

Improving Operational Wargaming: It's All Fun and Games Until Someone Loses a War

A Monograph

by

Lt Col Matthew E. Hanson
USAF



School of Advanced Military Studies
United States Army Command and General Staff College
Fort Leavenworth, Kansas

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Name of Candidate: Lt Col Matthew Hanson

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Approved by:

_____, Monograph Director
Peter J. Schifferle, PhD

_____, Seminar Leader
Charles T. Lombardo, COL

_____, Director, School of Advanced Military Studies
Henry A. Arnold III, COL

Accepted this 26th day of May 2016 by:

_____, Director, Graduate Degree Programs
Robert F. Baumann, PhD

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Abstract

Improving Operational Wargaming: It's All Fun and Games Until Someone Loses a War, by Lt Col Matthew E. Hanson, USAF, sixty pages.

In 2015, Deputy Secretary of Defense Robert Work committed the Department of Defense (DOD) to overhaul its approach to wargaming in order to reinvigorate innovation across the DOD, including a five-year target to use wargames to improve operational planning. This monograph explores the causes of wargaming failures and proposes recommendations for successful wargames. Does doctrine provide sufficient guidance, striking the appropriate balance between prescriptive and descriptive guidance? This monograph postulates that wargaming theory—including game element analysis and wargame pathologies—provides an excellent rubric for creating and evaluating wargames and wargaming doctrine, that doctrine and practice diverge from wargame theory, and that current doctrine does not provide sufficient guidance. The theory—history—doctrine approach of this monograph is intended for military planners, doctrine authors, and wargaming professionals.

Wargames are a useful tool to assess plans as directed in operational planning processes; however, commanders and staffs should neither equate wargame victory with wargame success, nor consider either as “validation” of a given plan. There are ten elements of wargame design: objectives, scenario, database, models, rules and procedures, infrastructure, participants, analysis, culture and environment, and audiences. These elements provide a framework for creating wargames, and analyzing wargames and their failure modes (known as pathologies).

By evaluating Japan's Midway campaign plan through the theories of game element analysis and wargame pathologies, this monograph creates greater understanding of those theories and provides recommendations for doctrine. Pathologies exhibited by Japanese planners include those related to wargame objectives, scenario, database, model, participants, and culture; genuine testing of the Operation MI plan appears to have been impossible. Wargame officials twice rejected inconvenient outcomes, undermining the credibility of the game, creating lasting controversy, and preventing meaningful analysis.

Current operational planning doctrine lacks sufficient detail on *how* to design and conduct wargames, neglecting the diverse needs of planning staffs. At present, doctrine diverges from wargame theory in its contents and by its omissions. Improving doctrine would capitalize on these insights and potentially avert an otherwise foreseeable military catastrophe.

In the absence of updated joint and service doctrine, operational planners will lack the descriptive—yet detailed—instruction necessary to ensure useful and valid operational planning wargames. Doctrine authors should include the lessons of game element analysis, wargame pathologies, and other sources into joint and service doctrine to assist operational planners in creating wargames that are theoretically sound and operationally insightful.

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Acronyms

AFD	Air Force Doctrine
AFI	Air Force Instruction
AL	Operation Aleutian Islands
AMSO	Army Modeling and Simulation Office
BOGSAT	bunch of guys sitting around a table
CAS	close air support
CNA	Center for Naval Analysis
COA	course of action
COCOM	Combatant Command
DOD	Department of Defense
ECOA	enemy course of action
FM	Field Manual
GEA	Game Element Analysis
IJN	Imperial Japanese Navy's
JFCOM	Joint Forces Command
JOPP	Joint Operational Planning Process
JP	Joint Publication
MA	most advantageous
MC-02	Millennium Challenge 2002
MCPP	Marine Corps Planning Process
MCWP	Marine Corps Warfighting Publication
MD	most dangerous
MDMP	Military Decision Making Process
MI	Operations Midway
ML	most likely
NWP	Navy Warfare Publication

OIF	Operation Iraqi Freedom
OSD	Office of the Secretary of Defense
ROC	rehearsal of concept
ROE	rules of engagement
TRADOC	Training and Doctrine Command
UFMCS	University of Foreign Military Cultural Studies
USSBS	United States Strategic Bombing Survey

Introduction

This wasn't the enemy we wargamed against.

—Lieutenant General William Wallace, Commander V Corps, 2003

Millennium Challenge 2002 (MC-02) was a \$250 million wargame hosted by the now-defunct Joint Forces Command (JFCOM). JFCOM intended to use MC-02 to test the Department of Defense's (DOD) new concept of Rapid Decisive Operations against a determined adversary.¹ The wargame erupted into controversy when the adversary "Red Force"—led by retired Marine Corps Lieutenant General Paul Van Riper, representing a third-tier middle-east adversary—sank the preponderance of the vastly superior US fleet on the first day. The game's umpires had no choice but to "float" the fleet and restart the game in order to meet additional training objectives.² This time, however, the Red Force's moves were tightly constrained, causing Van Riper to eventually step down in frustration.³ Finger pointing ensued, with the game's organizers claiming that Van Riper had exceeded his mandate. Van Riper and his supporters countered that what was

¹ US Joint Forces Command Millennium Challenge 2002: Experiment Report, accessed March 28, 2016, http://www.dod.mil/pubs/foi/Reading_Room/Joint_Staff/12-F-0344-Millennium-Challenge-2002-Experiment-Report.pdf F-1. The epigraph is from Stan J. Hinton, "Foundry 2.0: Evolution of Intelligence Readiness Training Towards Meeting the Needs of Army 2020," *MI Professional Bulletin* no. PB 34-14-4 (October-December 2014): 2, accessed January 18, 2016, https://fas.org/irp/agency/army/mipb/2014_04.pdf.

² Micah Zenko, *Red Team: How to Succeed by Thinking Like the Enemy* (New York: Basic Books, 2016), 56; Peter P. Perla III, *The Art of Wargaming: A Guide for Professionals and Hobbyists* (Annapolis, MD: Naval Institute Press, 1990), 47. According to many wargame theorists, umpires can be justified in modifying game outcomes. However, interventions are only appropriate in limited cases, such as facilitating other legitimate wargame objectives or correcting gross errors. Game controllers must thoroughly document the deviation and justification for intervention to retain any lessons from the initial outcome. Often the intervention is less problematic than the subsequent failure to record causes, potential solutions, or other lessons from the incident.

³ Zenko, 56-57. In a subsequent phase, for example, the umpires prevented the red force from even contesting blue's amphibious operation. The umpires even bypassed Van Riper, giving direct orders for the red force's employment to his chief of staff.

supposed to be a “free play” wargame was really a scripted exercise.⁴ Even Van Riper’s MC-02 opponent, blue force commander Lieutenant General B. B. Bell, defended his unconventional methods, and acknowledged the learning opportunity they created.⁵ The MC-02 case study highlights the high-stakes conflicts that can arise in wargames when strong-willed participants with competing agendas stridently disagree over contradictory objectives, scenarios, rules, and other game elements. Subsequent events in Operation Iraqi Freedom (OIF) underscored the unrealistic expectations often heaped upon wargames.

In March of 2003, commander of US forces in OIF, General Wallace, defended his V Corps against growing criticism for the chaos spreading in Iraq, stating “This wasn’t the enemy we wargamed against.”⁶ Whatever Wallace’s intent, the quote became a foil for criticizing Secretary Rumsfeld’s concept of rapid decisive operations during the ongoing struggles in OIF.⁷ It also served as a criticism of the umpires’ curtailment of Van Riper’s Red Force during MC-02. If MC-02 was any indication, the legitimacy of wargaming throughout DOD appeared to be in doubt.

Thirteen years and three secretaries of defense after MC-02, Deputy Secretary of Defense Robert Work committed the DOD to overhaul its approach to wargaming in order to reinvigorate innovation across the DOD. On February 9, 2015, he penned a memo titled “Wargaming and

⁴ Zenko, 58. In Van Riper’s own words “War-gaming is not normally corrupted, but this whole thing was prostituted; it was a sham intended to prove what they wanted to prove.” JFCOM Commander, General William F. Kernan, later regretted the conflict that arose over Van Riper’s expectation of free play, and subsequent curtailment. Senior Pentagon and JFCOM officials continued to insist that there was no undue influence in MC-02.

⁵ Zenko, 60.

⁶ Hinton, 21.

⁷ “Interview with COL (ret) Kevin Benson,” Operational Leadership Experiences (Fort Leavenworth, KS: Combat Studies Institute), accessed March 29, 2016, <http://cgsc.contentdm.oclc.org/utills/getfile/collection/p4013coll13/id/3026/filename/3029.pdf>. Wallace’s comment was taken out of context, leading to a media firestorm. The perceived slight to his chain of command nearly cost him his job as commander of V Corps.

Innovation” in which he decried the atrophied state of wargaming in the DOD. Secretary Work identified wargaming as a key method to prepare for an uncertain future, spur innovation, and shape future investments. He also highlighted wargames as a means to offset operational and technological risk. More importantly, he envisioned a cultural change in which experimentation, dissent, and risk-taking are valued, and “red-teaming” is endemic throughout the DOD as a means to innovation.⁸ Secretary Work also stated that these lofty goals required new guidelines, and professional military education must elevate wargaming to renewed prominence. Perhaps most ambitiously, Secretary Work envisioned a strategy-driven budget, and a planning, programming, budgeting, and execution process informed by wargaming.⁹ In June of 2015, the Office of the Secretary of Defense (OSD) issued a white paper identifying problems with the contingency plans briefed to the OSD by Combatant Commands (COCOMs). Plans briefed to the OSD lacked sufficient detail in planning assumptions, operational concepts, required resources, decision points, and risk to mission and forces—all areas addressed through wargaming.¹⁰ This monograph supports Secretary Work’s five-year target of using wargames to improve operational planning by exploring wargame failure modes and proposing actionable solutions.¹¹

⁸ Joint Publication (JP) 1-02 *Department of Defense Dictionary of Military and Associated Terms* (Washington, DC: Government Printing Office, 2015), 204. JP 1-02 defines red teams as “An organizational element comprised of trained and educated members that provide an independent capability to fully explore alternatives in plans and operations in the context of the operational environment and from the perspective of adversaries.”

⁹ Robert Work, “Wargaming and Innovation” (Deputy Secretary of Defense, memo issued to the Department of Defense, Washington, DC, February 9, 2015).

¹⁰ Office of the Secretary of Defense (OSD), “OSD Planning Review Process White Paper” (memo issued to combatant commands, Washington, DC, June, 2015).

¹¹ Work, “Wargaming and Innovation,” Although Work’s memo includes guidance relative to operational wargaming, the emphasis appears to be on wargaming to inform future capabilities requirements, research and development, technological trends, acquisitions and budgets. Work’s vision for wargaming appears to be nested his “Third Offset” strategy, which intendeds to maintain the United States’ military advantage through technological innovation. See remarks by Greg Grans, Special Assistant to the Office of the Deputy Secretary of Defense. “Analytical Wargaming Workshop” (talking points from Army War College wargaming summit, March 16, 2016).

Purpose, Research Question, and Thesis

The purpose of this monograph is to explore the causes of wargaming failures and propose recommendations for successful wargames.¹² The MC-02 debacle begs several questions. Primarily, how can the military create useful and unbiased wargames to test operational concepts? Does wargame theory offer a comprehensive rubric for evaluating wargames and wargaming doctrine? Does practice or doctrine diverge from wargame theory? Does doctrine provide sufficient guidance, striking the appropriate balance between prescriptive and descriptive guidance? This monograph postulates that wargaming theory—including Game Element Analysis (GEA) and wargame failure modes (known as pathologies)—provides an excellent rubric for creating and evaluating wargames and wargaming doctrine, that doctrine and practice diverge from wargame theory, and current doctrine does not provide sufficient guidance. As a result, operational planners often end up repeating the same old pathologies of wargaming, such as those exhibited by Japanese planners prior to Midway.¹³ The problems of MC-02 share many similarities with Japan’s wargames prior to the battle of Midway, suggesting these lessons remain relevant. As Japan would learn at Midway, the costs of poor wargaming are too great to leave the practice to chance. By evaluating Japan’s Midway campaign plan through the theories of GEA and wargame pathologies, this monograph creates greater understanding of those theories and provides recommendations for doctrine.¹⁴

¹² Matthew Caffrey Jr. in “Towards a History Based Theory of Wargaming,” *Aerospace Power Journal* (Fall 2000): 53. In 2000, Lt Col. Caffrey conducted a historical survey that identified perennial problems with wargaming, and called for further work to identify solutions.

¹³ Perla, 287-88. Beyond the scope of this monograph, it is appropriate to ask which types of problems are suitable for wargaming. According to Perla, “alone, wargames, exercises, and analysis are useful but limited tools for exploring specific elements of warfare. Woven together in a continuous cycle of research, wargames, exercises, and analysis each contribute what they do best to the complex and evolving task of understanding reality.”

¹⁴ GEA and wargame pathologies will be explored in detail on subsequent pages. GEA provides a deliberate framework for constructing (and critiquing) wargames. The pathologies explain common failure modes associated with the game elements included in GEA.

Methodology, Audience and Organization

Renowned Prussian military theoretician, Carl von Clausewitz, defines critical analysis as “the application of theoretical truths to actual events.”¹⁵ Clausewitz’s critical inquiry “the examination of means—poses the question as to what are the peculiar effects of the means employed, and whether these effects conform to the intention with which they were used.”¹⁶ In keeping with Clausewitz’s dictum, the methodology of this monograph is to evaluate the Battle of Midway—focusing on Japan’s planning and wargaming prior to the battle—through the theory of wargaming pathologies. Although existing histories briefly mention Japan’s wargames and the irony of Japan’s subsequent loss, this monograph attempts to fill an analytical void by systematically evaluating Japan’s wargaming practices against a theoretical framework.¹⁷ This approach also provides greater exposition of the GEA approach than mere definitions. Next, this monograph will examine current wargaming doctrine through GEA and wargame pathologies to evaluate whether current doctrine could contribute to any of the same wargame failure modes as those that befell Japan at Midway. Clausewitz explains how military professionals may use historical examples to explain an idea, demonstrate application of an idea, support a point of view, and deduce doctrine.¹⁸ This history—theory—doctrine approach is intended for military planners, doctrine authors, and wargaming professionals.

This monograph is organized into five sections that explore aspects of the theory, history, and doctrine of wargaming, and provide recommendations for wargaming doctrine. The remainder of the introduction outlines the GEA and wargaming pathologies methods of

¹⁵ Carl von Clausewitz, *On War*, translated and edited by Michael Howard and Peter Paret (Princeton: Princeton University Press, 1984), 141.

¹⁶ *Ibid.*, 157.

¹⁷ Jonathan Parshall and Anthony Tully, *Shattered Sword: The Untold Story of the Battle of Midway* (Washington, DC: Potomac Books, 2007), 442. As the authors state in their comprehensive account of Midway, future studies “will necessarily be based less on survivor accounts and more on the interpretation of operational data.”

