The Art of War(games):

Analyzing Assumptions Embedded Within United States - People's Republic of China Wargames

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Matthew Breeze

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Signature below of Paper Supervisor certifies successful completion of oral presentation and completion of final written version:

Dr. Christopher Preble
Professional Paper Supervisor
Senior Fellow and Director, Reimagining US Grand Strategy Program
The Stimson Center

April 21st 2025
Date, oral presentation

4/21/25
Date, paper completion

Shahrin Upoma, Ph.D.
Second Committee Member
Assistant Professor, Leadership and Management
Humphrey H. School of Public Affairs

04/21/2025
Date, paper completion

Jon Olson, CDR, USN (Ret.)
Third Committee Member
Visiting Sit Investment Chair for Asian Policy and Political Science
Carleton College

APRIL 21ST, 2025
Date, paper completion

Signature of Second Third Committee Members, certifying successful completion of professional paper

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Abstract:

This paper examines the critical role of wargaming in forming United States (U.S.) policy and military decision-making in the context of potential conflict between the U.S and the People's Republic of China (PRC). As abstract representations of conflict, wargames offer a valuable tool for policy-makers to explore various scenarios without real-world consequences of destruction and loss of life. However, the efficacy of these wargames hinges on their design and assumptions. This work argues that current table-top exercises that depict conflict between the U.S. and the PRC often fall short of adequately accounting for key factors, such as the high usage rates of weapons, logistical constraints and the protracted nature of modern conventional warfare. Drawing on historical case studies, like the U.S. Naval War College's War Plan Orange, the 1961 Berlin Crisis games, as well as analysis of more recent publicly available wargames and the conflict against the Houthis in the Red Sea, this paper highlights the necessity for more realistic and comprehensive wargame design in the future. Ultimately, this research advocates for the development of improved wargaming methods to provide policy-makers with more accurate insights into potential U.S.-PRC conflict, thereby fostering better informed strategic decision-making and hopefully reducing the risk of war.

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Introduction

She sinks. Joining many of her friends and many of her enemies, she rests gently on the bottom. CVN-68, the aircraft carrier USS Nimitz, is removed from the board. Her cardboard piece is put back in the box. She is not available for the next turn or the rest of the game.

After the end of the Second World War, Admiral Chester Nimitz, the commander of the United States Naval forces in the Pacific, and namesake of the aircraft carrier CVN-68, said, "The war with Japan had been reenacted in the game rooms at the Naval War College by so many people and in so many different ways, that nothing that happened during the war was a surprise… absolutely nothing except the kamikaze tactics toward the end of the war; we had not visualized these."[1] Nimitz knew wargames helped win the war. While this paper focuses on wargaming, the lessons people learn through gaming can extend beyond the military realm by providing a low-risk environment to explore complex scenarios, test assumptions, and improve decision-making in many fields, including business, diplomacy, and crisis management.

Wargames analyzing possible conflict in the Pacific today do not focus on The Empire of Japan, but instead on the People's Republic of China (PRC). Wargames are a niche hobby and an even more niche policy area. Yet, citizens should care because proper wargames save lives in real wars by showing policy-makers how poor decisions have costly consequences. They inform not only the mechanics of fighting a war, but also the policy-making around warfare. The wargames that are being conducted today, at least those in the public domain, make incorrect assumptions about a possible U.S.-PRC conflict. Wargaming a U.S.-PRC conflict is the focus of this work as the People's Republic of China is the most powerful potential adversary for the United States. Current games do not take into consideration the very high usage rates of

[1] Mizokami, K.: A brief history of naval wargames, USNI News [online] Available from: https://news.usni.org/2013/09/24/brief-history-naval-wargames (Accessed 27 February 2025), 2013.

weapons, equipment, personnel, and duration that a modern war in the Pacific would entail. Wargames can yield valuable knowledge only when conducted with due diligence. This paper will explain what makes a well-executed U.S.-PRC wargame.

What is a Wargame?

First, what is a wargame? A wargame is **people** making **decisions** in a context of competition or **conflict**.[2] In its most basic form, a wargame is a board game like Chess, Risk, Go,[3] or Acey Deucey.[4] Kriegspiel, developed in Prussia after the Napoleonic wars, is often thought of as the first 'official' wargame of the modern era.[5] However, wargames have been part of human civilization for thousands of years as political organizations and individuals attempted to hone policy- and decision-making without bloodshed.[6]

Wargames are abstracted representations of combat. They do not attempt to model or simulate conflict in ways that perfectly match reality. That would be impossible as there are too many variables, unknowns, or as Prussian military theorist Carl Von Clausewitz called them, 'frictions' to possibly represent with 100% accuracy.[7]

A wargame is an artificial conflict that can be used to help inform decision-making.[8] Wargames enable participants to engage in simulated conflicts using board games, maps, or digital platforms, providing valuable insights for decision-making. They can be relatively simple

