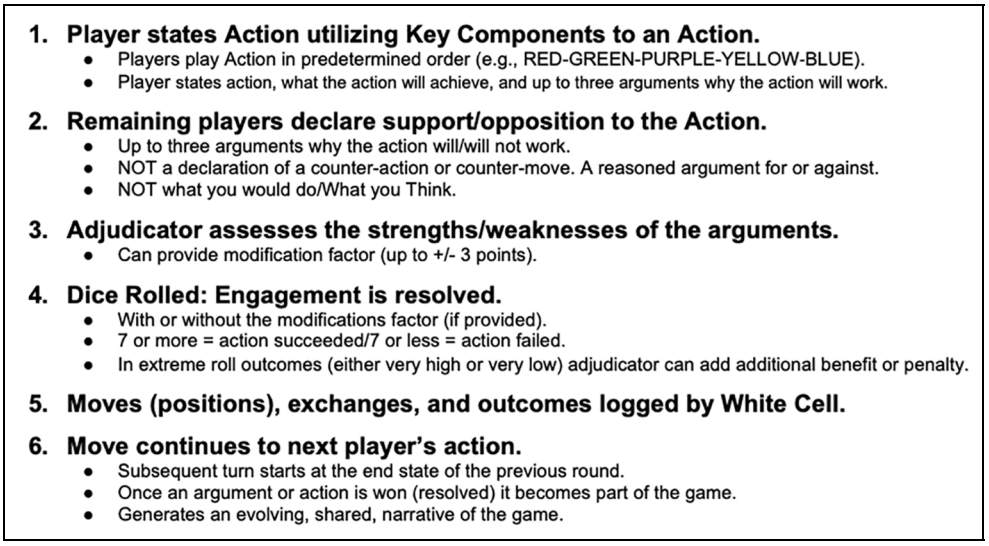

Figure 4. One full matrix gameplay turn.

of various platforms (speed, endurance, maneuverability). The overall flow of the game is outlined in Figure 3.

Players then play a round of platform–system–action cards in the same order as the move round. Platform–system–action cards contain details and performance characteristics for the platform, system, and action in question. After deliberation with team members, team leaders present their cards to indicate their chosen action/engagement. In a deviation from a typical kriegsspiel game, players provide reason(s) for their platform–system–action card choice. This helps to form the operational and strategic narrative used in the matrix component of the hybrid game.

If no engagement is played with the platform–system–action card choice, the turn goes to the next player's action in the play order sequence. However, if a player's action card represents an engagement with another player, the player being engaged (defending) is permitted a counter action. The defending player may choose to do nothing, defend against the engagement, counterattack, or attack the player elsewhere on the map.

Once the action and counter action are established, the action cards are referenced to an engagement table. The engagement table determines a baseline exchange rate between two competing players' engagement platform–system–action decision. The adjudicator rolls dice to determine the randomized outcome for the engagement. A dice roll of seven or more means the move succeeded; a roll of less than seven means the move failed. In effect, the exchange rate table determines the probability of success between the two players' courses of action. The dice roll determines the level of randomness (or risk) to an exchange rate engagement. In a hypothetical example, BLUE may hold a distinct advantage in its platform–system–action card choice *vis-á-vis* RED's card choice. However, when the adjudicator rolls the dice, it turns out to be overwhelmingly in RED's favor. The dice roll represents not only uncertainty, but, above all, risk. According to von Clausewitz:

> We see, therefore, how, from the commencement, the absolute, the mathematical as it is called, nowhere finds any sure basis in the calculations in the Art of War: and that from the outset there is a play of possibilities, probabilities, good and bad luck, which spreads about with all the coarse and fine threads of its web, and makes War of all branches of human activity like a gambling game. (von Clausewitz,[54] p. 117)

Randomness and risk represent real-life events that can influence and have an impact on the initial probability of success of a chosen course of action. Statistically most dice rolls will fall within the seven range ($\pm$ three). However, extreme rolls can and do happen (just like in real life) and can have a significant effect on the outcome of the game.