¹⁸ Clausewitz, 171.

constructing and evaluating wargames, which also constitutes the evaluation criteria for this monograph. Section One, Wargame Theory, explains the definition, purpose, and validity of wargames. Section Two, Battle of Midway Case Study, applies the GEA/Pathologies methodology to the Battle of Midway. Section Three, Wargaming in US Military Doctrine, reviews applicable joint and service doctrine regarding wargames. Finally, Section Four and Five provide conclusions and broad recommendations for doctrine.

Evaluation Criteria: Wargaming Pathologies

In 2004, the Center for Naval Analysis (CNA) published a study by Weuve et al. entitled *Wargame Pathologies*.¹⁹ *Pathologies* defines ten elements of wargame design: objectives, scenario, database, models, rules and procedures, infrastructure, participants (including players, controllers, and observers), analysis, culture and environment, and audiences.²⁰ These elements provide a framework for creating wargames, and analyzing wargames and their failure modes (known as pathologies).²¹ Game designers often cannot control all of these elements, therefore

¹⁹ CNA <https://www.cna.org/centers/cna/>, accessed March 9, 2016. Rather confusingly, the organization states that CNA is not an acronym and is correctly referenced as “CNA, a federally funded research and development center serving the Department of the Navy and other defense agencies.”

²⁰ Christopher A. Weuve et al., *Wargame Pathologies* (Alexandria, VA: CNA, 2004), 11-12. *Wargame Pathologies* endeavors to provide an improved theoretical framework and intellectual rigor to analyzing historical case studies as well as improving the execution of contemporary wargames. CNA’s 2004 “Wargame Pathologies” is a continuation of Robert C. Rubel’s 2003 unpublished work by the same title. Perla’s *The Art of Wargaming* originally defined six game elements; *Wargame Pathologies* adds four additional game elements: participants, infrastructure, culture and environment, and audience. Weuve’s experience includes six years wargaming at CNA, five years as assistant professor at the Naval War College, and ongoing work as a naval analyst at the DOD.

²¹ *Ibid.*, 3, 10. GEA offers several advantages for a wargame design team: It breaks the game into smaller parts that may be delegated to team members, it is a rigorous method of addressing all aspects of a game during design, and it is based on existing fundamentals of game design and therefore works within existing design procedures. *Pathologies* provides a user-friendly checklist to preempt most failure modes, and is an essential companion to game designers at any level.

they must carefully tailor the elements they can control to maintain balance between all elements. This monograph emphasizes objectives, scenario, participants, analysis, and culture and environment as the basis for historical and doctrinal critique. Although pathologies in any game element can contribute to wargame failures, a survey of notable historical wargames suggests these five have the greatest impact on success or failure.²²

Objectives address the underlying purpose for a wargame and are, for good or ill, the defining element of wargame design. Gameable objectives are “those objectives that are reasonably addressable through the medium of a game.”²³ Objectives should also be explicit and unambiguous whenever possible; however, wargame designers (including staff planners) must be aware of implicit organizational objectives.²⁴ It is up to the wargame designer to ensure the selected objectives are appropriate to wargaming, are not conflicting, and do not bias the wargame toward a preordained outcome. Of note, wargame objectives are distinct from the operational objectives of the war plan under review in an operational wargame, and often fall into broad categories of education (to include training) and research (including operational planning). For example, the operational objectives of the plan may include seizing territory, defeating the adversary’s military, or removing a dictator; whereas the wargame’s objective may be to explore possible outcomes of that operation (research), or to train the staff to command and control the

²² Cases considered for this monograph included the battle of Tannenberg, Midway, MC-02, and others. The game elements and associated pathologies are, in fact, closely linked. For example, a commander or higher headquarters (audience) can impart pressures on the participants.

²³ Weuve et al., 9. The authors’ definition excludes unrealistic goals, although context dictates when a particular goal is (or is not) realistic. A ‘healthy game’ meets its designed objectives, whereas an ‘unhealthy game’ does not. This monograph extends Weuve’s definition of unhealthy games to include games designed with inappropriate or counter-productive objectives. Wargame pathologies are simply the causes of unhealthy games.

²⁴ Ibid., 14. It may be inappropriate to overtly state certain implicit objectives for political reasons. The authors also propose a desirable implicit objective for wargame designers: to preserve the intellectual integrity of the wargame.

operation (education). Common failure modes related to objectives include unattainable objectives, conflicting objectives, game design that does not address objectives, and pre-determination.²⁵

The scenario establishes the qualitative boundaries of the game, such as the Red and Blue Forces' missions within a broader context including starting conditions and desired end states.²⁶ The mission represents the military objectives within the game scenario, as distinct from the aforementioned wargame objectives. The scenario also includes the geopolitical context, the contextual limits on participants (such as restrictions on weapons or techniques, etc.), and the resources available to the players (such as military units, their weapons, and capabilities). If properly constructed, the scenario melds the game elements into a seamless package, creating the suspension of disbelief necessary for optimal wargaming.²⁷

Scenario-related pathologies occur when the scenario is incomplete, overly specific, or lacks explicit guidance such as victory conditions and operational limitations. The scenario must be appropriate to the time and resources available; too short a scenario prevents realization of consequences of earlier moves, whereas too broad a scenario prevents meaningful exposition of disparate branches. Finally, the scenario should not artificially constrain player actions from the

²⁵ Weuve et al., 13-15; Perla, 165, 193-194. Predetermination may be intentional or unintentional. See Perla 195-203 for further discussion on how wargame designers must craft player roles to support game objectives. For example, should the operational commander and other key staff personnel 'play themselves' in the game? What if the game design forces the strategic (meaning operational) planner to delve into tactical details? There are no clear answers, but many questions and tradeoffs, which deserve careful consideration.

²⁶ Weuve et al., 16. End states can include the spectrum of win-sets, such as a preferred outcome and acceptable alternative outcomes.

²⁷ Weuve et al., 16-19; Salen and Zimmerman, *Rules of Play: Game Design Fundamentals* (Cambridge, MA: MIT Press, 2004), 7, 34, 95, 99. Salen and Zimmerman coin the term 'magic circle' to describe the special time and place, created by a game, in which players accept the limits of the rules and adopts the 'lusory attitude' (suspension of disbelief) necessary for successful game play. This definition originated with Johann Huizinga, *Homo Ludens: A Study of the Play Element in Culture*. Boston: Beacon Press, 1955.

full set of realistic options, unless required to meet overriding game objectives.²⁸ Considering MC-02, one can see how the implicit objective for Blue to win, and thus “validate” the concepts under review drove the umpires to modify the scenario to constrain the Red Force. The MC-02 umpire’s ever more debilitating (and farcical) restrictions undermined the credibility of the game, leading to Van Riper’s revolt.²⁹

Participants include players, controllers, and observers. Each plays a distinct role in the wargame, and each has its own set of pathologies. Players, including those in the Red (enemy), Blue (friendly), and Green (neutral) Forces, provide the essential human element that differentiates wargames from other methods of study, such as models or simulations.³⁰ Player-related pathologies include players placed into the wrong role or into a role they do not understand, player unfamiliarity, disaffected or bored players, and under-qualified players.³¹ For example, many doctrinal references prescribe that members of the intelligence staff should populate the Red Force. However, an operational officer, supported intelligence personnel, may be better qualified to role-play the enemy commander.

²⁸ Weuve et al., 16-19.

²⁹ Zenko, 54, 58. The backstory to MC-02 includes Unified Vision 2001, a wargame held the previous year to test the theory of ‘effects-based operations’ in which Van Riper also led the Red Force. In Unified Vision, a crude contrivance in the scenario allowed the blue force use hypothetical future technology to locate and destroy all twenty-six of the red force’s buried missile silos. Van Riper was angry when the final report failed to address the artificiality of the scenario and the ensuing flawed analysis. As a result, the JFCOM Commander (Kernan) promised van Riper that MC-02 would be “a free play and honest exercise.” This vignette indicates the complicated interaction between objectives, scenario, and participants that may be present in a wargame.

³⁰ Perla, 8, 274; Weuve et al., 29-37. Weuve also includes designers and the audience as a type of participant. For clarity, this monograph focuses on players, controllers, and observers. According to Perla, “Wargaming is an experiment in human interaction. Without human players there may be a model, but there is no game.”

³¹ Players acting above/below their actual age and experience may not grasp the complexities of that level. For example, a senior leader may lack recent experience in tactical matters, and a junior officer may be unaware of broader strategic or political issues familiar to senior leaders.

The second category of participants, controllers (also known as umpires or the “white-cell”), play a crucial role in game success. Controllers adjudicate outcomes and ensure players operate within game rules. White players must have the experience and judgment to arbitrate between Red and Blue, and independently and impartially “sanity-check” game outcomes. Controllers can consciously or subconsciously bias the game towards a particular side or outcome if they step outside of their role as an impartial arbiter.³² Observers comprise the final category of participants, and may represent the sponsoring organization, parallel or higher commands, or contracting organizations supporting the game, to name a few. Observers can induce pathologies by actively influencing the game, or unintentionally biasing participants towards actions or decisions favored by the observer. Applicable to any type of game, Salen and Zimmerman define five player (participant) types: standard, dedicated, unsportsmanlike, cheaters, and spoil-sports.³³ In a wargame, all participants exhibit one or more of Salen and Zimmerman’s player types.

Analysis serves the purpose of research wargames, and potentially provides one of the greatest sources of pathologies.³⁴ Wargamers should not attempt to steer wargame analysis in a manner inconsistent with wargaming, such as attempting to use results to “prove” a concept or

³² Weuve et al., 34-36.

³³ Salen and Zimmerman, 268-276. In this construct, the *standard* player makes a good faith effort and follows the rules. The *dedicated* player goes above and beyond the standard player and is willing to attempt innovative strategies to win. The *unsportsmanlike* player ostensibly follows the rules, but violates the lusory spirit of the game attempting to find any avenue to win. The *cheat* violates the rules in order to win, and the *spoil-sport* is more interested in disrupting the game than winning or losing. Salen and Zimmerman’s construct describes players of all types of games, and they are certainly applicable to professional wargaming.

³⁴ Analysis, as used here, is concerned with recording and using the raw data from the recently completed wargame, and reflecting on the game design to eliminate pathologies. This is a distinct, but essential, precursor to the courses of action (COA) *analysis* step in JOPP and service-specific planning processes familiar to military planners. In the JOPP steps for COA analysis and comparison, planners grade COAs with numerical or qualitative values in order to facilitate COA selection. See Joint Publication (JP) 5-0 *Joint Operational Planning* (Washington, DC: Government Printing Office, 2011), IV-30, IV-38.

operational plan, or conduct many types of quantitative analysis.³⁵ According to CNA, “good wargaming analysis is closer to analytical history than to scientific analysis.”³⁶ As a rule of thumb, “If the answer you are looking for is a number, a wargame is not the best approach.”³⁷ The most important outputs of analysis include the key decisions of the wargame, why each side made those decisions, and the potential outcomes of alternative decisions. Analysis should also assess the validity of the game—in terms of both its design and execution—to determine if flaws in the game design biased any of the wargame results.

Impatience or conflicting interests can cause many failures in the analysis step. Controllers must diligently record decisions and adjudications during game play, just as game designers must carefully document the game’s design. Undocumented decisions, particularly those that override original outcomes, violate proper analysis procedures. If participants or sponsors blithely treat “victory” in the game as validation of a plan or concept, the game will fail to produce its most important outputs, such as decisions, assumptions, alternatives, and areas for further study.³⁸ Similarly, the audience and participants must resist the temptation to reject inconvenient lessons from the game arbitrarily. This is not to suggest that controllers should never overrule game results; However, discounting or rejecting game results should only follow thorough and impartial analysis with ample documentation.³⁹

Culture and environment encapsulates a wide variety of influences. One source of cultural bias is deep-seated cultural norms, such as deference to authority, gender roles,

³⁵ Weuve et al., 38-39; Perla 179-180.

³⁶ Weuve et al., 38.

³⁷ Elizabeth Bartels, “Getting the Most Out of Your Wargame: Practical Advice for Decision-Makers” War on the Rocks, accessed March 7, 2016. <http://warontherocks.com/2016/01/getting-the-most-out-of-your-wargame-practical-advice-for-decision-makers/>

³⁸ Bartels.

³⁹ Weuve et al., 39-40.

worldviews, and religious beliefs. Unsurprisingly, service or agency culture and doctrine can also lead to conflicts or bias game play. Even office culture, such as intolerance for conflicting views or negative attitudes towards wargames and exercises, can affect game participation and results. Failures related to culture can begin as early as game design that fails to address or offset cultural biases. Cultural influences from any level may induce participant bias or changes in risk tolerance during play, all of which may influence outcomes.⁴⁰

The remaining five game elements—rules, infrastructure, database, models, and audience—and their associated pathologies are not central to the present historical and doctrinal critique. However, it is essential for aspiring wargamers to be familiar with all game elements and pathologies. Rules are “the specified procedures for the ‘orchestrated use’ of scenarios, databases, and models.”⁴¹ Rule-related pathologies include rules that are wrong or incomplete, are too complicated, do not support game objectives, or are burdensome to participants.⁴² Infrastructure includes the “hardware, software (non-game specific), facilities, and supplies” that facilitate game play consistent with game objectives.⁴³ Infrastructure presents a pathology when it is inadequate or does not reasonably approximate real-world infrastructure.⁴⁴ The database is closely related to the scenario, but encompasses the quantitative aspects of the game, such as friendly and enemy composition, disposition, and strength, which the model should represent. While the scenario should outline the specific units available to Blue and Red, the database would include the

⁴⁰ Weuve et al., 41-42.

⁴¹ Weuve et al., 24. Katie Salen and Eric Zimmerman, 120. Salen and Zimmerman alternatively define rules as the “logical underbelly beneath the experiential surface of any game.”

⁴² Weuve et al., 26-27.

⁴³ *Ibid.*, 28.

⁴⁴ Many wargames—particularly those needed by military staff planners during the operational planning process—do not require elaborate infrastructure. High-fidelity infrastructure is only necessary if driven by the wargame objectives. Furthermore, infrastructure does not need to physically exist so long as it is represented in the rules or model in the game.

combat power associated with those units; however, the probability a given Blue Force has of imposing damage or defeat on a given Red Force is contained in the model. Database pathologies may include data that is incomplete, incorrect, hard to access, or that participants do not trust.⁴⁵

Models are the “physical, mathematical, or otherwise logical representation of a system, entity, phenomenon, or process.”⁴⁶ Models both support decision-making and assist in adjudicating combat outcomes by describing the interaction between the elements of the wargame scenario and database. For example, combat resolution tables are a simple model representing the probable outcomes of various combat actions. In contrast, planners may use multiple iterations of a complicated computer model to estimate the munitions requirement for a battle or campaign. Models present a host of potential failure modes, such as difficulty of use or a level of accuracy or fidelity inappropriate to the game design or objectives.⁴⁷ A wargame’s audience includes the sponsoring organization, or any other party with an interest in the wargame. While it is generally important to know one’s audience, this knowledge can bias the wargame’s design or participants towards predetermined outcomes, negating the wargame’s natural ability to create new insights.⁴⁸

⁴⁵ Weuve et al., 19-21.