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[2] Perla, Peter. "Wargaming and The Cycle of Research and Learning." *Scandinavian Journal of Military Studies*, vol. 5, no. 1, 2022, pp. 197–208, https://doi.org/10.31374/sjms.124.
[3] Wéiqí or 围棋 in simplified Chinese characters is a Chinese strategy game played with black and white stones where the goal is to control territory on a square lined board.
[4] Rubel, R. C.: Acey Deucey can teach military strategy, U.S. Naval Institute [online] Available from: https://www.usni.org/magazines/proceedings/2023/march/acey-deucey-can-teach-military-strategy, 2023. (Acey Ducey is a backgammon like game popular in the early 20th century U.S. Navy.)
[5] Mason, Roger C. "Wargaming: Its History and Future." *The International Journal of Intelligence, Security, and Public Affairs*, vol. 20, no. 2, 2018, pp. 77–101, https://doi.org/10.1080/23800992.2018.1484238.
[6] Wilson, Andrew. *The Bomb and the Computer ; Wargaming from Ancient Chinese Mapboard to Atomic Computer.* Delacorte, 1968. (p. 1, Go is from about 3000 BC)
[7] Watts, Barry D. *Clausewitzian Friction and Future War*. Institute for National Strategic Studies, 1996.
[8] Harris, J.: Why The Military Plays Games to Prepare for War, YouTube [online]

and operate easily, or can be extremely complicated, multi-day affairs. These extended table-top exercises span multiple days, involving dozens of participants, and aim to train real-world decision-makers by simulating the realities of warfare. Well constructed wargames are unscripted sequences of player made decisions where the participants move the game forward and are compelled to live with the consequences of their decisions. This paper uses the terms *wargame*, *game* and *table-top exercise* interchangeably.

A Note on Sources

Strategic competition between the U.S and the PRC has been fertile ground for wargames. While there is certainly a great deal of classified wargaming happening in the U.S. and in the PRC, the research for this paper was conducted solely using publicly available information in English.[9]

The scope of review for this research was broad. Academic peer reviewed journal articles were an important, but small portion, of the literature used to inform this work. Academic studies were most useful in understanding the theory around wargames and the history of wargaming as a modern tool for military decision-making. Reports from respected think tanks formed a central pillar of this research. Think tanks have conducted U.S.-PRC wargames and have published their findings for review. Thus they are an important element of public literature on the subject. Books informed the historical case studies, history of wargaming, and current ideas about what a war between the U.S. and the PRC could look like. This research leaned heavily on recent news reports, non-academic sources, and op-eds, as the conversation about U.S.-PRC wargaming is ongoing. The section on U.S. operations in the Red Sea against the Houthis in particular used

[9] This was reviewed by the University of Minnesota Institutional Review Board (IRB) and does not require IRB approval, Date:03/14/2025, IRB ID: STUDY00024541.

contemporary news reports. Primary source documents formed an important element of the Berlin 1961 case study, but did not play a key role in this work overall.

The sources generally agree that wargaming is an important tool to inform decision-makers. Sources also generally agree that current weapons stocks are inadequate for a long war between the U.S. and the PRC. However, there are gaps in current literature. These gaps include propositions to implement lessons learned from recent naval engagements into U.S.-PRC wargaming, the inclusion of nuclear weapons in wargames as a standard practice and lack of public wargames depicting a war longer than 30 days between the United States and the People's Republic of China.

Why Conduct Wargames?

Although all types of training are important for a military, wargaming is a special type of training that will be the focus here. Wargames are different from other types of military training such as exercises, simulations, or weapons practice. They have broad appeal as a way to develop crisis and decision-making skills.[10] Wargames allow policy- and decision-makers to experiment with tactics and strategy without risking equipment or human casualties. They emphasize learning in the absence of fighting, where it is safe to fail.[11] Wargames allow testing assumptions, as incorrect assumptions can lead to deadly surprises during conflicts.

Wargaming emphasizes decision-making where the choices people make impact future in game decisions. For example, if a participant in a wargame makes a decision to move a ship on

[10] Schechter, Benjamin, et al. "Wargaming as a Methodology: The International Crisis Wargame and Experimental Wargaming." *Simulation & Gaming*, vol. 52, no. 4, 2021, pp. 513–26, https://doi.org/10.1177/1046878120987581.
[11] Mouat, Tom. "The Use and Misuse of Wargames." *Scandinavian Journal of Military Studies*, vol. 5, no. 1, 2022, pp. 209–20, https://doi.org/10.31374/sjms.121

the board and it is then sunk, that ship is not available in the next turn. Decisions have consequences in the world of the game, just as in real life.

In wargames there are no right or wrong moves, only decisions and consequences. Using the example from before, if you move a ship on the game board and it is immediately sunk, that is not necessarily a bad move. However, you no longer have that ship. This type of training is not practical with real ships or planes. Conducting an exercise with real ships is excellent training, but table-top exercises provide different knowledge as they avoid pressure to keep pieces (ships, units, planes etc) on the board artificially. Winning or losing are less important than learning from table-top exercises.[12]

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In addition to official wargames, there are also commercial wargames. Designed for entertainment, these wargames need to be fun, economically viable, and have a generally equal chance for either side to win. In contrast, wargames designed for decision- or policy-makers need, above all else, to reflect reality. That is not to say that publicly-available commercial wargames are not useful; there are some that can provide a great deal of practical information and are based on assumptions that are fully grounded in the real world. Commercial wargames have been used by uniformed military personnel and have even formed the basis for official United States Marine Corps (USMC) games like Assassin's Mace.[13] The assumptions made in some select commercial wargames will therefore inform part of this analysis.