To conclude the turn, conflicts are resolved and the outcome(s) of the turn (the moves/positions, exchanges, and outcomes of the dice roll) are implemented and documented by the adjudicator. This then creates the starting point for the next turn. Furthermore, the outcome of the turn is used to shape the strategic and operational situation, potentially affecting the option space for following moves, and providing further input for the strategic matrix game. In this way, the kriegsspiel becomes an integral part of the strategic game, rather than simply a tactical conflict resolution game against a strategic backdrop. The tactical

kriegsspiel game is played for five turns, or until end conditions are met. (End conditions were contained in team brief documents.) Once the tactical level kriegsspiel game has run its course, the results of the kriegsspiel game, as well as the changed strategic and operational conditions are applied to the strategic level matrix game to explore the outcome of tactical effects that have strategic consequences.

4.3. Matrix game: playing out the strategic

Once the tactical level game is resolved, the matrix game is played to determine the strategic outcome.[53] In typical matrix game fashion, players play an action round in a preset order (in this example RED–GREEN–PURPLE–YELLOW–BLUE). The key components to an action involve a player stating their action, what are the desired/expected effect(s) of the action, and up to three well-reasoned arguments for why their action would succeed. Then the other players can present their own reasons and arguments either in support or opposing the outcome. This is not a declaration of a counter-action or counter-move, it is a reasoned argument/counter-argument for or against the stated action. Once all participants have delivered their arguments, the adjudicator assesses the arguments and can provide a modification factor (up to $\pm$ three points). The dice are then rolled, and the outcome is adjusted by the modifications factor (if applicable). If the total is seven or more, the action succeeds. If the total is seven or less, it fails. If the outcome is extreme (either very high or very low) the adjudicator can add additional benefit or penalty to the player. Figure 4 shows the various steps to one matrix gameplay turn.

Once a gameplay turn is completed, it is the next player's turn to state their action. Subsequent turns start at the end state of the previous round. It is important to note, in matrix games, once an argument or action is won (resolved) it becomes part of the game. This approach makes matrix games a collective narrative building exercise, because every player must build upon the results of the previously made decisions and outcomes. The strategic matrix game is played either for a predetermined number of turns (in this case for only one turn), or until the end condition(s) are met.

5. Game implementation and testing

The hybrid wargame was initially intended as a tabletop wargame to be played at the NATO International Concept Development & Experimentation Conference in the fall of 2020. However, with the outbreak of Coronavirus-19 (COVID-19) and the resulting travel restrictions imposed by many national governments, it was decided to design and execute the game online in a virtual environment. Notwithstanding these developments, the intent remains to revert the game back to a tabletop wargame in the future to enable potential exploration of classified scenarios.

Several different online and web-based solutions were considered and, in some cases, tested by the NATO SAS-151 Wargame Working Group. (The SAS-151 Wargame Working Group was a group established within the SAS-151 panel with the aim of developing the hybrid wargame methodology, mechanics, scenarios, and online execution. It consisted of international members from NATO (the SAS-151 panel), JIFCO, and DRDC.) Owing to the distributed nature of the game, one of the most important challenges was identifying an information technology (IT) solution, or solutions, that would accommodate different user requirements (some players used personal computers whereas others used work/government/NATO computers), that did not require significant login or joining instructions, was stable enough for prolonged gameplay, and was cost-effective. After considering the advantages and disadvantages of the different IT options and tests, the SAS-151 Wargame Working Group decided on a combination of Webex™ for video, and Google™ Docs/Slides (Google™ Docs for team text chats, Google™ Slides for map and gameplay and to capture player moves using speaker notes). Owing to the complexity of the hybrid game setup NATO SAS-151 ran two full-scale test games to validate the game methodology, scenarios, and online execution of the gameplay tools.