⁴⁶ Army Modeling and Simulation Office (AMSO) accessed on March 23, 2016. <http://www.ms.army.mil/library/gloss.html>. According to AMSO, simulation is merely “a method for implementing a model over time.” Note that other definitions, including Perla’s, include wargames as types of simulations. AMSO bridges this ambiguity with a secondary term ‘simulation game,’ which includes wargames.

⁴⁷ Weuve et al., 21-24; Perla, 216. Perla cautions against overreliance on computer models and simulations for many reasons, including accuracy and complacency.

⁴⁸ Weuve et al., 43-44; Robert Work and Paul Selva, “Revitalizing Wargaming is Necessary to Be Prepared for Future Wars” accessed March 23, 2016 <http://warontherocks.com/2015/12/revitalizing-wargaming-is-necessary-to-be-prepared-for-future-wars/>. In their article, Work and Selva (Vice Chairman of the Joint Chiefs of Staff) emphasize the importance of vigorous, unbiased, red teams in order to reveal weaknesses and spark innovation throughout the DOD. According to Weuve et al., audiences often exert subtle or overt influence on game objectives or participants, which can bias game play or results. For further discussion, see Stephen Downes-Martin’s “Your Boss, Players, and Sponsors: The Three Witches of Wargaming” in *Naval War College Review* 2014, Vol 67, No. 1, 31-40.

There are many ways to construct wargames and evaluate their design; the GEA/pathologies method is comprehensive yet flexible enough to work in many situations. It also provides the military planner with a ready toolkit to supplement incomplete guidance in doctrine. GEA provides a window into the complex interactions of the game elements that can bias the wargame during its design and execution. This awareness can help the designer eliminate bias and remain true to the overriding element—the wargame objectives. The following sections apply GEA and the pathologies of wargaming to current US doctrine and Japanese wargames prior to the battle of Midway.

Wargame Theory

In addition to GEA and the pathologies of wargaming, many modern wargaming theorists offer generally complimentary, but somewhat divergent views. The following section will summarize the generally accepted purposes, definitions, and justifications for wargames. Amongst other uses, wargames present a unique method to test operational plans, train commanders and staffs, and develop requirements for logistics and weapons systems. Through player participation, wargames create deeper and more lasting insights than other investigative methods. Wargames are also well suited to address complex, or “ill-structured” problems.⁴⁹

Purposes of Wargames

By providing commanders and staffs a “synthetic experience” to explore “decision-making possibilities in an environment with incomplete and imperfect information,” wargames are a highly effective method for developing leaders and training headquarters staffs, amongst other uses.⁵⁰ Wargames are a useful tool to assess plans as directed in the Joint Operational

⁴⁹ Robert Rubel, “The Epistemology of War Gaming,” *Naval War College Review*, Vol. 59, No. 2 (Spring 2006):110-111.

⁵⁰ Shawn Burns, ed., *War Gamers Handbook: A Guide for Professional War Gamers* (Newport, RI: US Naval War College, 2012) 3. Quote is originally from Herman, Frost, and

Planning Process (JOPP); however, commanders and staffs should view wargame results as plausible, rather than predictive.⁵¹ Furthermore, they should neither equate wargame victory with wargame success, nor consider either as “validation” of a given plan. Instead, the purpose of wargaming in the planning process is to apply the rigor of a thinking enemy against a plan in order to create learning opportunities for the participants and identify potential problems with the plan. These lessons enable the staff to make informed revisions to the plan, and better prepare the commander to make decisions during operations.

A successful wargame should portray a possible set of outcomes and reactions, and generate insights for the participants. When used as a part of military planning processes, the wargame should also elucidate measures of effectiveness, which may be useful in both evaluating competing plans and measuring progress during real-world execution of the plan.⁵² Indeed, even the term “success” is misleading: Blue may lose in the wargame, but the wargame is only successful if the staff learns from the experience and improves the plan by resolving issues exposed by the wargame. If Blue wins a wargame, but the staff does not identify and correct planning errors, then the wargame has in fact failed its purpose. Furthermore, a good wargame expresses the human nature of warfare through live player interaction.⁵³ As in war, uncertainty is an essential element of any wargame. In wargames, this is achieved through participation of live

Kurz, 2009.

⁵¹ JP 5-0, Chapter IV.

⁵² Peter Perla, *The Art of Wargaming: A Guide for Professionals and Hobbyists* (Annapolis, MD: Naval Institute Press, 1990) 164.

⁵³ *Ibid.*, 164.

players and, typically, from combat resolution calculations which incorporate chance.⁵⁴ By definition, therefore, one cannot reproduce wargame results.⁵⁵

Wargames Defined

Just what is a wargame? The broadest definitions include nearly any analytical method for exploring potential outcomes to a given situation as well as combined staff and field exercises such as Key Resolve, Red Flag, and training deployments to the National Training Center.⁵⁶ Peter Perla, former Director of Interactive Research Products at CNA, defines wargames narrowly as “a warfare model or simulation whose operation does not involve the activities of actual military forces, and whose sequence of events affects, and is, in turn, affected by the decisions made by players representing the opposing sides.”⁵⁷ The Naval War College also uses this definition in its

⁵⁴ Incorporating chance into a wargame can introduce a risk: participants may reject unfavorable or unlikely outcomes or take a negative attitude toward the game. Conversely, removing chance eliminates an important dimension of a good wargame—it should force both sides to react to unpredictable outcomes.

⁵⁵ Perla, 164.

⁵⁶ Martin Van Creveld, *Wargames: From Gladiators to Gigabytes* (Cambridge, UK: Cambridge University Press, 2013). Historian Van Creveld goes even further by including tribal games, Roman gladiators, medieval tournaments, paintball, laser tag, and more. His broad historical approach provides an extensive historical survey, considering wargames from many perspectives, such as a surrogate for actual war, training and preparation for war, and a means for the layperson to experience vicariously the thrill of combat. While an interesting historical survey, van Creveld’s approach is far too broad to be of use in this monograph, except to the extent he addresses wargames as an analytical exercise for training commanders and staffs, and for developing operational plans (see chapter four).

⁵⁷ Perla, 164; David Ross, “Investigating the Fundamentals of the Third Generation Wargame: Wargaming, a Course for Future Development” (Air Force Research Laboratory, 2008), accessed January 9, 2016, https://www.researchgate.net/publication/235051725_Investigating_the_Fundamentals_of_the_Third_Generation_Wargame_Wargaming_a_Course_for_Future_Development, 1. Perla is one of the foremost contemporary wargaming theorists. His *The Art of Wargaming* is an essential companion to any professional wargamer. According to Ross, *The Official Dictionary of Military Terms* (1992) defined *wargame* as “a simulation by whatever means of a military operation involving two or more opposing forces, using rules, data, and procedures designed to depict an actual or assumed real-life situation.” However, the modern version of the same publication, Joint Publication 1-02 *Department of Defense Dictionary of Military and Associated Terms* (2015) does not define the term.

War Games Division's *War Gamers' Handbook*, emphasizing the benefits of wargaming over field exercises: "decisions are not constrained by safety, rules of engagement (ROE), real-world territorial boundaries, or training objectives."⁵⁸ Phrased more proactively, the wargame designer can tailor a host of attributes, such as friendly and enemy forces, ROE, political constraints, military objectives, collateral risks, or acceptable losses in order to discover how certain courses of action affect outcomes.

Models and simulations are not games, though they may provide the means of calculating combat resolution or providing analytical support to wargames. Models and simulations often provide the computational backbone of a wargame, but they are *not* wargames in their own right. Multiple iterations of a simulation may be able to generate a probable range of possibilities for outputs such as campaign progress, munitions expenditures, or countless other quantifiable details, but it will always take a thinking and cunning opponent (in a wargame) to test Blue and its plans against the uncertainties of actual conflict.

Dr. John T. Hanley, former Director of Strategy for the Office of the Director of National Intelligence, developed a five-tiered scale of indeterminacy, which illustrates the limitations on models and simulations.⁵⁹ On Hanley's scale, "no indeterminacy" described the simplest problems, which were amenable to calculated solutions; "structural indeterminacy" described the most complex problems, such as war, in which initial conditions and the interactions within the system are unknown. By definition, models can represent non-indeterminate problems, whereas structurally indeterminate problems can only be addressed by weakly structured tools, such as wargames. In the middle of Hanley's scale are problems of "stochastic-indeterminacy" which, given starting conditions, behave according to statistical variation. Thus, models and simulations can represent non-indeterminate problems with known interactions; repeated runs of models or

⁵⁸ Burns, 4.

⁵⁹ Rubel, 111-112.

simulations with statistical variations can provide insights to stochastically indeterminate problems, but only wargames can address truly indeterminate problems.⁶⁰

This monograph excludes pure field exercises, such as training deployments to the National Training Center and Red Flag, from the family of wargames. While field-training exercises are undoubtedly premier training forums against challenging and dynamic opponents, the focus of such exercises is clearly on tactical proficiency and real-time command and control rather than testing strategic or operational plans against a real-world opponent. Staff exercises, such as Key Resolve and Millennium Challenge, defy strict categorization because they primarily focus on practicing command and control at the higher headquarters level. Staff exercises often do involve simulations and opposing forces; however, the purpose of these elements is to animate the scenario, thus creating a more robust training environment for the staff to rehearse an operational plan. Furthermore, staff exercises are often designed to cover diverse events for staff training purposes; these are valid training objectives but are often in contravention to the open-ended nature at the heart of true wargames. Despite these differences, this monograph includes staff exercises under the umbrella term of wargames because they can still provide dynamic training environments for staffs and valuable feedback to operational plans. Furthermore, the lessons of GEA and wargame pathologies are largely applicable to staff exercises. Indeed, the distinction between true wargames and many exercises is a matter of degree, rather than absolutes.

So-called “table-top games” or “seminar games” present another challenge to define, but are essentially a formalized version of a BOGSAT (bunch of guys sitting around a table).⁶¹ In a

⁶⁰ To use the Persian Gulf as an example, given known friendly and enemy forces, and expected attrition ratios, multiple runs of a model can produce a probable range for the number US ships that an expected Red missile salvo would damage. In contrast, the MC-02 wargame illustrated how an adaptive opponent can create a plausible future scenario outside the strict boundaries of a computer model.

⁶¹ The term “table-top games” can also apply to commercial board game-style wargames. As used throughout this monograph, the term indicates a synonym for “seminar game.”

seminar-style exercise, a facilitator presents a small group of leaders with a problem. As the group proposes solutions and reactions, the facilitator acts as a devil's advocate to challenge the proposals and present the opposing side's counteraction. Through successive turns, the facilitator can expose the group to potential outcomes and other considerations, and potentially lead to valuable insights. However, these exercises lack the rigor of true wargames, and there is a tendency for players to revert to shared biases or assumptions. Furthermore, the facilitator is likely to have a disproportionate and undue influence on the course of the game.⁶² For these reasons, this monograph does not categorize such exercises as wargames.

This is not to suggest that such activities have no place in operational planning. An informal meeting to “red team” (present contrary opinions) can be a valuable educational tool and may generate significant insights into potential enemy actions and possible counteractions.⁶³ Likewise, a facilitated—even scripted—rehearsal of the actions and decision points expected of a commander can be beneficial to the commander and staff, and provides an opportunity for informal discussion of branch plans or contingencies. However, because seminar games are essentially one-sided, they cannot provide the same robust experience as a wargame.⁶⁴ As Nobel Laureate Thomas Schelling postulated the following impossibility theorem: “One thing a person cannot do, no matter how rigorous his analysis or heroic his imagination, is to draw up a list of the things that would never occur to him!”⁶⁵ Compared to seminar or table-top exercises,

⁶² Weuve et al., 48-49. The referenced pages are in Appendix 1 of *Pathologies*, which includes the original pathologies as drafted by Professor Robert Rubel of the Naval War College.

⁶³ Note that red teaming (in this context as a verb) is distinct from the designated Red Force (noun) in a wargame.

⁶⁴ A seminar game that includes Red, Blue, and Green players will likely provide a more ‘wargame-like’ experience than one in which the facilitator plays White, Red, and Green. However, seminar games do not include the key game elements of rules, procedures, databases, and models. Therefore, it may be easier to construct a seminar game, but only at the expense of the rigor of a true wargame.

⁶⁵ Burns, 4; Thomas C. Schelling “Role of War Games and Exercises,” in *Managing Nuclear Operations*, eds. Ashton B. Carter, John D. Steinbruner, and Charles A. Zraket (Washington, DC: The Brookings Institution, 1987), 436.

wargames better enable participants to gain such insights; therefore, despite the many benefits of seminar exercises and similar activities, they do not qualify as wargames. Despite these limitations, an operational planner may need to rely upon a seminar-style game during crisis action planning when there is simply no time to prepare a more formal wargame.

Why Wargames Work, and Limitations of Wargames

Historian Thomas B Allen criticizes that “what the wargaming enthusiasts then (WWII) and now often fail to say is that the losers of World War II took gaming far more seriously than the winners did.”⁶⁶ Allen appears to confuse correlation with causation. If anything, Allen’s critiques reinforces the arguments that wargames must be carefully designed and executed, and participants and audiences should consider results as informative, not predictive. Indeed, the losers’ wargames revealed valuable lessons that they all too often ignored. The following section addresses Allen’s critique.

Participation is one of the key reasons why wargames are distinct from, and generally preferable to, seminar-type “games.” This is not an arbitrary distinction, as participation and experiential learning form the basis of most adult learning models.⁶⁷ In wargames, the act of participation makes the player more likely to internalize the lessons and experiences of the game, as compared to more passive learning methods. As psychologist Dietrich Dorner notes in *The Logic of Failure*, “The wise gain their wisdom through experience.”⁶⁸ In a well-constructed game, participants suspend disbelief of the fictional scenario; behaviors and decisions are more true to

⁶⁶ Thomas B. Allen, *War Games: The Secret World of the Creators, Players, and Policy Makers Rehearsing World War III Today* (New York: McGraw-Hill, 1987), 127.

⁶⁷ Jeff Leser and James Sterrett “A Battle in Every Classroom: Gaming and the U.S. Army Command & General Staff College,” in *Joystick Soldiers: The Politics of Play in Military Video Games*, eds. Nina B. Huntemann and Matthew T. Payne (New York: Routledge, 2009), 146-159.