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[12] Kristof, N.: War at Sea: Naval Warfare at the Operational Level of War, Georgetown University Wargaming Society [online] Available from: https://www.youtube.com/watch?v=KtHMc29u15I

[13] Barrick, T.: Wargame Design: The Marine Corps' Operational Wargame System w/ Tim Barrick, YouTube [online] Available from: https://www.youtube.com/watch?v=3A7JZ4MjIMM (Accessed 27 February 2025), 2021.

The use of commercial wargames is beneficial because it allows many people to quickly and easily participate in wargames. In the Nimitz quote referenced before; "The war with Japan had been reenacted in the game rooms at the Naval War College by so many people and in so many different ways, that nothing that happened during the war was a surprise… absolutely nothing except the kamikaze tactics toward the end of the war; we had not visualized these."[14] People often focus on the portion referring to the U.S. Naval forces being unsurprised by Japanese actions. However, we should also focus on the portion that says "by so many people and in so many different ways."[15]

Wargames, at least good ones, are special because they allow "so many people" to make decisions and be involved in the learning process. These players can be uniformed military, civilian officials or public researchers. In short, wargaming can be a relatively quick and inexpensive way to visualize and learn from many possible outcomes. Players can learn about a collection of outcomes so that, in a real crisis where lives are actually on the line, they will be less likely to be surprised.

Historically Bad Wargaming Examples

Millennium Challenge 2002

An example of a poorly constructed wargame was Millennium Challenge 2002.[16] This wargame pitted 'blue' U.S. forces in the Persian Gulf against a simulated enemy or 'red' force

[14] Mizokami, K.: A brief history of naval wargames, USNI News [online] Available from: https://news.usni.org/2013/09/24/brief-history-naval-wargames (Accessed 27 February 2025), 2013.
[15]Mizokami, K.: A brief history of naval wargames, USNI News [online] Available from: https://news.usni.org/2013/09/24/brief-history-naval-wargames (Accessed 27 February 2025), 2013.
[16]Jones, N.: How the U.S. military lost a $250 million war game in minutes - The Washington Post, The Washington Post [online] Available from: https://www.washingtonpost.com/investigations/2024/10/30/usa-war-military-money-report/ (Accessed 8 February 2025), 2024

resembling Iran or Iraq. Millennium Challenge 2002 was expensive, unrepeatable, biased with political influence, contained faulty assumptions, involved wargaming tied to real force exercises, and did not let players make and then live with their decisions. In the end, the wargame was ineffective because it both failed to produce useful insights and, perhaps equally significant, policy-makers were unwilling to consider any lessons from the game in the first place.

At a cost of $250 million (about $438 million in 2025 dollars) Millennium Challenge was one of the most expensive wargames ever run. The cost alone is enough to call it a bad wargame, as the price tag ensured that it could only be performed once. The large cost was due to the fact that the game included thousands of participants as well as live training of troops. The most valuable wargames are not conducted in conjunction with live-fire training exercises; as wargames should be separate from exercises to avoid artificially restricting piece removal and to reduce costs. One could argue that Millenium Challenge should never have been referred to as a wargame in the first place.

Millennium Challenge was run about a year before the U.S. invasion of Iraq in 2003. With hindsight, it is now clear that there was a veritable thumb on the scale for U.S. forces to perform according to a preordained plan that could then supposedly inform plans for Iraq. Leaders wanted only to learn those lessons that could be applied to - and build support for - the invasion of Iraq, but they did not like their first lesson.

In the first 10 minutes, 19 U.S ships, including an aircraft carrier with 5,000 crew on board, were sunk by “enemy” forces commanded by U.S. Marine Corps Lieutenant General Paul Van Riper, using unexpected methods and tactics, Van Riper was able to use asymmetrical ‘weaker’ forces to utterly destroy U.S. forces at the beginning of the game. However, instead of

compelling U.S. forces to decide how to respond to this unexpected shock, the game adjudicator ruled the successful attack "wouldn't have happened." The adjudicator "refloated" the "sunken" ships and restricted Van Riper's enemy forces, so that they were not able to initiate combat, thus violating the military axiom that the enemy always gets a vote.

Because the game involved actual forces, if ships were sunk in the game then they would not be able to conduct their planned live-fire training. By simply saying that something was not possible, even though it clearly was, the participants avoided making tough decisions and learning the consequences of their flawed plans. Hitting the reset button after ten minutes does not provide valid knowledge. The adjustments made after the refloat/reset ensured a U.S. victory according to a predetermined plan and did not allow players to prepare for exploitation of known U.S. liabilities. Assuming that forces are invulnerable to unconventional tactics, ignoring clearly exploitable weaknesses, and tying a game to real world force movements are all examples of bad wargaming.

In the case of Millenium Challenge 2002, a rigged game led to inadequate lessons and poor policy.

Valid wargames allow an enemy to succeed if they are able. Van Riper stepped down as commander of the simulated enemy forces after the reset as he realized that U.S. forces were no longer operating against a "thinking and adaptive enemy."[17] After the game Van Riper wrote a memo outlining his position and said that the public should have been able to read his report

[17] Van Riper, P. K.: Lt. gen. Paul K. Van Riper, senior mentor, opposition force, Millennium Challenge 2002, "Opposition force senior mentor's observations of Millennium Challenge 2002," Secret/noforn, August 21, 2002, 21 pp., National Security Archive [online] Available from: https://nsarchive.gwu.edu/document/32484-lt-gen-paul-k-van-riper-senior-mentor-opposition-force-millennium-challenge-2002, 2002.

immediately afterwards. Instead, it was kept classified so the game could not be scrutinized, probably in part because this failed wargame influenced U.S. decision-making in the 2003 Iraq invasion, where a weaker asymmetrical force caused real-life problems for the U.S. military with deadly results. A rigged game led to inadequate lessons and poor policy.