The first test game occurred on 23–25 June 2020. This wargame serial successfully tested scenario one, the game mechanics and its transition from a tabletop to online/virtual game, the tools used for intra- and inter-team communications and game moves, and a comparison of the baseline IFC actions/outcomes versus advanced IFC use. The second test game was conducted from 29 September–1 October. It used scenario two to test the game mechanics in an online/virtual environment, transitioning from a tactical kriegsspiel game to a strategic matrix game, revisions to the tools used for intra- and inter-team communications, and game moves. This same game will be used by SAS-151 in conjunction with the NATO International Concept Development & Experimentation Conference to launch the NATO IFC Concept Development program.

5.1. Scenario one

The first scenario considers a visiting NATO Maritime Task Force in a civilian non-NATO member port. The port visit is required to conduct resupply and replenishment of the Task Force. The scenario looks at the harassment of the alongside vessels via small UAVs, and groups of civilians impeding/disrupting access to the vessel.[55] Both are used together to challenge the decision-making of the NATO Maritime Task Force Commander.

To provide greater strategic context, the scenario includes pre-existing tensions between the Host Nation Government and parts of the population (local ethnic minorities) that oppose the NATO presence (motivated by a Host Nation Opposition group). Although the Host Nation Government has tried to maintain a friendly relationship with NATO, any incident between NATO forces and the local population would complicate the ability of the Host Nation Government to allow the NATO port visit to continue.

5.2. Scenario two

This second scenario looks at the harassment of coalition vessels by maritime militia, go-fasts and rigid-hull inflatable boats, and other military vessels of two aligned hostile countries. These boats impede a NATO Maritime Task Force's navigation in a constrained and contested waterway; they also use medium sized UAVs to swarm and harass the NATO vessels. These capabilities and tactics give a distinct advantage to any hostile actor that utilizes harassment, swarming, bumping and ramming, and/or hit-and-run tactics. These are used together to challenge the decision-making of the NATO Maritime Task Force Commander.

Adding to the complexity of the security situation, the scenario takes place in a very tense security environment where any miscalculation or excessive use of force can have significant strategic consequences. There are multiple overlapping and competing maritime claims in the region, including excessive territorial sea and exclusive economic zone claims made by RED and its ally (PURPLE), as well as an ongoing information operation campaign being used by RED and PURPLE to discredit NATO and the Task Force mission.

5.3. Game implementation and testing

In each scenario, two possible BLUE capability sets were considered. The first option played the NATO Maritime Task Force not having any IFCs. RED was also given a slight advantage at the start of the scenario owing to the demonstrated initiative and effectiveness of the real-world forces RED was modeled on. This generally left the Task Force with the options of either doing nothing or escalating to the use of lethal force (warning shots can be easily misinterpreted as an attempted attack). The second option played the same scenario but with the NATO Maritime Task Force having advanced IFCs (technology expected 5–10 years in the future). It was expected that this would give the Task Force more options to control (escalate/de-escalate) the situation and to take strategic initiative.

The test games led to two main observations. First, methodologically the hybrid wargame approached worked, and conducting the wargame using a combination of WebEx™ and Google™ Docs/Slides during COVID-19 was also an effective way to conduct a virtual distributed wargame. The SAS-151 Wargame Working Group was able to use a tactical kriegsspiel game within a wider strategic context, and then play the outcomes and concurrent changes in the strategic narrative of the kriegsspiel game in a strategic level matrix game. In other words, it was observed that tactical actions affected the strategic narrative.

Second, gameplay generated valid data and results that the SAS-151 Wargame Working Group can use to analyze the IFC capability options. There was an observable difference in the game dynamics at the strategic level with and without the IFCs. In the absence of the IFCs, RED was able to generally control the situation and maintain the strategic initiative. With IFCs, BLUE was able to address strategic dilemmas imposed by RED and gain the strategic initiative, forcing RED into a reactive mode.