⁶⁸ Peter P. Perla and ED McGrady, "Why Wargaming Works," *Naval War College Review*, summer 2011 64, no. 3 (June 2011), 112.

how participants would act and think in the real world, incorporating feelings of stress and responsibility for the consequences of one's actions.⁶⁹ Any type of table-top or BOGSAT game does not elicit the same authentic participation or impart the same lasting lessons. Through interactive game play, participants also create their own unique "constructed narrative" as they respond to the game's "presented narrative."⁷⁰ Another benefit of player interaction is the fresh—often passionate—exchange of diverse opinions.

In order for a wargame to "work," one must start with proper expectations for what a wargame can and cannot deliver: "wargames produce insights, not proofs."⁷¹ These insights may include the myriad of relationships within a complex operational environment. Wargames also indicate possible outcomes, however a key limitation to such outcomes is the degree of free choice permitted of the opposing force by the wargame objectives, rules, and officiating. In other words, one cannot hope for broad insights from a wargame if the opposing force is tightly constrained. The more tightly the opposing force is constrained, the more the activity behaves like a deterministic model or simulation, rather than a wargame.⁷² In MC-02, conflicting objectives led the umpires to constrain Red behavior well beyond what was operationally reasonable. For example, White prevented Red anti-aircraft batteries from opposing Blue's amphibious assault. Such constraints may be appropriate if the objective is simply to rehearse an operation; however,

⁶⁹ Peter P. Perla and ED McGrady, 114-16, 122. As anyone who has ever fought with their sibling over a game of Monopoly can attest, even the simplest games can quickly become very real to its participants.

⁷⁰ *Ibid.*, 121. The authors attest that "in games, then, disbelief is suspended twice, once when the players enter into their roles and again when they use their new (game) identities to construct the game's narrative." Additionally, the BOGSAT approach to analysis is more likely to regurgitate existing opinions as opposed to turning over new analytical stones.

⁷¹ Rubel, 112.

⁷² Perla, 34. As the author notes, "It is this very lack of certainty, however, that makes wargaming so important. We may never know the right answers, but gaming can sometimes help us learn to ask the right questions."

if the purpose is to test a plan against reasonable contingencies, such constraints are difficult to justify.⁷³

It is also important for wargamers and their audiences to understand that wargames are only reliable in cases appropriate to their design. Wargame characteristics are often a trade-off between multiple attributes, which the wargame designer combines to achieve specific wargame objectives. For example, in general, the easier a game is to play, the less (or more narrowly) it represents reality. A more realistic game will involve far more calculations, will require more specialized personnel and equipment to run, will cost more, and likely take longer. Furthermore, the concept of realism should not be confused with objective accuracy, nor imply any expectation of accurately predicting future events.⁷⁴ Increased realism implies the game attempts to represent more detail in the scenario, model, simulations, experience, and outputs. Increasing realism may require more detailed input conditions and models that are more complicated, in order to produce more granularity in outputs; however, these input conditions and models are still subject errors in estimation and design. The following section will apply wargame theory, GEA, and the pathologies of wargaming to Japan's wargames for Operation Midway.

⁷³ Gary Anderson and Dave Dillege, "Six Rules for Wargaming: The Lessons of Millennium Challenge '02," War on the Rocks, accessed March 23, 2016 <http://warontherocks.com/2015/11/six-rules-for-wargaming-the-lessons-of-millennium-challenge-02/>. The authors identify the conflicting objectives of a wargame, experiment, and real-world exercise as the first of six causes for MC-02's failures.

⁷⁴ George Lewin, *War Games and Their History* (Stroud, England: Global Book Sales, 2012), 12; Perla, 32-34. The authors concur on the tradeoffs between playability and realism, and the greater time and complications involved with wargames that are more comprehensive. Perla also points out that a lack of realism can also lead to a lack of playability, and vice-versa. For a comprehensive history of wargaming, see C. G. Lewin's *War Games and their History*. Perla's *The Art of Wargaming* (chapter one) provides a select history, as does Matthew Caffrey Jr. in "Towards a History Based Theory of Wargaming," *Aerospace Power Journal* (Fall 2000): 33-56.

Battle of Midway Case Study

Two primary criteria influenced the case study selected for this monograph: availability of source material, and, if possible, a wargame that subsequently played out in actual warfare. Operational wargames and war plans are, of course, carefully guarded secrets, limiting the available source material. Furthermore, historical treatment of wargames in battle and campaign histories is generally cursory. Wargames prior to the turn of the twentieth century, such as Koenigspiel and Kriegsspiel, were primarily used for teaching tactical principles rather than formally testing draft war plans, and therefore did not offer the necessary historical comparison.⁷⁵ The battle of Midway met the selection criteria and offered the possibility of comparing and contrasting Japan's Midway wargaming with wargaming prior to Pearl Harbor and with contemporary US Naval wargaming.⁷⁶

Midway marked Japan's first major defeat in World War II, and was a watershed event in Japan's conquest in the Pacific. From Japan's perspective, the battle of Midway presents an abject lesson in military planning in general and in wargaming in particular. Japan's wargames in preparation for Midway are a small but significant piece of a much larger story. However, the impact of Japan's wargames had little to do with the game's actual accomplishments, and almost everything to do with what they failed to contribute to the operation. The following case study examines Japanese wargaming and its relationship to the failure in battle through the lens of GEA

⁷⁵ Such early games typically included a map or game board of varying detail, and game pieces to represent individual combatants or larger units. Earlier games were often used to teach minor nobles in the principles of war. Later games, such as Kriegsspiel (which Helmuth von Moltke aggressively promoted throughout the Prussian military), were intended to improve proficiency throughout the military.

⁷⁶ Many potential case studies were considered for inclusion in this monograph. The World War I battle of Tannenberg had the distinction of being wargamed by both opponents prior to the battle. Captain Karl Doenitz used wargames to develop "wolf pack" tactics and refine U-boat technical specifications prior to World War II. Former Secretary of Defense, Robert McNamara used wargames, known as Sigma I and II, during the Vietnam War. In recent history, Millennium Challenge 2002 exhibited a host of wargaming pathologies. Although Midway offered the greatest source material, each of these examples provides insights into wargaming, and is worthy of further study—particularly if additional source material is available.

and wargaming pathologies. The case study will illustrate GEA and wargaming pathologies as a method for evaluating wargames, and highlight areas in which wargaming could have prevented or lessened the Japanese disaster, and demonstrate the need to improve current US wargaming doctrine.

Operational Context

In the spring of 1942, the Japanese military was flush from recent victories at Guam, Wake Island, and the Philippines, and controlled a vast swath of the western Pacific. Thousands of miles of contested ocean separated allied strongholds at Hawaii, Midway, and Australia. Japanese war planners considered their next move, eventually settling on the tiny atoll of Midway. Despite Japan's many successes from the surprise attack at Pearl Harbor, the US carriers remained unscathed, a matter of overriding concern to Japanese naval planners, who now debated the best way to mitigate the threat of the US fleet.⁷⁷ Commander Minoru Genda, Operations Officer for Commander in Chief, First Air Fleet, Admiral Chuichi Nagumo, hatched a central-Pacific plan to lure the US carriers into battle at Midway and destroy them.⁷⁸ Nagumo's superior, Commander in Chief, Combined Fleet, Admiral Isoroku Yamamoto, championed the Midway plan to the Naval General Staff.

⁷⁷ Japan sank *Lexington* and badly damaged *Yorktown* at the Coral Sea in early May, 1942; however, Japanese military leadership had already approved the concept of Operation MI. Furthermore, the bulk of the US carrier fleet remained at large.

⁷⁸ Mitsuo Fuchida and Masatake Okumiya, *Midway: The Battle That Doomed Japan; the Japanese Navy's Story* (Annapolis: Naval Institute Press, 2001), 59; Prange, *Miracle at Midway* (New York: McGraw-Hill, 1982), 35. In 2007, Jonathan Parshall and Anthony Tully published *Shattered Sword: The Untold Story of the Battle of Midway*, in which the authors take Fuchida to task for apparently comprehensive and willful misrepresentation of actual events to support his personal agenda. The purpose of the present monograph is to assess the factors affecting Japanese wargaming of Operation MI, not to provide the definitive account of the battle. Whenever practical, corroborating sources are provided in addition to Fuchida's. Furthermore, many of Fuchida's alleged historical inaccuracies primarily involve decisions during the actual battle, and have no bearing on the wargame. Co-author Okumiya's role as one of the umpires of the Midway wargame makes his a key voice, though hardly an impartial one.

Japanese military planners did not arrive at a quick or easy consensus behind the Midway plan, however. Japan's initial successes were so overwhelming as to open up a debate as to how much further Japan could—or should—pursue her war effort. Furthermore, Japan had achieved many of her strategic goals by ejecting or gravely threatening the territories of colonial powers, such as the United States, Holland, and Great Britain. Japan had secured access to the resources, such as oil, rubber, and minerals, which her burgeoning industrial base demanded. The contentious debate over what to do next strained the already difficult relationship between the Japanese Army and Navy, and also created factions within the Navy.⁷⁹

Rear Admiral Kusaka, Chief of Staff to Admiral Nagumo, favored consolidating Japan's gains and shifting to a strategic defense. The US aircraft carriers had survived the Pearl Harbor attack unscathed, and Allied counterattack was inevitable. In the fall of 1941, however, Kusaka and Nagumo had both opposed Yamamoto's bold plan to attack Pearl Harbor. Events had, so far, vindicated Yamamoto, leaving his critics poor standing to criticize his latest scheme. Most parties favored continuing offensive action over passive defense, but were strongly opposed over the exact approach.⁸⁰

Another faction on the Naval General Staff favored seizing part of Australia in a south-Pacific approach. This would inhibit US support to Australia and complicate any Allied plans to counterattack via Australia. The Japanese Army, however, vetoed this option over the large manpower requirement and the difficulties inherent in sustaining such a large force. Yamamoto yearned to eventually invade Hawaii and finish the job started at Pearl Harbor, although the Army and the Navy General Staff opposed this objective for the same reasons.⁸¹

⁷⁹ Parshall and Tully, 19, 22.

⁸⁰ *Ibid.*, 24-27. Admiral Osami Nagano, Chief of the Imperial Japanese Navy, correctly sensed the United States' reluctance for to join the war, barring any direct attacks on US territory.

⁸¹ *Ibid.*, 27-29.

Admiral Yamamoto's Chief of Staff, Rear Admiral Matome Ugaki, favored attacking the British in India in order to enable eventual linkup with the rest of the Axis powers. A series of wargames from February 20-23, 1942 tested this option. The results were not favorable, and the concept quickly faded away. Two notable concerns raised during the game were locating and neutralizing the allied fleet, and the Imperial Japanese Navy's (IJN) vulnerability to airpower.⁸²

For its part, the Japanese Army maintained its position that the land war in China should be the highest priority. To support Japan's initial conquest of the Pacific, the Army had only released eleven divisions, just one fifth of its strength.⁸³ The Army subsequently opposed all significant requests for additional manpower to support further expansion in the Pacific. This obsession with economy of force and lack of adequate transport were key planning constraints that drove the eventual selection of Midway as the objective. In the original Midway plan, the Navy's Special Naval Landing Force, similar to the US Marine Corps, would accomplish the invasion due to the Army's lack of support.⁸⁴ The Navy was capable of seizing a larger objective than Midway, but the Army would have vetoed garrisoning anything larger.⁸⁵

A bold stroke by the enemy cast the deciding vote in favor of the Midway operation, rather than anyone in the Japanese military hierarchy. Colonel James H. Doolittle's fabled raid against mainland Japan on April 18, 1942 is known both for its audacity and for its

⁸² Matome Ugaki, *Fading Victory: The Diary of Admiral Matome Ugaki*, ed. Donald M. Goldstein and Katherine V. Dillon (Annapolis, MD: Naval Institute Press, 1991), 93; Parshall and Tully, 30. It is also notable that the same uncertainties were present during the later wargames for Operation Midway; however, these concerns did not derail the Midway plan.

⁸³ Parshall and Tully, 25.

⁸⁴ Robert E. Barde, "The Battle of Midway: A Study in Command" PhD dissertation, University of Maryland, 1971), 28.

⁸⁵ Parshall and Tully, 25-26. The Japanese Army had been engaged in difficult operations in China since 1937, and maintained a large reserve force following a defeat by the Russians in Manchuria in 1939. The Army was deeply suspicious of the Navy's designs on the greater Pacific, and the manpower requirement that would come with it.

disproportional effect on Japanese psyche, particularly amongst the military leadership.⁸⁶ The casual historian may be forgiven for overlooking an entirely unforeseen consequence: the threat to mainland Japan from carrier-based aircraft quickly galvanized support behind Yamamoto's previously contentious plan to capture Midway.⁸⁷ Even though possessing Kiska and Attu Islands in the Aleutians (in addition to Midway) could not prevent future allied advances into the Pacific, Japan's military and civilian leaders concluded it was the most concrete step they could take.⁸⁸ The Army promptly reversed its objections to the campaign, proffered troops to participate in the assault, and even began quietly planning for a potential follow-on operation against Hawaii.⁸⁹ The die was cast.

The Midway Plan

The force assembled for the combined Operations Midway (MI) and Aleutian Islands (AL) was the largest assembled in the eighty-year history of the IJN, but was divided into several distinct groups operating under the concept of "distant cover."⁹⁰ In Operation MI, Nagumo's Carrier Division would lead the attack, followed by Yamamoto in the Main Body 300 nautical miles behind (about a day's sail). The Transport Group contained the landing and occupation

⁸⁶ Ugaki, 98, 112-115. Doolittle's raid was on April 18. On the 19th Ugaki remarked to his diary that the Americans were certain to attempt another such attack, and Japan must increase her vigilance to the east.

⁸⁷ Fuchida and Okumiya, 97-98.

⁸⁸ Parshall and Tully, 42-43; Barde, 29; Fuchida and Okumiya, 91. After the Doolittle raid, Japanese military leaders were mortified that the allies had threatened the emperor's safety. This particular aspect appears to be at the heart of the disproportionate psychological value of the Doolittle raid. As a result, Japanese planners became convinced of the necessity of carrying out the Midway attack. Fuchida and Okumiya corroborate the effect on military leaders of any threat to the Emperor.

⁸⁹ Parshall and Tully, 43.

⁹⁰ Barde, 46; Parshall and Tully, 54. Under the concept of distant cover, Yamamoto divided the fleet into widely separated groups. Theoretically, this obscured the objective and would lure the US carriers to battle, while providing mutual support if necessary. In practice, the groups were far too distant to do so.

force, and the Close Support Group included minesweepers and four heavy cruisers to support the landing, both of which were followed by the Invasion Force Main Body. The plan presumed one round of airstrikes would quell Midway's airfield on June 3, thus giving Nagumo's carriers free reign. Additional strikes on June 4 would prepare for the amphibious assault on June 6th. The plan called for Japanese engineers to reopen the airfield by the June 8 in order to serve as the primary base of operations to repel the expected US counterattack. Planners further assumed the US fleet was at Pearl Harbor, would not sortie until the attack on Midway began, and would take three days to reach Midway.⁹¹ Japan brought enough men and equipment to establish a formidable fortification at Midway—if they could first take the island.