Tannenberg, April 1914

Another example of a bad wargame, where participants failed to learn important lessons, occurred in April 1914.[18] The Imperial Russian army conducted a table-top exercise wargaming their contingency plan for war with Germany. The Russians had two table-top simulated armies, First Army in the north commanded by General Paul Von Rennenkampf and Second Army further south commanded by General Alexander Samsonov. The Russians played through an opening scenario depicting a Russian invasion of East Prussia if war were to break out with Germany, with the German team played by other Russian officers. The two Russian armies made positive progress across their map in the first few simulated days. Pieces were moving quickly across the board with little German team opposition. Then, the Russian table-top forces entered an area of rough ground and lakes that made progress and coordination difficult.

The German team then placed a small force in front of the northernmost Russian army. This small force was able to hold the numerically superior Russian force in place while the bulk of the German forces were shifted across the table-top to confront the southernmost Russian army. The German team surrounded and destroyed the southern Russian forces who were unable to coordinate with their northern neighbors.[19] The Russian officers who played the German team performed well. One might think that armed with such knowledge the Russian contingency plan

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[18] Wilson, Andrew. *The Bomb and the Computer ; Wargaming from Ancient Chinese Mapboard to Atomic Computer.* Delacorte, 1968. (p 33)

[19] CAFFREY JR., MATTHEW. "Toward a History-Based Doctrine for Wargaming." *Aerospace Power Journal*, vol. 14, no. 3, 2000, pp. 33-.

for war with Germany would change, thus leading to a crushing Russian victory over Germany in the early stages of the Great War that started that summer. One would be wrong.

Only four months later, in August of 1914, in a real invasion of East Prussia, Rennenkampf and Samsonov implemented what seemed like the exact same plan they had employed in the table-top exercise. The actual German army left a small holding force in front of the now real, northernmost Russian army, then turned south and annihilated the southernmost Russian army at the battle of Tannenberg, just like in the game from earlier that spring. The Russians suffered over 120,000 casualties at Tannenberg.[20] The real German army then returned their focus to the northernmost Russian army and destroyed it in the battle of Masurian Lakes, inflicting a further 120,000 Russian casualties.[21] The Russian forces that were supposed to march into Germany instead retreated.

Generals Rennenkampf and Samsonov could and should have used their own wargame experience of April 1914 to change their plans. They were beaten in precisely the same way in real life as in the game. They could have made changes to their battle plan based on the outcome of the very recent wargame, or at least taken better care not to become so separated where they could be beaten piecemeal. Instead, they completely ignored the lessons from the game that could have changed the course of the Great War and could have saved many lives. One is hard pressed to find a more obvious example of when lessons could have been so clearly learned and were instead so recklessly abandoned in such a short order.

The wargame itself was obviously well constructed as it gave results eerily similar to reality. The reason this was a faulty wargame experience is that nobody bothered to learn anything from it. They did not apply what the game taught them. Effective wargaming demands

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[20] Tuchman, Barbara W. *The Guns of August*. 1st Presidio Press Mass Market ed., Ballantine, 2004. (p.343)
[21] Buttar, Prit. *Collision of Empires : The War on the Eastern Front in 1914*. Paperback edition., Osprey Books, 2016. (p. 239)

not only a well-designed setup grounded in realistic assumptions and capabilities; there must also be an institutional commitment to learning from the insights the wargames provide. When done well a wargame can show vulnerabilities in a plan. If nobody cares to make changes and decision-makers ignore a game's lessons, then why bother playing the game? Having a coordinated system for capturing lessons learned, so that those lessons can then be applied in another game or in real life, is crucial for gaining knowledge from wargames. Wargames are meant for learning; if you do not want to learn then no amount of wargaming will help you. The Russian army wargame of April 1914 could have changed history. Instead it is merely a footnote of what could have been.[22]

Historically Good Wargaming Examples

War Plan Orange

Many people have praised the gaming curriculum of the U.S. Naval War College during the interwar years (1919-1940), see Robert Rubel's, *Restoring Wargaming Focus to the Naval War College,* for an example.[23] Their wargaming curriculum undoubtedly assisted in the victory over Japan.[24] This time period was the zenith of U.S. Naval wargaming whereas now, explains Rubel, "wargaming is no longer heavily featured in the curriculum" of the Naval War College.[25]

Good wargames are iterative. They can be played many times with dynamic results that allow many scenarios and a wide variety of decisions. This was certainly the case for students at

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[22]CAFFREY JR., MATTHEW. "Toward a History-Based Doctrine for Wargaming." *Aerospace Power Journal*, vol. 14, no. 3, 2000, pp. 33-.?