Specifically, in scenario one, RED had the initiative when NATO did not have any IFC capabilities. NATO, however, had the initiative with advanced IFCs. Advanced IFCs resulted in RED resorting to an outright misinformation campaign at the strategic level, whereas this did not occur in the baseline scenario. This observation echoes the findings of Shortland et al. where lack of a response option (in this case doing nothing) had the same effect as using force.[41] It provided the adversary with the strategic initiative and a narrative that was highly damaging to the NATO Task Force's activities/mission.

In scenario two, coalition vessels had limited time and space to deal with harassing vessels impeding navigation and air operations. Similar to scenario one, RED had the initiative when NATO did not have IFCs. However, NATO had the initiative with advanced IFCs, and RED's activities had less of an effect on the NATO mission. Observations from scenario two support findings from SAS-094. The presence of NLWs (as a subset of IFCs) provide additional engagement time and space for the NATO Maritime Task Force Commander to make decisions. They provided the NATO Task Force a means by which to isolate targets to be engaged, and a means by which to engage targets when conventional force would not be possible or appropriate.[38]

6. Conclusion

As noted at the outset, hybrid threats in the gray zone encompass a wide spectrum of tactics, domains, systems, and areas of conflict/competition. Colonel Qiao highlighted just how complex this competition is when he asserted nothing is off limits, nothing is forbidden. Notwithstanding the fact that nothing is off limits,

adversaries will aim to achieve their objective below the threshold of open armed conflict. Adversaries are not positioning themselves to challenge the West in force-on-force confrontations, but rather with military technologies in niche areas combined with asymmetric means (such as the use of civilian proxies and militias) to constrain and limit our freedom and action and conventional superiority. In this environment, the traditional lines between tactical, operational, and strategic are either diminishing, blurring, or disappearing. Adversaries try to create dilemmas for decision-makers at all levels. In these situations, tactical responses often have strategic consequences.[56,57] Doing nothing or using force will give adversaries the initiative, allow them to control the narrative, control the escalation/de-escalation of strategic events, and initiate and use crises to their advantage.

Developing and fielding IFCs is all the more important when one considers these developments in the broader strategic environment. To be sure, IFCs are not a silver bullet and an answer to all hybrid threats. However, evidence from recent conflicts in Iraq and Afghanistan (and supported by NATO SAS-094 wargaming and live experimentation) suggests that development of robust IFC/non-lethal capabilities not only against personnel, but against systems (trucks, cars, UAVs, etc.) could effectively counter undesirable adversarial behavior. Rather than taking away options from Coalition forces and limiting Coalition freedom of action, IFCs have the effect of nullifying adversaries' options and creating dilemmas for them.

Initial results of from the virtual/online hybrid test games conducted by NATO SAS-151 further support and build on these earlier findings. The hybrid wargame approach was developed because neither a tactical kriegsspiel game nor a strategic matrix game can individually determine whether IFCs can make a difference to mission success. The hybrid wargame circumvents this issue by taking advantage of the individual strengths of a kriegsspiel game and a matrix game by using them both together. By setting the tactical vignette in a wider strategic and operational context, resolving the kriegsspiel game while allowing it to change the strategic narrative itself, and then playing the results of this kriegsspiel game in a matrix game, SAS-151 was able to observe that the presence of IFC capabilities had an effect on tactical level play as well as strategic level play.

The two test games also brought community members and subject matter experts together, and it got defense planners ''thinking'' about tactical and strategic IFC challenges in the gray zone. The outcomes suggest that the hybrid wargame is a viable analytical tool for assessing IFCs against hybrid threats in the gray zone. Gameplay generated valid data and results that SAS-151 can use to analyze different IFC capability options. Promising preliminary results of the NATO SAS-151 hybrid wargame opens possibilities for additional IFC research and gaming. Development of land-based scenarios, classified scenarios, and scenarios incorporating alternative or conceptual adversarial hybrid capabilities/tactics are all areas for further consideration, investigation, and testing. As noted by the JIFCO, IFCs are an essential strategic risk mitigation investment effort that provide warfighters with the tools necessary to seize the initiative while competing below the level of armed conflict. An essential capability requirement in the current geostrategic environment.

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