Operation AL would take place nearly simultaneously but, considering the 2,400 miles between the objectives, was effectively a separate operation. Yamamoto never wanted to attack the Aleutian Islands; however, Admiral Osami Nagano, Chief of the Imperial Japanese Navy General Staff, imposed this secondary objective upon Yamamoto as the price for his approval of Operation MI.⁹² The operation involved a June 4th attack on Dutch Harbor, followed by landings on Kiska and Adak two days later. As the second largest naval operation thus far in the war (after MI), Operation AL added another layer of complexity to an already complex plan, and came at a high opportunity cost to operation MI. By allowing Operation AL to tie-up some eighty ships in total, especially four of the IJN's precious aircraft carriers, Yamamoto willingly under resourced his primary objective: the US carrier fleet and Midway Island. Despite its ostensible role as a supporting effort, and the optimistic promise of "distant cover," the forces assigned to Operation AL could not provide any mutual support to Operation MI. Once the combined plan was

⁹¹ Parshall and Tully, 48-50.

⁹² *Ibid.*, 37, 43-44. Most histories refer to Operation AL as a diversionary attack to lure the US fleet from Pearl Harbor. The authors present a convincing case that Operation AL was simply an "expedient land grab."

completed, one final step remained before Emperor Hirohito would approve Yamamoto's ambitious plan: a wargame.⁹³

Synopsis of the Midway Wargame and Battle

From May 1-5, the battleship *Yamato* hosted a large war game, including representatives from the Navy General Staff, Yamamoto's Combined Fleet, and subordinate commands. Yamamoto's Chief of Staff, Ugaki, was head umpire. Each staff operated independently, and communicated via messages carried by runners to simulate the expected challenges of command and control between the disparate elements of the operation. Admiral Nagumo played his role as leader of the planned six-carrier strike force that would attack Midway and engage the US fleet. Nagumo had always opposed the central-Pacific strategy in general, and operations MI and AL in particular, but he pulled his punches, declining to raise any concerns of the plan's feasibility.⁹⁴ Yamamoto remained confident that his six carriers could handle any challenge.⁹⁵

Despite his confidence, Yamamoto posed a question to his the wargame participants at the end of the exercise. What would the carrier force do if ambushed by the US Pacific Fleet after the Japanese aircraft had already sortied for planned strikes against Midway?⁹⁶ Admiral Nagumo's Air Officer, Genda, rose and provided an emphatic, though vague, declaration "*Gaishu Isshoku!*" a familiar motto that loosely translates to "We'll wipe them out!"⁹⁷ Yamamoto criticized Nagumo for lacking such a contingency plan, and explicitly ordered him to hold half of the First Air Fleet's level bombers in reserve, loaded with torpedoes, to counterattack the US

⁹³ Parshall and Tully, 43-48.

⁹⁴ *Ibid.*, 61-62.

⁹⁵ H. P. Wilmot, *The Barrier and the Javelin* (Annapolis, MD: Naval Institute Press, 1983), 93. The original plan called for all six carriers, not the four actually employed.

⁹⁶ Barde, 45-46.

⁹⁷ Parshall and Tully, 63; Prange, *Miracle at Midway*, 35. Literally translated, *Gaishu Isshoku* means "One touch of an armored sleeve."

carriers should they arrive ‘early.’ Historians have speculated that First Air Fleet’s failure to follow this verbal order may be the single greatest contributing factor to the Japanese debacle at Midway.⁹⁸

In contrast to Yamamoto’s rose-tinted wargame, the actual battle of Midway was an unmitigated disaster for Japan. Nagumo’s First Air Fleet launched its first attack wave just before dawn on June 4. The attack inflicted only minor damage at Midway, although its escort fighters earned a lopsided victory, downing seventeen of twenty-six defending aircraft. Meanwhile, Admiral Chester W. Nimitz’s fleet, aided by decoded Japanese radio intercepts, counterattacked. Although not coordinated, Midway-based fighters, and US carriers *Enterprise* and *Yorktown*, launched successful—though costly—raids. Caught unprepared and with insufficient defensive air cover, the *Soryu*, *Kaga*, and *Nagumo*’s own *Akagi* were mortally wounded before the morning was over. The surviving *Hiryu* managed a successful reprisal, damaging the *Yorktown* before herself falling victim to a counterattack from the *Enterprise*. Japanese submarine I-168 later sank the *Yorktown* and a destroyer, and the US fleet sank a Japanese heavy cruiser and damaged numerous other ships. Although he briefly considered attempting to salvage the operation, with his once-vaunted carrier fleet ablaze (and the aspirations of Japan’s central-Pacific gambit up in smoke) Yamamoto had no choice but to withdraw. Operation AL’s success was a pyrrhic victory, having robbed Operation MI of much needed carriers. The Japanese succeeded in occupying Kiska and Attu Islands for three unproductive months, before abandoning them shortly before a US counterattack.⁹⁹

The battle of Midway remains a fascinating case study, and a source of much historical speculation and debate. Recent histories, such as *Midway Inquest* and *Shattered Sword*, have shed

⁹⁸ Barde, 45.

⁹⁹ Dallas W. Isom, *Midway Inquest: Why the Japanese Lost the Battle of Midway* (Bloomington: Indiana University Press, 2001), 104-105; “Battle of Midway,” Naval History and Heritage Command, Accessed March 8, 2016, <http://www.history.navy.mil/research/library/online-reading-room/title-list-alphabetically/b/battle-of-midway-4-7-june-1942.html>.

new light on the battle and challenged many myths. This monograph will instead attempt to fill a void in the voluminous history of the battle with a focused analysis of Japan's wargaming practices through the theory of GEA and wargame pathologies.

Analysis: Midway Wargames and Wargaming Pathologies

The following section evaluates various aspects of the wargames held on May 1-4, 1942 from the perspective of GEA and wargaming pathologies, and will address five independent focus questions. This analysis acknowledges that the historical record of the wargame and subsequent battle is incomplete, and that contemporary Japanese sources may have had mixed motives. Rather than second guessing decisions and events of the battle, as most histories do, the purpose of the present analysis is to illustrate the strength of the wargaming pathologies method using one of the pivotal battles of World War II.

The first focus question is: What were the impacts of objectives and scenario design in the operation MI wargame? Although not stated directly by Yamamoto, contemporary observations provide insight into his (and by proxy Ugaki's) objectives for the wargame. Yamamoto apparently wanted a rubber-stamp proceeding, and approved few changes to the plan.¹⁰⁰ For example, Kusaka raised a widely shared concern over hardware limitations of Japanese carriers, which limited the range of their radios. Kusaka was concerned that the carriers would be unable to intercept the enemy radio transmissions needed to form an accurate understanding of the battlespace. This would affect Nagumo on his flagship *Akagi* as he directed

¹⁰⁰ Fuchida and Okumiya, 125-126; Parshall and Tully, 62-63; Ugaki, 121. The plan was virtually unchanged by the wargame. The available historical record appears unanimous in this general critique of Yamamoto's apparent objective and Ugaki's supporting interventions during the wargame. Although the head umpire in any wargame has the prerogative to intervene, the lack of serious challenges to—or meaningful revision of—the plan strongly suggest that Yamamoto's objective for the wargame was to hasten through the formality of the game prior to receiving final approval for the plan from the Emperor, which was granted on May 5th. An alternative argument is that the plan was not changed due to "passing" the wargame. If this is true, it begs the question of how much of a test the wargame really was.

the carrier strike fleet—the main effort of the plan. Two proposals discussed at the wargame would have repositioned Yamamoto’s flagship, the battleship *Yamato*, in order to relay essential information, but Yamamoto rejected both alternatives.¹⁰¹

Kusaka’s concerns proved to be prescient: in the battle, Yamamoto, aboard the *Yamato*, received intelligence that the United States was aware of the Japanese plans, and US carriers may be en route to Midway. Yamamoto did not want to break radio silence, and assumed that Adm. Nagumo had received the same transmissions aboard the *Akagi*. Historian Dallas Isom identifies this assumption as one of the greatest blunders leading to Japan’s defeat at Midway.¹⁰² That planners uncovered this exact situation during the wargame and provided mitigating solutions is a testament to the usefulness of wargames. It is also a testament to Yamamoto’s unwillingness to accept changes or delays, and reveals his objective in the wargame: to hasten through the formality of the game and get on with the mission. As events of the battle transpired, Nagumo sailed on, oblivious to the fact that Yamamoto’s decision to ignore one of the wargame findings put him on a collision course with another discarded finding from the wargame—the unexpected presence of the US fleet.

Modern doctrine directs planners to wargame selected friendly COAs against both the most likely and most dangerous ECOAs. In contrast, Yamamoto constrained Red to scripted behaviors better described as most advantageous to Blue. When Red attempted a surprise attack from the flank of Nagumo’s exposed carriers, the umpires ruled the move as “impossible,”

¹⁰¹ Admittedly, the proposals were not minor changes.

¹⁰² Isom, 268. Although this monograph is not a counterfactual history, it is not unreasonable to assume that the aforementioned radio intercepts would have significantly influenced Nagumo’s decisions and the course of the battle. Parshall and Tully, 431, disagree, asserting that the Japanese carriers were all perfectly capable of receiving the transmissions. Of relevance to this monograph is Yamamoto’s unwillingness to make changes to his plan due to his personal objectives in the wargame. Additionally, the fleet was divided and unable to provide mutual support, which worried Genda (Prange, *Miracle at Midway*, 36-37). It is possible that the staff raised the radio argument as a foil to try to leverage Yamamoto to unite the fleet and thus resolve their operational concerns.

repositioned the Red carriers, and replayed the turn. In the actual battle, the US fleet, aided by decoded radio intercepts, attacked at essentially the same time and location as the Red Force had, sinking carriers *Kaga*, *Soryu*, *Akagi*, and *Hiryu*. By severely restricting the scenario, however, Yamamoto eliminated the opportunity to test his plan against undesirable events.¹⁰³

The second focus question is to evaluate the wargame database and model from the perspective of wargame pathologies. Was the database and underlying model of the Operation MI and AL games sufficiently accurate, and, in retrospect, can history judge that Japanese planners should reasonably have had a better model? Recall that the model describes the underlying reality of a wargame, including planning factors, weapons system capabilities, and combat resolution tables. Although the wargame concluded on May 4, 1942, significant Japanese losses during the Battle of the Coral Sea on May 8 should have given IJN planners great pause. US aircraft, particularly SBD Dauntless dive-bombers, proved to be highly effective, scoring as many as five torpedo and eleven bomb hits on *Shoho* before she quickly sank.¹⁰⁴ The *Zuikaku*, though undamaged, was combat ineffective due to losses to her air wing, and three 1,000lb bombs badly mauled the *Shokaku*. The *Zuikaku* and *Shokaku* would be unavailable for at least one and three months respectively; however, the Midway plan remained unchanged.¹⁰⁵ Furthermore, US opposition at the Coral Sea was qualitatively different from that of Japan's previous opponents.

¹⁰³ Parshall and Tully, 62. The critique here is not that Yamamoto should have foreseen the US Navy's exact moves, or that he should have suspected his radio communications were not secure. However, the wargame should have included plausible enemy actions and relevant contingency plans. Current US doctrine instructs staffs to wargame against both the ML and MD ECOAs *at minimum*, and for good reason. This example of the US fleet showing up on Nagumo's flank while his aircraft were already committed to attacks on Midway Island surely represents the worst possible ECOA. If ever pressured to skip assessment of the MD ECOA in the interest of time, the future staff officer may cite this example to illustrate potential pitfalls.

¹⁰⁴ Parshall and Tully, 64-65; Fuchida and Okumiya, 129-130.

¹⁰⁵ Parshall and Tully, 69; Fuchida and Okumiya, 135; *United States Strategic Bombing Survey* (USSBS), n.d., accessed January 10, 2016, <http://www.history.navy.mil/research/library/online-reading-room/title-list-alphabetically/i/interrogations-japanese-officials-voli.html>, 68. The relevant section of the USSBS is an interview with Captain Watanabe, gunnery officer of Yamamoto's staff. According to Fuchida and Okumiya, the original plan included Carrier

The critical reader may rightly ask how the Coral Sea losses of May 7-8 have any bearing on the wargames of May 1-4. First, the Coral Sea losses suggest that the risk and damage models in use during the May 1-4 wargame—and the IJN’s general attitude of invincibility—were likely becoming outdated.¹⁰⁶ This is not a specific indictment of those responsible for the models in use on May 1-4, but primarily underscores to the importance of the model’s accuracy in any wargame. That Yamamoto or the Naval General Staff did not immediately delay or modify the Midway plan after Coral Sea is a matter of leadership, not wargaming. Secondly, naval planners participated in a supplemental wargame aboard *Yamato* on May 25. Admiral Takeo Takagi, commander of the IJN force at Coral Sea, provided a detailed report at this second wargame, yet there is no indication that the Midway plan received renewed scrutiny in light of his losses or the adversary’s increasing proficiency.¹⁰⁷ Although details are sparse, this second wargame may have been more akin to rehearsal of concept (ROC) drill than a true wargame. Even so, it likely represented the last chance to scrutinize the viability of the forthcoming invasion prior to departure.

The third focus question is to evaluate the MI wargame with respect to participants and culture. Most participants in the wargame were significantly handicapped by the brief time available to review the operational plan before the wargame began, disaffecting participants, and forcing them to play scripted parts in Yamamoto’s wargame theater.¹⁰⁸ Many participants in the May wargames held private concerns over the complexity and ambitiousness of the plan, and

Division 5 with *Zuikaku* and *Shokaku*, which would no longer be available.

¹⁰⁶ Parshall and Tully, 31, 65; Fuchida and Okumiya, 135. Fuchida and Okumiya posit that the extensive damage caused to *Shokaku* by just three bomb hits should have provided sufficient evidence of the Japanese carriers’ vulnerability.

¹⁰⁷ Fuchida and Okumiya, 140; Ugaki 128-9.

¹⁰⁸ Fuchida and Okumiya, 125; Parshall and Tully, 63. The wargame was heavily choreographed.

thought the enemy threat was underrated, but were unwilling to voice public opposition.¹⁰⁹ For example, Nagumo, previously chastised by Yamamoto for lack of aggression after Pearl Harbor, dared not raise his reservations, privately stating that he “would rather go to Midway and die than be branded a coward.”¹¹⁰ To suggest that command influence biased the proceedings seems an understatement; genuine testing of the Operation MI plan appears to have been impossible.¹¹¹

The fourth focus question is to evaluate the Operation MI game with respect to analysis.¹¹² Wargame officials twice rejected inconvenient outcomes, undermining the credibility of the game, creating lasting controversy, and preventing meaningful analysis. In the first case, the Red Force’s carriers showed up much earlier than expected, and attacked from Nagumo’s exposed flank, badly damaging the Japanese carriers, and threatening the entire operation.¹¹³ An umpire intervened, declared Red’s actions “impossible,” and removed the Red carriers as a threat. Despite the red player’s tearful pleas, the umpire refused to reconsider, and Yamamoto’s staff never modified the plan to address this contingency.¹¹⁴

¹⁰⁹ Fuchida and Okumiya, 127-128.