[23] Rubel, Robert. C.: Restoring Wargaming Focus to the Naval War College, Center for International Maritime Security [online] Available from: https://cimsec.org/restore-wargaming-focus-to-the-naval-war-college/

[24] Pellegrino, P.: Evolution of War Plan Orange, Invicta [online] Available from: https://www.youtube.com/watch?v=KXal8JUqAfQ (Accessed 27 February 2025), 2019.

[25]Rubel, Robert. C.: Restoring Wargaming Focus to the Naval War College, Center for International Maritime Security [online] Available from: https://cimsec.org/restore-wargaming-focus-to-the-naval-war-college/

the interwar Naval War College, including the future Admiral Nimitz. Students played on both sides, acting as the U.S. Navy and the enemy navy, usually Imperial Japan or the United Kingdom. Naval War College games where Britain was the enemy were known as War Plan Red. Games where Japan was the enemy were known as War Plan Orange (changed to War Plan Rainbow after the Second World War began in Europe).

War Plan Orange detailed the entirety of the war in the Pacific, and was conducted every year by naval officers. "The decision makers of WWII carried the Orange strategy 'genetically encoded' in their memories," explained Edward Miller in his comprehensive study of the plans.[26] Each plan evolved year after year to reflect technological changes as well as changes in strategy. For instance there were initial plans that war with Japan should involve a U.S. "thrust" from the west coast across the Central Pacific to the American Philippines and then onwards to the Japanese home islands. Wargaming, especially as submarine and aircraft capability increased, showed the "thrusting" plan would not work; U.S. forces would be shredded by air and undersea attacks on the long voyage. Charging straight at the enemy led to severe losses both in combat capability and importantly to logistics ships.

Wargaming also showed that islands across the Central Pacific would need to be taken so that aircover and logistics facilities could be established to support an offensive towards the Philippines and the Japanese home islands. However, not every island would be taken. In *War Plan Orange: The U.S. Strategy to Defeat Japan, 1897-1945,* Miller explains, "By 1937 planners had rejected the notion of clearing all enemy islands along the ocean highways in favor of bypassing the nonessential or too stoutly defended."[27] Wargaming tested this radical change in

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[26] Miller, Edward S. *War Plan Orange : The U.S. Strategy to Defeat Japan, 1897-1945*. Naval Institute Press, 1991. (p.330, Miller's book is probably the best account of the evolution of War Plan Orange yet published.)
[27] Miller, Edward S. *War Plan Orange : The U.S. Strategy to Defeat Japan, 1897-1945*. Naval Institute Press, 1991. (p.349)

strategy, as, at the time, it was extremely unusual to hop over strongpoints leaving them in the rear. Under the new strategy informed by the war games, strong points were left to wither on the vine while advanced supply bases were built to support continued forward movement by U.S. forces. Part of the success of War Plan Orange was that it did not neglect the less sexy side of military operations, logistics. Indeed, logistical considerations were a major reason that the thrusting strategy was abandoned in favor of the island hopping strategy. There is an old adage that amateurs talk tactics and professionals talk logistics. Logistics wins wars.

By accounting for logistics across the tyrannically large distances of the Pacific Ocean, War Plan Orange was able to prepare military leaders and policy-makers for the unprecedented logistical support needed to defeat the Empire of Japan. The island hopping strategy adopted as part of War Plan Orange often involved heavy construction, as bases would be built and supplies gathered at newly conquered atolls. U.S. Admiral William 'Bull' Halsey called the bulldozer one of the three decisive weapons of the war.[28] We should not forget that bulldozers and concrete, as well as planes and ships, win wars and thus should be accounted for in wargames like they were at the interwar Naval War College.

Bulldozers and concrete, as well as planes and ships, win wars and thus should be accounted for in wargames.

The plans that were successfully implemented during the war were based on War Plan Orange wargames. Although the specific choice of islands changed over time, the basic plan

[28] Miller, Edward S. *War Plan Orange : The U.S. Strategy to Defeat Japan, 1897-1945*. Naval Institute Press, 1991. (p.351) Unfortunately Miller does not name the other two decisive weapons.

developed at the War College was surprisingly similar to what happened during the war (see map reference 1, p46).[29]

Technology changed and War Plan Orange changed with it. Naval leaders let the games play out over the entirety of a simulated conflict against the Empire of Japan year after year so that they could learn what worked and what did not work in changing environments. While it took time, effort and resources to run these large games every year, that is what the Naval War College was established for. Gaming is one of the reasons that decision-makers in WWII were prepared for the situations that presented themselves during the war. They had 'played' similar battles before.

West Berlin 1961

Another example of good wargaming is the Berlin Crisis games that were first conducted at RAND in the summer of 1961 and were then played again in September of 1961 by some Kennedy administration officials.[30] The game played by Kennedy administration officials is the focus here. The game portrayed a rise in tensions between the U.S. and U.S.S.R over West Berlin. The wargame scenario saw West Berlin blockaded by the Soviets with the U.S. attempting to maintain freedom of access, replicating what transpired in 1948-1949, commonly known as the Berlin Airlift.[31] The game also included an East Berlin uprising.[32] In the game, the

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[29] Miller, Edward S. *War Plan Orange : The U.S. Strategy to Defeat Japan, 1897-1945*. Naval Institute Press, 1991. (p.340) - You can see in the map reference that the Southwest Front led by General Douglas MacArthur was not part of the wargames played before the war. War Plan Orange did not account for the politics or desires of General Douglas MacArthur and how those would impact the course of the war in the Pacific.

[30] BERLIN CRISIS Game, https://n2t.net/ark:/54723/h31z4245x (Participants in Political-Military Berlin Game document, including David Henry - State Department, Carl Kaysen -White House, Timothy Stanley - Department of Defence, Seymour Weis - State Department, Thomas Wolfe - Department of Defense, John Ausland - State Department, Alexander George - Rand Corporation, Henry Kissinger - White House, John McNaughton - Department of Defense, John Shaw - State Department, Robert Spraggins - Department of Defense)

[31] The Berlin Airlift was a response to the U.S.S.R.'s blockade of West Berlin where U.S. and Western Allies supplied the city by air with food, fuel and other supplies. This operation was a test of Western resolve in the early stages of the Cold War.

[32] BERLIN CRISIS Game, https://n2t.net/ark:/54723/h31z4245x (Revolt in East Berlin Sept. 15, 1961 document)

Soviet team was played by U.S. personnel. Thus it was 'blue' players playing a 'red' team. The teams struggled with how to achieve their objectives while also avoiding a general conventional war or nuclear war between the U.S. and U.S.S.R. The objectives for the U.S. team were to keep access to West Berlin open and support a simulated revolt in East Berlin. The objectives for the U.S.S.R. team were to put down the revolt and close access to West Berlin. The key difference from 1948 was that during the Berlin Airlift the U.S. had a monopoly on nuclear weapons, whereas in 1961 both the U.S. and U.S.S.R. possessed large numbers of nuclear weapons. By the end of the game there was intense conventional, non-nuclear, fighting between the two sides and negotiations to end the crisis began.[33]

President Kennedy was briefed on the outcomes and takeaways of the wargame in a presidential memo dated September 22nd, 1961. In this memo Deputy Special Assistant for National Security Affairs Carl Kaysen wrote, "The greatest value of the game was the stimulus to imaginative thought about Berlin it provided for the participants. Its greatest weakness as played was that none of the participants involved held positions of the highest responsibility in the government."[34] Stimulating imagination is a key component of successful wargames and is essential to learning how to learn. Good games also simulate decision-making in stressful environments.

The 1961 Berlin wargame was particularly effective because of its timing. Only one year later, in October 1962, Kennedy seems to have used many of the lessons learned in the wargame to survive the Cuban Missile Crisis. There is no doubt that the Berlin wargame had an impact on the management of the Cuban Missile Crisis. Avoiding nuclear war and unchecked escalation,

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[33] BERLIN CRISIS Game, https://n2t.net/ark:/54723/h31z4245x (Summary History of the Berlin Political War Game document)
[34] BERLIN CRISIS Game, https://n2t.net/ark:/54723/h31z4245x (Memorandum For the President document from Sept. 22, 1961)

communicating through military force, keeping violence within certain bounds, and more, were all goals in the wargame that were paramount in the October Crisis.

While Berlin and Cuba are not the same, the wargamed crisis and the real crisis bore enough resemblance that the lessons learned in the game could be applied to real life. Decision-makers, including Kennedy himself, had been briefed on, as well as thought imaginatively about, what to do in a crisis. Wargames like this are important because they teach people how to make decisions and policies in a crisis where the stakes are not real. It appears that Kennedy and his team learned from this wargame, then applied those lessons to a crisis a year later with the same adversaries where the consequences were significant for human life on earth. This is a particularly good example of effective wargaming.

The teams were able to get through the crisis without wider escalation, but not without substantial fighting between the two nuclear-armed superpowers.[35] One of the key takeaways from this historical wargame that could be helpful when thinking through U.S.-PRC wargaming is the desire to avoid nuclear escalation and to communicate with an enemy while fighting.[36] Even military actions are a form of negotiation when the two sides are not trying to completely destroy each other. The game players in 1961 acknowledged that it was incredibly hard to communicate to the opposing team with military strikes and other offensive measures, but communicating through acts of force was the goal of both teams.[37] U.S. communication with the PRC in a crisis would also likely be difficult, but extremely important for de-escalation.

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[35] BERLIN CRISIS Game, https://n2t.net/ark:/54723/h31z4245x (Berlin Crisis Memo for Secretary Oct. 2, 1961 document)
[36] BERLIN CRISIS Game, https://n2t.net/ark:/54723/h31z4245x (Schelling Comments on Campi David document)
[37] BERLIN CRISIS Game, https://n2t.net/ark:/54723/h31z4245x (Schelling Comments on Campi David document)

What Can We Learn From Recent Publicly Available Wargames?

The most accessible wargames for public analysis, for those without access to classified information, that depict conflict between the U.S. and the PRC have been conducted by think tanks such as the Center for Strategic and International Studies (CSIS)[38]and the Center for a New American Security (CNAS).[39] On the one hand, these games provide some useful lessons for decision- and policy-makers. On the other hand, they possess some faulty assumptions that could cause decision-makers to draw the wrong conclusions about a future conflict.

Dangerous Straits

The Center for a New American Security's "Dangerous Straits: Wargaming a Future Conflict over Taiwan" game has been well known since at least 2022. The game was played once with legislators as participants and featured on NBC's Meet the Press. Some aspects of this game are done well, others less well.