¹¹⁰ Barde, 53; Parshall and Tully, 13-14, 62. Despite commanding a carrier group, Nagumo was surface warfare officer by trade, and was further handicapped by his lack of experience in aviation operations, forcing him to rely upon Genda.

¹¹¹ Salen and Zimmerman, 276. The author’s five player types provide an interesting angle to view the Midway wargame participants. Most participants were likely standard players. Despite the obvious frustrations of participants over the scripted and unserious nature of the game, there is no evidence that any general participants resorted to unsportsmanlike, cheating, or spoil-sport behaviors. However, those who orchestrated the game and gerrymandered its results could be considered unsportsmanlike or cheaters, depending on the method of intervention.

¹¹² Recall that analysis-related pathologies includes rejection of inconvenient analysis, the presumption that wargame victory equates to validation of a plan, and failure to analyze the validity of the wargame itself.

¹¹³ Parshall and Tully, 62.

¹¹⁴ Masataka Chihaya, “An Intimate Look at the Japanese Navy,” in *The Pearl Harbor Papers* by Donald M. Goldstein and Katherine V. Dillon (New York: Brassey’s, 1993), 348. Chihaya’s unabashed self-critique of Japan’s psychology and groupthink in addition to the pitfalls of ambition, overconfidence, and lack of realistic assessment should provide a warning to any military planner.

In the second instance, an umpire, Lieutenant Commander Okumiya, initially declared that a raid by Midway-based B-17s sank *Akagi* and *Kaga*. Senior umpire Ugaki intervened and reduced the damage from nine hits to three, sinking the *Kaga* and leaving the *Akagi* unharmed.¹¹⁵ Ugaki continued to influence the early May wargame, in which the Midway invasion went off without a hitch, as did the wildly ambitious subsequent plans against Truk, New Caledonia, Fiji, Australia, and Hawaii.¹¹⁶ These favorable outcomes apparently resulted from Ugaki's frequent intervention to overturn unfavorable adjudications, in fact Ugaki returned the *Akagi* to the wargame for the subsequent New Caledonia and Fiji portions of the operation.¹¹⁷

One of the key purposes of wargaming and analysis in modern doctrine is to provide an opportunity to challenge existing planning factors, assumptions, and to test a plan's resilience to unforeseen events. Operational planners should not perceive such challenges as a threat to the plan or the persons who created it. Instead, they should use the wargame as an opportunity to consider alternative outcomes, test both the sensitivity and the vulnerability of the plan to unexpected events, and to identify what information will assist the commander's decisions during actual operations. Game participants should highlight those informational elements, known in modern doctrine as commander's critical information requirements (CCIRs). The staff must monitor these CCIRs during actual execution of the plan facilitate rapid decision-making and identify if changes to the plan are necessary. Furthermore, in modern doctrine the game should explore the potential negative outcomes of unexpected events, allowing planners to develop

¹¹⁵ Parshall and Tully, 62; Fuchida and Okumiya, 124-125. Parshall and Tully record the *Akagi* as undamaged, and cite Fuchida and Okumiya as the source. However, Fuchida and Okumiya actually list *Akagi* as slightly damaged. Level bombing from high altitude had a poor success rate against ships; intervention by the umpire to correct the model may have been well justified, but Japanese planners should not have dismissed the possibility of aerial attack.

¹¹⁶ Fuchida and Okumiya, 123-124.

¹¹⁷ *Ibid.*, 123-124.

branch plans to mitigate those outcomes and identify decision points (DPs) that may need to be addressed during operations.

Japanese planners intended for Operation MI to lure the US fleet in battle, but planners also attempted to maintain tactical deception by dispersing the Japanese fleet. This reveals a paradox of the Japanese plan that remained unresolved after the May wargame. How could the Japanese fleet both mask its true intent (and appear vulnerable enough to warrant attack) while still massing sufficient firepower and providing mutual support? A properly designed wargame with a capable Red Force would likely have revealed the hollow promise of distant cover, leading to changes in the plan.¹¹⁸ Yamamoto and Ugaki preferred to disregard such inconvenient analysis.¹¹⁹

The fifth focus question is: What are the similarities and differences between Operation MI and Operation HI (Hawaii) with respect to wargaming and execution of the plan? The Japanese wargaming of the Pearl Harbor attack provides a useful basis of comparison for the Midway wargames. Both were audacious attacks, far from homeports, and dependent upon operational surprise. The IJN first wargamed a Pearl Harbor attack in 1927, long before the US Pacific Fleet moved there in May of 1940. The 1927 game indicated that Japan's two aircraft carriers were woefully inadequate for the task, as were the aircraft and weapons available at that

¹¹⁸ Among other many other sources, operational planners may use any of the twelve principles of joint operations as "evaluation criteria" against which a COA is graded after the wargame. Had Japanese planners graded the plan against the principles of mass, economy of force, security, simplicity, or perseverance, they would likely have uncovered considerable cause for concern. For details, see Joint Publication (JP) 5-0, *Joint Operation Planning* (2011), IV-30 through IV-31, and JP 3-0 *Joint Operations* (2011), Appendix A.

¹¹⁹ Downes-Martin, 31-40. Counterproductive influence is an unfortunate reality in many wargames. The necessary introspection for effective wargaming can be difficult in any military organization, and may have been culturally impossible in wartime Japan. Downes-Martin identifies "three witches of wargaming:" the wargame director's supervisor and chain of command (Ugaki, supervised by Yamamoto), the senior players within each game cell (such as Van Riper in MC-02), and the sponsor of the wargame and his or her chain of command.

time.¹²⁰ The concept of such a surprise attack endured, bolstered by a 1936 study at the Japanese Naval Staff College which advocated surprising the US carriers at Pearl Harbor.¹²¹

Japanese planners wargamed the Pearl Harbor attack in September and October 1941 with two primary objectives: evaluate the feasibility of the attack, and the likelihood of maintaining surprise.¹²² The Red Force in the September exercise, aided by thorough reconnaissance patrols, disrupted both attack waves, preventing significant damage to the US fleet, and sinking two Japanese carriers. This result led the staff to revise the plan to reduce the chance of detection. Under the updated plan, the carriers approached from the north, and executed a high-speed night dash south, ahead of their escorts, prior to launching the attack. The wargame results under the revised plan was similar to Japan's success of the actual battle.¹²³

Key to the game's success was the Red Force, headed by Captain Kanji Ogawa, who observed Pearl Harbor defense exercises in the 1930s. Now Chief of American Affairs in Japan's

¹²⁰ David Evans and Mark Peattie, *Kaigun, Tactics, and Technology in the Imperial Japanese Navy, 1887-1941* (Annapolis: Naval Institute Press, 2003), 473-474; Van Creveld, 167-168.

¹²¹ Evans and Peattie, 474.

¹²² Prange, *At Dawn We Slept: The Untold Story of Pearl Harbor* (New York: McGraw-Hill 1981), 226-227; Goldstein and Dillon, 104-05. At what might be better described as a BOGSAT prior to the game, the participants agreed that the fleet would not send out air patrols, due to an increased chance of those patrols being discovered by US vessels or aircraft. Modern doctrine directs planners to wargame multiple draft COAs against two or more enemy COAs as an intermediate step in plan development. It is possible that Japanese planners used a similar approach, but it appears that they may have only wargamed a single blue COA for later refinement. However, conclusive primary sources, such as contemporary Japanese doctrinal publications or detailed first-hand accounts, are not available. Descriptions of the Midway wargames from multiple sources suggest that Ugaki and Yamamoto constrained the Red Force to a single—and favorable—ECO. Modern US wargame doctrine also identifies feasibility and surprise as potential “evaluation criteria,” which are areas of significant concern that all COAs must be evaluated against in order to form the basis of later COA comparison and selection.

¹²³ Prange, *Miracle at Midway*, 228-229. There were two key differences between the revised wargame and the actual battle. In the wargame, the US carriers were in Pearl Harbor, and blue succeeded in destroying or heavily damaging three. In the game, Japan also lost a carrier and fifty aircraft, before a timely rainsquall prevented further pursuit by the Red Force. In the actual battle, of course, the US carriers were not in port, but the attackers escaped with fewer aircraft lost and no ships damaged.

Intelligence Bureau, Ogawa was a former naval attaché in Washington DC.¹²⁴ Another significant outcome was the continued skepticism of the plan by Nagumo, who commanded the carrier strike force in both operations.¹²⁵ Nagumo preferred to expand Japan's gains in Southeast Asia, rightly assessing that the United States, though concerned over Japan's aggression, was in no hurry to join the war unless provoked.¹²⁶ During the actual Pearl Harbor raid, Nagumo's reservations likely influenced his decision to cancel the planned third attack wave against Pearl Harbor once it was clear that the US carriers were not in port. Nagumo later received many criticisms for cancelling the third wave in the actual battle; however, in the Pearl Harbor wargame, the consensus was on preserving Japan's carriers with a timely getaway.¹²⁷ The October 1941 wargame indicated that lack of oilers would require planners to cut the attacking force from four carriers to three. This posed unacceptable risk to the mission, causing planners to acquire additional oilers and boost the attacking force to the six carriers actually used in the operation.¹²⁸

Unlike the Operation MI wargame, Operation HI wargame participants did not reject inconvenient analysis, nor did they appear to treat victory in the wargame as validation of the plan. The selection of Captain Ogawa as the Red Force leader exemplifies CNA's dictum to select qualified participants, with both the experience and attitude to test the plan rigorously.¹²⁹

¹²⁴ Van Creveld, 168; Evans and Peattie, 473; Gordon W. Prange, *At Dawn We Slept: The Untold Story of Pearl Harbor*, 150, 228. Evans and Peattie contradict Van Creveld's assertion that any Japanese observers were present at the 1932 or 1938 defensive exercises at Pearl Harbor. Prange, *Miracle at Midway*, supports Van Creveld's that Ogawa had observed at least one of the exercises at Pearl Harbor.

¹²⁵ Van Creveld, 168.

¹²⁶ Parshall and Tully, 24.

¹²⁷ Prange, *Miracle at Midway*, 230. Goldstein and Dillon, *The Pearl Harbor Papers*, 110. Wargame discussions notwithstanding, Carrier Striking Task Force Operations Order No. 3 (November 23, 1941) directed Nagumo to rearm his planes after the first and second waves, and continue strikes as long as conditions remained favorable.

¹²⁸ Van Creveld, 169.

¹²⁹ Alfred H. Hausrath, *Venture Simulation in War, Business, and Politics* (New York: McGraw-Hill, 1971), 31-32; Weuve et al., 32-33; Zenko, 11-16. Zenko identifies three key

Additionally, the willingness of participants to make significant revisions to the plan indicates both the thoroughness of the game and the willingness of participants to address—rather than reject—inconvenient results.¹³⁰

It is interesting to note that many of the key participants, most importantly Yamamoto himself, were involved in both wargames but behaved differently. What, then, can explain the different approaches to the wargaming process and the eventual outcomes? In the Pearl Harbor case, the IJN staff and leadership disagreed over the wisdom of launching a surprise attack rather than focusing on the south Pacific and then reacting to any US advances against Japan. Perhaps most importantly, the plan's architect and eventual hero, Yamamoto, had grave reservations of his own. Yamamoto was opposed to war with the United States and Britain, but was firmly convinced that if war was inevitable, Japan must seize the initiative and cripple the US Pacific Fleet. Even so, Yamamoto did not endorse the concept of Operation HI until late fall of 1940. Once personally committed to the Operation HI strategy, Yamamoto famously threatened to resign if the Naval General Staff objected to his draft plan involving four carriers. No sooner had Yamamoto's gambit paid off than he revised his requirement from four to six carriers based on the wargame results from the fall of 1941. Outmaneuvered again, the Naval General Staff relented, unwilling to cancel the operation they had just approved. For Operation HI, Yamamoto was willing to demand the necessary resources after testing and modifying the plan.¹³¹

variables for identifying red team members: character traits, experience, and interpersonal skills. Hausrath cites a Japanese wargame in September of 1942 in which the Naval General Staff went to great length to select an unbiased Red Force familiar with the enemy they were to represent. The US government had interned a group of Naval Intelligence Officers on embassy duty in Washington DC when the war broke out, and were repatriated in August of 1941. Upon their return, the officers were sequestered from any outside information or influences until the completion of the wargame.

¹³⁰ Weuve et al., 39.

¹³¹ Evans and Peattie, 475-478; Isom, 359n43. Isom, citing Munehiro Miwa, contradicts the common viewpoint that Yamamoto was a reluctant warrior. History recognizes the enduring influence Yamamoto gained by first leveraging the General Staff and then succeeding at Pearl Harbor. Yamamoto would later use his influence in gaining approval of the ill-conceived

Both wargames shared some common failures, including optimistic assumptions, and lack of contingency plans should those assumptions prove false. Just as at Midway, the primary objective of Operation HI was to destroy or cripple the carrier fleet stationed at Pearl Harbor, yet neither the wargame nor the plan addressed the potential absence of the carriers.¹³² When the US carriers were found to be absent during the battle, Nagumo cancelled the third Pearl Harbor raid and made a hasty retreat rather than attempt to locate and strike the US carriers. Nagumo cited the logistical concern of making a scheduled rendezvous with his oilers as the reason for this caution. The Operation HI wargame could have established a decision point and branch plan to address this entirely foreseeable contingency. Instead, Japan would never be in a better position to eliminate the US carrier fleet, as subsequent events at Midway would prove.

The fundamental difference in the two cases appears to be organizational culture, as defined in *Pathologies*.¹³³ Prior to Pearl Harbor, Japan was ambitious and aggressive, but still had operational surprise and was wary of the US. As a result, planners rigorously wargamed and revised Operation HI with less undue influence from Yamamoto. In contrast, Operation MI was ill-conceived, saddled with resource requirements for Operation AL, and predicated on wildly optimistic planning assumptions. Almost inexplicably, Yamamoto refused to hold out for the full fleet of six carriers for Midway as he had for Operation HI.¹³⁴ Flush from a string of victories, the IJN (and Yamamoto in particular) refused to subject the plan to critical review through wargaming or any other means.¹³⁵ Finally, Japan's fixation on pursuing a decisive battle trumped

Operation MI in 1942.

¹³² Prange, *At Dawn We Slept*, 544. Goldstein and Dillon, *Pearl Harbor Papers*, 95-110. Review of reconstructed orders and directives reveals no specific branch plan in the event the US fleet was not in port, other than to attack the fleet should it appear.

¹³³ Weuve et al., 41-42.

¹³⁴ Chihaya, 348. The author laments Japan's rush to battle at Midway, rather than waiting for repairs to *Shokaku* and *Zuikaku*.