On the positive side, the inclusion of nuclear weapons in the game is an excellent feature. The takeaways that a war over Taiwan involving the PRC and the U.S. would be extremely costly are also well grounded. As Stacie Pettyjohn writes in the CNAS report to congress about the table-top exercise that took place on April 19th, 2023;

> "The Blue team had over 10 bases attacked, over 90 aircraft lost, two attack submarines destroyed, three attack submarines damaged, two amphibious ships sunk, and one carrier damaged after just a week of fighting. For its part, the Red team lost over 150 aircraft, 15 submarines, over 100 surface ships, and one aircraft carrier. It managed to

[38] Cancian, Mark F., et al. "The First Battle of the Next War: Wargaming a Chinese Invasion of Taiwan." *CSIS*, www.csis.org/analysis/first-battle-next-war-wargaming-chinese-invasion-taiwan.
[39] Pettyjohn, Stacie, et al. "Dangerous Straits: Wargaming a Future Conflict over Taiwan." *Center for a New American Security (En-US)*, 15 June 2022, www.cnas.org/publications/reports/dangerous-straits-wargaming-a-future-conflict-over-taiwans

land around 50,000 forces on Taiwan but lost over 40,000 troops from the landings and ground combat components of the operation."[40]

The scale of destruction and large number of casualties provide a sobering experience for decision-makers to learn from and grapple with when making policy.

Showing this high level of death and destruction is, in this particular case, good wargaming so that people learn realistic lessons about what a conflict would look like. A conflict between the U.S and PRC over Taiwan, or anywhere, would produce devastating casualties. CNAS does not sugarcoat how intense the fighting would be. However, CNAS 'decision to only play through the first six days of a conflict is inadequate. Yes, the first six days will be costly, that is useful information; but the meat of decision-making will be what to do after that initial period. CNAS acknowledges that a longer war is likely, but they do not elaborate as to what this would look like. Other writers at CNAS argue that protracted wars happen unexpectedly or when they are unwanted and that they should be planned for.[41] In 1914, the French lost 40,000 soldiers in the week between August 20th and 27th with 27,000 of those killed on one single day.[42] What did they do next? The French continued fighting until November 11th, 1918, suffering millions of casualties, including hundreds of thousands of deaths.

That is the question for a U.S.-PRC wargame: What happens after the initially catastrophic first week? What would the U.S. (or the PRC) do if faced with a similar situation

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[40] Pettyjohn, Stacie, et al. "Bad Blood: The TTX for the House Select Committee on Strategic Competition between the United States and the Chinese Communist Party (CCP)." *Center for a New American Security (En-US)*, 27 Apr. 2023, www.cnas.org/publications/congressional-testimony/bad-blood-ttx.

[41] Krepinevich, A.: Protracted great-power war, CNAS [online] Available from: https://www.cnas.org/publications/reports/protracted-great-power-war

[42] Lafon, A.: War losses (France) / 1.0 / handbook - 1914-1918-online (WW1) encyclopedia, International Encyclopedia of the First World War [online] Available from: https://encyclopedia.1914-1918-online.net/article/war-losses-france/ "Between 20 August and 27 August 1914, the French army lost 40,000 men, 27,000 of which were killed on 22 August alone."

today? CNAS does not attempt to answer that question in their otherwise well done "Dangerous Straits" wargame.

The First Battle of the Next War

The Center for Strategic and International Studies (CSIS) ran a longer simulated conflict in their "The First Battle of the Next War: Wargaming a Chinese Invasion of Taiwan," game built primarily by CSIS Defense and Security Department senior advisor Mark Cancian.[43] The maps and weapons data are great resources for anyone looking at building a near future wargame between the U.S., PRC, Japan, and Taiwan (see map reference 2, p46). The game was run dozens of times with various players to test out a range of possibilities. Each game started with the PRC attacking Taiwan. Most of these games ran for a simulated timespan of about three weeks or six game turns. The games were organized around three scenarios, each with different assumptions.

The "Base" scenario represented the most likely assumptions and combat scenarios. This was run three times with U.S. and allied Taiwanese/Japanese victories each time. Still, even with a relatively easy victory, the U.S. suffered simulated losses of 168-372 aircraft, 7-20 ships, including two aircraft carriers, and thousands of corresponding personnel casualties. Interestingly, most aircraft were destroyed on the ground and U.S. long range anti-ship missile stocks were entirely expended within a week.

The "Pessimistic" scenario, where the PRC was deemed to have more advantages than in the base scenario, was run eighteen times. These games assumed the U.S. had reduced anti-ship missile effectiveness, and losses during the playing of the game ranged widely from 90-774 for U.S. aircraft with similar ship losses as the base game. One takeaway of note is that every U.S.

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[43] Cancian, Mark F., et al. "The First Battle of the Next War: Wargaming a Chinese Invasion of Taiwan." *CSIS*, www.csis.org/analysis/first-battle-next-war-wargaming-chinese-invasion-taiwan. Accessed 29 Sept. 2024.

or allied ship approaching Taiwan was sunk by the PRC. The campaign ran an average of 21 simulated days, about a week longer than the base games.

Finally, CSIS ran a "Taiwan Stands Alone" scenario where Taiwan received no outside assistance and was soundly beaten after a grueling ten weeks of mostly land-based combat on the main island of Taiwan. CSIS also ran a "Ragnarok" scenario to see how the PRC could win a decisive total victory.[44] In this scenario the U.S. could not operate out of Japan and had other handicaps that resulted in a clear PRC victory. This game showed that the U.S. needs basing in Japan to win a future conflict, something important for policy-makers to consider.