¹³⁵ Parshall and Tully, 64, 409-410. Parshall and Tully also support cultural factors, including a predilection for complex battle plans, a fondness of indirect approaches, and an

reason in drafting and wargaming Operations MI and AL.¹³⁶ Perhaps the gravest lesson for the modern professional wargamer from Midway is the insidious nature of enduring and localized cultural factors that may undermine the intellectual rigor upon which wargames depend.

If this monograph has but one amendment to make to Parshall and Tully's comprehensive treatment of the Midway battle, it is to redress the accusation that Ugaki's unilateral decision to resurrect the Kaga was purely cultural or political hubris. Indeed, Ugaki was well within his right to re-adjudicate the engagement. The unforgivable error was the failure to address US air threat, particularly the unexpected arrival of the US fleet, or how (if) the plan would adapt to unforeseen setbacks of any cause.¹³⁷

In the days after the Midway debacle, Yamamoto and Ugaki summoned the First Air Fleet's staff, including the Chief of Staff (Kusaka), the Senior Staff Officer (Oishi), and Air Officer Genda aboard the *Yamato*. Nagumo remained aboard the *Nagara* with a stomachache. Ugaki summarized the conclusion of the meeting and reflected on the causes of the Japanese defeat in his diary. "The main cause for the defeat was that we had all become conceited because of past successes and lacked studies of the means and steps to be taken in case an enemy air force should appear on a flank while our force was launching an attack on one target—something which had worried me greatly."¹³⁸ Ironically, this is the very threat the Red Force had attempted during the fruitless May wargame, and which Yamamoto had posed to his staff at its conclusion. Had the staff given this contingency due consideration—as opposed to Genda's platitude of "*Gaishu*

obsession with offensive operations.

¹³⁶ Chihaya, 372; Evans and Peattie, 129, 482-86. Evans and Peattie explain that Japan's naval victory at Tsushima during the Russo-Japanese War firmly imprinted the decisive battle doctrine in the IJN. The doctrine centered around a great engagement of surface combatants and, somewhat incongruously, a war of attrition despite the IJN's smaller size (relative to the US Navy) and focus on quality over quantity of ships.

¹³⁷ Perla, 47.

¹³⁸ Ugaki 161.

*Isshoku!*¹³⁹ —the outcome of the naval engagement could have been quite different. Ugaki specifically regretted not breaking the carriers into two groups, the first to launch the initial attack wave, while the second group stood alert to counterattack the enemy fleet should it emerge. Had Nagumo followed Yamamoto’s verbal order to retain loaded torpedo bombers, US carrier losses may have offset the damage to the Japanese fleet.¹⁴⁰ Ugaki also suggested an additional carrier should have been dedicated to air defense interceptors, presumably to provide a continuous defensive umbrella over the fleet.¹⁴¹ With dedicated defensive air patrols, the First Air Fleet could have significantly blunted the US attack. Regrettably for Nagumo’s carrier force, the contrived nature of the wargame forced these to be lessons of hindsight rather than foresight. Indeed, the enemy fleet that Admiral Ugaki encountered was not the one he had wargamed against.

Wargaming in US Military Doctrine

Having established wargame theory and pathologies through historical critique, the following section provides a firm foundation for the following review of current military doctrine. Operational planning doctrine directs wargames as a required step in the operational planning process, and functional area doctrine (e.g., engineer, logistics, intelligence) often prescribes support to wargames. Although many doctrinal references direct wargames, there are significant deficiencies in US joint and service wargaming doctrine. Doctrine almost exclusively addresses wargaming in the context of operational planning, ignoring the many other uses of wargames such as training, developing tactics, or exploring future strategic scenarios. Furthermore,

¹³⁹ Prange, *Miracle at Midway*, 35; Parshall and Tully, 478-490. Parshall and Tully conduct a brief counterfactual history based on the presumption of a Japanese Naval victory and subsequent invasion attempt. In a well-supported argument, Parshall and Tully conclude that the defending US Marines would likely have massacred the Japanese landing force, leading to a stalemate and Japanese withdrawal.

¹⁴⁰ However, it almost certainly would not have prevented it.

¹⁴¹ Ugaki, 161. According to Ugaki, the best means would have been to delay the operation until the *Zuikaku* and/or *Shokaku* were available.

operational planning doctrine lacks sufficient detail on *how* to design and conduct wargames. There is no single source in joint or service doctrine that provides a start-to-finish guide to staffs and planners on the proper design and execution of wargames.

Joint Publications

Joint Publication (JP) 5-0 *Joint Operation Planning (2011)* contains the most detailed description of wargaming in Joint Doctrine. JP 5-0 directs wargaming as the primary means of analyzing potential friendly courses of action (COA) in JOPP.¹⁴² In JOPP, planners are to wargame selected friendly COAs against both the enemy's most likely (ML) and most dangerous (MD) COAs whenever time permits. JP 5-0 lists many benefits of wargaming that are consistent with wargame theory. These benefits include creating a common understanding, evaluating advantages and disadvantages of a plan, identifying new insights, and identifying key events, requirements, or problems in the plan. Unfortunately, JP 5-0 also mentions computer-aided modeling and simulation as "the most sophisticated form of wargaming," conflating models and simulations with the wargames they should support rather than replace.¹⁴³

JP 5-0 directs a turn-based scheme known as "action—reaction—counteraction," an approach commonly repeated in service publications.¹⁴⁴ JP 5-0 provides a long list of potential

¹⁴² JP 5-0, IV-27. JOPP is the "orderly, analytical process, which consists of a set of logical steps to examine a mission; develop, analyze, and compare alternative COAs; select the best COA; and produce a plan or order." Army, Air Force, Navy, and Marine Corps planning doctrines are substantially similar to JOPP. JOPP is a deliberate, structured formula for commanders and staff to plan against well-structured and medium-structured problems as described in Training and Doctrine Command (TRADOC) Pamphlet 525-5-500 *Commander's Appreciation and Campaign Design*, version 1.0 (Washington, DC: Government Printing Office, 2008), 8-9.

¹⁴³ *Ibid.*, IV-27 through 28.

¹⁴⁴ In action—reaction—counteraction, the side with the initiative (red or blue) initiates action, the opposing side reacts, and the initiating side gets to make a counteraction before the turn in adjudicated (although this description is absent in JP 5-0). JP 5-0 also does not list the game methodology of continuous turns, more akin to common board games. In either methodology, game turns can be time or event-based according to the game's design.

evaluation criteria against which the planning staff scores the results of the wargame and its analysis. Wargame participants are to record key outputs in a “synchronization matrix,” and draft a decision support template with the commander’s critical information requirements, which will aid the unit commander during execution of the plan.¹⁴⁵ These output products do not contradict wargame theory, and are consistent with the intent of research-oriented games. Despite many instructions to conduct wargames and the importance of the wargaming step in JOPP, JP 5-0 provides few details about how planners should conduct wargaming.¹⁴⁶

A number of joint publications direct support to wargaming, usually in general terms. JP 2-01 *Joint and National Intelligence Support to Military Operations* describes the essential role of intelligence personnel in determining ML and MD COAs early in the planning process, and in supporting wargame execution as the adversary force.

JP 3-09.3 *Close Air Support* (2014) directs wargaming of close air support (CAS) plans in support of plan and order development. Modeled after the Military Decision Making Process (MDMP) steps, JP 3-09.3 includes a five-step CAS planning phase. Step four, COA analysis and wargaming, directs CAS planners to determine which COA best meets the commander’s intent. Unfortunately, JP 3-09.3 confuses rehearsing the CAS plan through ROC drills with actual wargame methodology.¹⁴⁷ While a ROC drill may reveal deficiencies in the plan, they are fundamentally about briefing a concept to ensure understanding of a plan, not testing a plan against a thinking and unpredictable enemy.

Joint doctrine repeatedly directs commanders and staffs to conduct or support wargames, but provides insufficient detail for designing or conducting a wargame. For example, JP 4-0 *Joint*

¹⁴⁵ JP 5-0, IV-35 through 36.

¹⁴⁶ *Ibid.*, IV-30. According to JP 5-0, wargaming is so important that it should be afforded more time than any other step in JOPP.

¹⁴⁷ JP 3-09.3 *Close Air Support* (Washington, DC: Government Printing Office, 2014), III-4 through III-11.

Logistics (2013), briefly directs logistics planners in wargames to assess the concept of support.¹⁴⁸

Several publications do little more than direct planners to conduct wargaming.¹⁴⁹ JP 3-30

Command and Control of Joint Air Operations (2014) contains an excellent synopsis of the purpose and benefits of wargaming in air operations planning, and lists outputs that wargamers should record. As in other many other doctrinal examples, there are no details on *how* planners should conduct the wargame.¹⁵⁰

Army Doctrine

Field Manual (FM) 6-0 *Commander and Staff Organization and Operations* (May 2014) builds upon the guidance in JP 5-0. Chapter nine of FM 6-0 describes the seven steps of MDMP, which commanders and staffs are to use in developing operational plans. Step four of MDMP is COA analysis (which includes wargaming) to which FM 6-0 devotes 14 pages.¹⁵¹ MDMP directs operational planners to develop and wargame several friendly COAs against the ML and MD enemy COAs (ECOAs), as assessed by the intelligence staff.¹⁵² FM 6-0's description of the importance, benefit, and uses of wargaming is closely aligned with JP 5-0.¹⁵³

¹⁴⁸ JP 4-0 *Joint Logistics* (Washington, DC: Government Printing Office, 2013), IV-9.

¹⁴⁹ JP 3-33 *Joint Task Force Headquarters* (Washington, DC: Government Printing Office, 2012), IV-9, 11, and A-E-2; JP 3-05 *Special Operations* (Washington, DC: Government Printing Office, 2011), A-17, B-33; JP 3-35 *Deployment and Redeployment Operations* (Washington, DC: Government Printing Office, 2013), III-5.

¹⁵⁰ JP 3-30 *Command and Control of Joint Air Operations* (Washington, DC: Government Printing Office, 2014), III-13.

¹⁵¹ Field Manual (FM) 6-0 *Commander and Staff Organizations and Operations* (Washington, DC: Government Printing Office, 2014), 9-3, 9-26 through 9-39. MDMP is the US Army analogue to JOPP.

¹⁵² *Ibid.*, 9-23. Interestingly, the instruction to test the plan against both ML and MD ECOAs is not contained in the wargaming section in FM 6-0.

¹⁵³ The goal of wargaming in MDMP is refined COAs, prepared for COA comparison (step five), and selection of a preferred COA by the commander (Step 6). Once approved, FM 6-0 directs the staff to translate the selected COA into operational orders for dissemination to subordinate units.

As implied by the title, FM 6-0 is oriented towards staff planning. The wargaming methods in FM 6-0 (*belt*, *box*, and *avenue in depth*) are generally adequate for wargaming part of a battle, a single battle, or a series of battles. In practice, the operational artist may incorporate aspects of all three methods, based on skill and experience, to test various aspects of the plan.¹⁵⁴ Each method forces the wargamer to assume away or “hand wave” aspects outside of the game’s borders; the potential risk of such assumptions is difficult to overstate.¹⁵⁵ Other aspects of a campaign, such as logistical needs or humanitarian assistance, may defy strict categorization. Furthermore, the entire MDMP process attempts to provide structured solutions appropriate to reasonably-structured problems. However, strategy and operational art must often address ill-structured problems; current doctrine does not attempt to address the complexities of gaming ill-structured problems.¹⁵⁶

As in Joint Doctrine, however, FM 6-0 falls short in providing specific techniques for conducting wargames, possibly due to a wide variance in anticipated user’s needs. Military planners from Corps to Battalion or below may use the methods in FM 6-0. Different staffs may have different planning horizons and broader or narrower focus appropriate to command level,

¹⁵⁴ For example, the belt method may be appropriate for evaluating a broad land campaign, but a key enemy stronghold in that campaign may need the detailed analysis that the box method can deliver. The avenue in depth approach may be more appropriate for geographically narrow operations that extend relatively deep into enemy territory.

¹⁵⁵ Neil A. Garra, *Wargaming: A Systematic Approach* (Sierra Vista, AZ: The S2 Company, 2004), 36-39. Such assumptions can be problematic. For example, in an avenue in depth game, the avenue under study (operation A) may depend upon a separate, but parallel, operation (B), which will protect an exposed flank. The wargamer must assume the parallel operation will proceed as planned, exposing plan (A) to the risk of unforeseen delays to operation (B) during execution.

¹⁵⁶ TRADOC Pamphlet 525-5-500, 13. Doctrine attempts to bridge this divide by pointing out that the operational artists job is the art of taking an “unstructured problem and giving it enough structure so that further planning can lead to useful action.” This monograph asserts that wargames are a viable means to address the uncertainty of ill-structured problems by creating shared understanding of the problem and capturing potential unforeseen outcomes.

scope of the problem, or commander's directives. Unfortunately, the diverse needs of planning staffs exceed the scope of FM 6-0.

Marine Corps Doctrine

Marine Corps Warfighting Publication (MCWP) 5-1 *Marine Corps Planning Process* (2010), and the operational planning process it describes, bears considerable similarity to chapter nine of FM 6-0. However, a few variations bear mention here. First, MCWP 5-1 suggests that informal war game methods, such as "what if" conversations with the commander can help shape earlier phases of the Marine Corps Planning Process (MCP).¹⁵⁷ While such informal "red teaming" of a problem can indeed help in problem framing and creating initial shared understanding, this is just another name for a BOGSAT, and is not a wargame. MCWP 5-1 also shares the common misperception that modeling and simulation is another form of wargaming, rather than a possible tool to aid in wargaming against a thinking enemy. In addition to the ML and MD ECDOA, MCWP 5-1 also directs the staff to wargame friendly COAs against the most advantageous (MA) ECOA.¹⁵⁸ MCWP 5-1 also introduces *key event* and *sequence of critical tasks* as potential wargame methods in addition to *belt*, *box*, and *avenue-in-depth*.¹⁵⁹ MCWP 5-1 provides more detail in wargame preparations than FM 6-0. However, instruction in actual wargaming methods is so sparse that the uninitiated planner would be hard pressed to execute the

¹⁵⁷ Marine Corps Warfighting Publication (MCWP) 5-1 *Marine Corps Planning Process* (Washington, DC: Government Printing Office, 2010), 4-1 and 4-3.

¹⁵⁸ In this context, MA refers to the ECOA that best plays into the friendly scheme, and may better position the Marine force to capitalize on 'catastrophic success.' For historical comparison, the ECOA Yamamoto wargamed against could be best described as the MA ECOA: The US fleet was prevented from arriving until after the island was seized, and was not permitted to achieve tactical surprise. The Japanese plan also assumed a successful amphibious operation against long odds.

¹⁵⁹ MCWP 5-1, F-5, 4-2, 5-1. The synchronization matrix in MCWP 5-1 is similar to that described in FM 6-0, however it also stresses that the synch matrix should not be carried forward as literal 'script' for future operation. Actual events are likely to be far too fluid to adhere to a rigid script, and a tightly coupled plan is likely to crumble under real-world conditions.

method properly, whereas FM 6-0 at least includes several pages of graphics, instructions, and considerations for selecting the best method.¹⁶⁰

Navy Doctrine

Navy Warfare Publication (NWP) 5-01 *Navy Planning* is also similar to sister service planning doctrine, with a few relative strengths and weaknesses. Despite an admonition not to go through the motions of the wargame simply to populate a worksheet, NWP 5-01 proceeds with a disproportionate emphasis on the materials for recording wargame activity and presenting the results of the wargame. Specifically, the instructions on preparing for the wargame lack detail, and can be misleading. The operational planner can vary four fundamental elements to distinguish one COA from the next: ends, ways, means, and risk.¹⁶¹ This is problematic as NWP 5-01 states that friendly forces (means) should be constant across all friendly COAs, inexplicably removing one of the key elements that a planner should be at liberty to change. Additionally, NWP 5-01 gives almost no explanation or guidance for the belt, box, avenue in depth, or critical event wargame methods.¹⁶²

NWP also 5-01 instructs the wargame facilitator to brief and enforce the rules without suggesting how the facilitator might design the rules to support the game's objectives. This vague guidance is a disappointing oversight, considering that rules should generally be explicit and unambiguous, shared by all players, and fixed, binding, and repeatable.¹⁶³ Furthermore, misalignment between wargame rules and objectives is a recipe for an unhealthy game. A

¹⁶⁰ FM 6-0, 9-28 through 9-31; MCWP 5-1, F-4 through F-5.

¹⁶¹ JP 5-0, IV-37.

¹⁶² Naval Warfighting Publication (NWP) 5-01 *Naval Planning* (Washington, DC: Government Printing Office, 2013), 4-7 through 4-9.

¹⁶³ Salen and Zimmerman, 122-123, 126. The authors define three types of rules: *operational*, *constitutive* (sic), and *implicit*.

strength of NWP 5-01 are instructions for using the wargame to facilitate development of the (often-overlooked) assessment plan through wargaming.¹⁶⁴

Air Force Doctrine

In comparison to other service doctrine, Air Force doctrine provides the least detail of all service doctrine, with a scant two pages in Air Force Doctrine (AFD) Annex 3-0 *Operations and Planning* (2012). AFD 3-0 partially offsets its brevity by referring the reader to JP 3-30 and the JOPP wargaming steps in JP 5-0.¹⁶⁵ Unfortunately, JP 3-30 provides less than a page of guidance.¹⁶⁶ None of the doctrine address the Air Force's unique mission or capabilities.

Air Force doctrine does have some positive attributes that are consistent with wargame theory, including a warning to “be wary of any plan, technique, methodology, or wargame that claims to offer deterministic or predictive insight into warfare’s outcome.”¹⁶⁷ Additionally, planners must avoid “mirror imaging” bias, and can use wargames to identify “plan, information, or resource shortfalls, generating branch and sequel planning requirements, requests for information, requests for forces, and refinements to COAs.”¹⁶⁸ However, the shortfalls of Air Force wargaming doctrine far outweigh the benefits, including the common confusion of actual wargames with table-top exercises, models, and simulations. The same criticisms of joint and other service doctrine also apply to Air Force doctrine. The lack of detail in Air Force doctrine is particularly troubling, considering that air operations are generally not as linear as land, or even sea, operations. Therefore, the standard wargaming methods of belt, box, and avenue in depth are

¹⁶⁴ NWP 5-01, 4-7 through 4-17.

¹⁶⁵ Air Force Doctrine (AFD) Annex 3-0 *Operations and Planning* (Washington, DC: Government Printing Office, 2012), 68, 76.

¹⁶⁶ JP 3-30, III-13.

¹⁶⁷ AFD Annex 3-0, 15.

¹⁶⁸ *Ibid.*, 76.

not sufficient for wargaming the full spectrum of air operations, although they are appropriate in some cases.¹⁶⁹ The Air Force would be better served by doctrine tailored to its unique capabilities, mission, and wargaming requirements.¹⁷⁰

Conclusion

After a thorough study of the theory, history, and doctrine of wargaming, this monograph has reached several well-supported conclusions. Wargaming is a powerful technique for training, educating, and refining operational plans. However, wargaming—amongst other operational planning activities necessary to create shared understanding—requires an open and inquisitive environment to flourish. The wargame theory of GEA and wargame pathologies provides a framework for creating and executing valid wargames at the tactical, operational, and strategic levels of warfare. Applying wargame theory to the Midway case study both clarifies the understanding of this well-studied battle, and corroborates the strength of the theory. At present, doctrine diverges from wargame theory in its contents and by its omissions. Improving doctrine would capitalize on these insights and potentially avert an otherwise foreseeable military catastrophe—such as that which befell Yamamoto’s Midway invasion force—from striking the US military.

¹⁶⁹ For example, the Air Force meets joint objectives by adjusting the priority and weight of effort (typically as a percentage of kinetic effort) applied towards operational objectives. An Air Force war game ought to consider the range of ends, ways, means, and risk available to the air planner to achieve the air component’s operational objectives. Targets corresponding to these objectives may be arrayed throughout the area of operations, therefore the belt, box, and avenue in depth approaches may be inappropriate for wargaming air operations, unless the purpose of the game is to support a surface wargame that is structured according to the belt, box, or avenue in depth approaches.

¹⁷⁰ Air Force Instruction (AFI) 10-2802 *Air Force Experimentation* (Washington, DC: Government Printing Office, 2013). AFI 10-2802 provides some guidance that parallels elements in GEA, such as formulating objectives, identifying stakeholders (audience), and developing the scenario and database. However, the AFI is oriented towards so-called “Title 10” games and Headquarters Air Force agencies, not operational planners. Furthermore, such games have a large budget, and are supported by a professional wargaming staff.

To the skeptic who prefers the lack of specificity in current doctrine and doubts the benefit of more detailed instructions, consider the following case. During the Midway wargame, Yamamoto asked his staff how the First Air Fleet would react if the US fleet arrived while the First Air Fleet's aircraft were away attacking Midway. Lacking any plan, Genda gave an unsupported—and unsupportable—claim of defensive strength. An unbiased study (war game), based on detailed planning factors, would have revealed the impossibility of Genda's claims.¹⁷¹ The tragedy of Genda's bravado became painfully clear on the morning of May 4, 1942, as Dauntless dive-bombers hurled 1,000-pound bombs into the *Akagi*, with Genda aboard.

Most doctrinal (and non-doctrinal) wargame instructions include an early step to “gather tools and information,” including a list of perhaps ten broad categories. Such glib instructions belie the detailed planning factors the staff must assemble to draft a feasible COA and thoroughly wargame it. In Genda's case, these planning factors would include the number and location of the carriers, the types of aircraft on each, their respective munitions and missions, and the intricacies of carrier operations such as deck cycles, locations of refueling and rearming equipment, and so forth. When a wargame reveals that a COA is not feasible, acceptable, suitable, or complete, one of two results ensue: The planning team can assemble the necessary information, revise the plan, and restart the wargame, or the staff can “hand-wave” the problem away. All too often—as evident in MC-02 and Midway—wargamers adopt the latter solution, justifying the lapse as essential due to time constraints, or as an acceptable risk.

¹⁷¹ Parshall and, Tully, 431; Isom, 266-278. For decades, historical debate has raged regarding Nagumo's decisions during the battle, including that to disregard Yamamoto's instruction to retain torpedo bombers and rearm them with bombs for additional strikes against Midway. Authors, such as Parshall and Tully, Isom, and others, have drawn conclusions that undermine much of the conventional wisdom of the battle. It is not the purpose of this monograph to identify the “most correct” interpretation of events. However, the detailed analysis by these authors is quite similar to the analysis wargamers must accomplish to thoroughly test the feasibility of an operational concept, and how unexpected events might unfold.

This monograph concludes that current doctrine provides insufficient guidance to the operational planner; more detail is necessary. It would be unreasonable—and likely counter-productive—for revised wargame doctrine to attempt to specify every possible detail. Some wargame experts may consider such details self-evident; however, the essential purposes of doctrine include establishing a body of professional knowledge, a common language, and best practices across the force.¹⁷² Current doctrine falls well short of the details necessary to conduct a successful wargame. Furthermore, doctrine should describe the many ways of solving problems through wargaming, rather than prescribing rote solutions.¹⁷³

Recommendations for Doctrine

Joint and service doctrine are oriented towards evaluating COAs under development, rendering it largely irrelevant for other purposes, such as planning hybrid wargames or other training-focused wargames. Recall that hybrid wargames, such as the theater-wide exercise Key Resolve and division-level Mission Command Training Program do test real (or realistic) war plans against a thinking adversary. However, these larger games have many distinctions from the limited operational planning games conceived in JP 5-0, FM 6-0, MCWP 5-1, AFD 3-0, and NWP 5-01. The primary objective of the exercises listed above is to provide a training environment for the staff to gain proficiency at the operational planning process, as well as many other skills required for effective command and control; it is not a refined COA for later comparison and approval as described in planning doctrine.

Service doctrine provides a better understanding of wargaming than joint doctrine, particularly when planners reference multiple service publications; however, service doctrine still

¹⁷² Army Doctrine Publication (ADP) 1-01 *Doctrine Primer* (Washington, DC: Government Printing Office, 2014), 1-1.

¹⁷³ Clausewitz, 151-153. As Clausewitz observed, there is “no prescriptive formulation universal enough to deserve the name of law can be applied to the constant change and diversity of the phenomena of war.”

paints an incomplete picture, and is almost exclusively oriented towards tactical problems. Planners must often rely on wargaming techniques relayed by word of mouth, experience, and various non-doctrinal handbooks. While many excellent sources of wargaming guidance exist outside of military doctrine, the purpose of doctrine is to provide a reliable baseline of instruction. Under the status quo, the planner's understanding and proficiency are idiosyncratic and highly dependent upon individual initiative to pursue resources and learning beyond the few techniques in doctrine. For such a critical operational planning step—which JP 5-0 instructs should receive the greatest time and effort—this is an inexplicable state of affairs.¹⁷⁴

In the absence of updated joint and service doctrine, operational planners will lack the descriptive—yet detailed—instruction necessary to ensure useful and valid operational planning wargames across the DOD. Until that time, they may reference many external sources. Doctrine authors should reference many of these same sources while drafting updates to doctrine. Perla's *The Art of Wargaming* includes an engaging history of modern wargames. More importantly, it clearly lays out the theoretical framework for wargames. *The Art of Wargaming* addresses designing and executing tactical, operational, and strategic-level wargames, and is detailed and insightful without being prescriptive.¹⁷⁵ US Army Command and General Staff College (CGSC) Student Text 100-3 (2002) *Battle Book* is generally aligned with joint and service doctrine, although it has since been superseded. *Battle Book*'s strength is in its detailed instruction, such as

¹⁷⁴ JP 5-0, IV-30; FM 6-0, 9-6. Dr. Peter J. Schifferle, course notes, School of Advanced Military Studies, Ft. Leavenworth, KS. FM 6-0 identifies Mission Analysis (Step 2) as the most important step in MDMP. This does not conflict with JP 5-0's guidance that planners should spend the most time on wargaming. Done properly, MA should reveal the detailed planning factors necessary to develop COAs that are feasible, suitable, and acceptable, and which enable comprehensive wargaming as envisioned in this monograph. Furthermore, the US Army's School of Advanced Military Studies instructs that the action-reaction-counteraction framework should be applied to Red and Blue at several stages of operational planning process, including Mission Analysis, COA Development, COA Comparison, and Orders Production. Although not a formal wargame at these other steps, this format encourages the staff to consider second and third order effects at each step.

¹⁷⁵ Perla, *The Art of Wargaming*.

a full page of screening and evaluation criteria for COAs, and reflective questions useful in game design and execution. *Battle Book* also includes detailed rules, instructions for sequence of play, and thorough exposition of combat resolution calculations—all areas treated briefly in current doctrine.¹⁷⁶

Neil Garra's *Wargaming: A Systematic Approach* is written by a retired Army intelligence officer who identified many details missing from wargaming doctrine. Garra provides detailed instructions for game turns, combat resolution, and tracking game time. Although limited in scope to tactical gaming of land conflict, Garra's critiques and solutions remain as valid today as when he wrote them in 2004.¹⁷⁷ Micah Zenko's *Red Team: How to Succeed by Thinking Like the Enemy*, and the Army's University of Foreign Military Cultural Studies (UFMCS) *The Applied Critical Thinking Handbook*, explore "red teaming," a concept independent from, but closely related to, wargaming. The techniques in both books can help all types of planning teams to improve the breadth and thoroughness of solutions.

Last, but not least, the elements of wargame design from GEA provide a logical roadmap for wargame design. This roadmap should describe and detail proper wargame design methods while avoiding unnecessarily directive instructions. The pathologies of wargaming provide a check and balance to game design, prompting planners to scrutinize planned wargames for potential failure modes and sources of bias before they are manifested in a wargame of operational significance. Doctrine authors should include the lessons of these and many other sources into detailed joint and service doctrine to assist operational planners in creating wargames that are theoretically sound and operationally insightful. If it is desirable to ensure that future wargamers do not assume-away problems as blithely as Commander Genda did, creating comprehensive wargaming doctrine is the logical first step.

¹⁷⁶ Command and General Staff College Student Text 100-3 *Battle Book* (Fort Leavenworth, KS: US Army Command and General Staff College, 2002), 15-24 through 15-42.

¹⁷⁷ Garra, *Wargaming*.

Glossary

Blue: Players representing friendly forces in a wargame.

Gameable Objective: “those objectives that are reasonably addressable through the medium of a game.”

Green: Players representing neutral forces in a wargame, such as displaced civilians.

Healthy Game: A game that meet its designed objectives.

Magic circle: The special time and place created by a game, in which players accept the limits of the rules and adopts the *lusory attitude* (suspension of disbelief) necessary for successful game play.

Model: “A physical, mathematical, or otherwise logical representation of a system, entity, phenomenon, or process.”

Red: Players representing hostile forces in a wargame.

Red Team: An organizational element comprised of trained and educated members that provide an independent capability to fully explore alternatives in plans and operations in the context of the operational environment and from the perspective of adversaries.

Simulation: A method for implementing a model over time.

Unhealthy Game: A game that does not meet its designed objectives, or a game whose design is inappropriate or counter-productive for the objectives of a given instance of wargaming.

Wargame: A warfare model or simulation whose operation does not involve the activities of actual military forces, and whose sequence of events affects and is, in turn, affected by the decisions made by players representing the opposing sides.

Wargame Pathology: A wargame failure mode. The reasons an unhealthy game occurs instead of a healthy one.

White: Wargame umpires who both ensure the smooth running of the scenario and adjudicate outcomes and resolve disagreements.

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