Running the game multiple times with a diversity of players and different assumptions is exactly how a wargame should be conducted to achieve the best results. Having different scenarios, assumptions or setups is also a great learning tool and is one of the main advantages of wargaming; you can simply set up the pieces and run the game again.

While CSIS did many things well, they also had some questionable assumptions. First, they initially excluded nuclear weapons from these games. CSIS corrected this later when they modified their Taiwan wargame to test the effectiveness of nuclear deterrence and its possible failure in a future conflict. They ran fifteen games, a decent number of iterations, in which three went nuclear, in other words three instances in which nuclear deterrence failed and a nuclear exchange resulted in millions of lost lives.[45] These games showed that once nuclear weapons are used it is incredibly difficult to contain escalation or limit nuclear weapons' horrible effects.

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[44] Decisive Total Victory for the PRC meant negating U.S. airpower and taking complete uncontested control of Taiwan.

[45] Cancian, M. F., Cancian, M. F. and Heginbotham, E.: Wargaming nuclear deterrence and its failures in a u.s.–china conflict over Taiwan, CSIS [online] (Notably both sides resorted to nuclear use at least once. The PRC team used nuclear weapons first on two occasions when they thought that they were losing the conventional war and feared that a loss would lead to a collapse of Chinese Communist Party rule. The U.S. team used nuclear weapons first in one iteration when their initial losses were so high that the team feared they could not come back from their initial losses to achieve victory, victory defined as preventing a PRC takeover of Taiwan, without resorting to nukes. However, victory with nuclear weapons use can hardly be described as victory.)

In the original game CSIS tried to account for the lack of nukes in other ways, but it would have been better to include them from the start. They tracked some weapons usage, like long range anti-ship missiles, but stipulated "Other munitions not specifically tracked, such as air-to-air (missiles), were assumed to be available in sufficient numbers."[46] However, assuming that a U.S. force will have a sufficient supply of any type of missile, let alone important air-to-air missiles, is a serious mistake. The base case also assumes that other key missile supplies that are spread out across the globe are all available for use in a U.S.-PRC war in the western Pacific. This too is a faulty assumption. Many of those munitions would need to be kept in other parts of the world or simply would not be able to be moved to the western Pacific in a timely manner and in sufficient quantities because of logistical constraints.[47] Game designers should not assume there are enough munitions available in current stocks, across all needs, to support a war against the PRC.

Assuming that a U.S. force will have a sufficient supply of any type of missile, let alone important air-to-air missiles, is a serious mistake.

Lastly, the table-top exercise from CSIS suffers from the same problem as CNAS's by not simulating a long enough conflict. The designers say this about the length of their games, "Many U.S.-China wargames have short time increments, which allows detailed assessment of forces

[46] Cancian, Mark F., et al. "The First Battle of the Next War: Wargaming a Chinese Invasion of Taiwan." *CSIS*, www.csis.org/analysis/first-battle-next-war-wargaming-chinese-invasion-taiwan. Accessed 29 Sept. 2024. (p. 68)
[47] Grieco, K. A., Slingbaum, H. and Walked, J. M.: Cratering effects: Chinese missile threats to US air bases in the Indo-Pacific • Stimson Center, Stimson Center [online] Available from: https://www.stimson.org/2024/cratering-effects-chinese-missile-threats-to-us-air-bases-in-the-indo-pacific/ and Reese, T., Hudson, C. and Evers, M.: AMCL 2023: Contested Logistics Wargaming Report, PAXsims [online] Available from: https://paxsims.wordpress.com/2023/10/15/amcl-2023-contested-logistics-wargaming-report/ (Both reports give different, but compelling reasons, why logistics would be constrained in a future conflict in the Pacific.)

and weapons but means that game play covers only the first few days of a conflict. This is the time of greatest U.S. and partner weakness, after initial Chinese attacks but before substantial reinforcements begin to flow."[48] While the CSIS game is longer than the CNAS game, which is an improvement, a maximum of a month of simulated combat depicts only the very early stages of a war that is likely to last much longer. The key is what comes next, after the initial flurry of active combat, as both sides realize that they have taken severe losses, have run through a great deal of their weapons stocks, and still may not have achieved their ultimate goal. Ending the game after 30 simulated days and declaring a tie or victory is not enough. A better use of these games would be to keep going and see what decision- and policy-makers choose to do next.

Ultimately, the assumptions made in wargames that help influence policy choices and military decisions should be based on realistic scenarios. Even if those scenarios are varied and maybe implausible, like the Ragnarok scenario in the CSIS game, they are still grounded in realistic 'what ifs' that are important to play and learn from. Numerous reports and a few full-length books detail realistic scenarios depicting what a possible conflict between the U.S. and the PRC might look like. While these books are not wargames, as they do not involve decision-making or representations of combat, they are excellent resources to inform future wargaming and are incorporated in the following analysis.

The Chinese Invasion Threat

Ian Easton's book *The Chinese Invasion Threat: Taiwan's Defense and American Strategy in Asia*[49] gives a very detailed account of possible Chinese plans for an invasion of Taiwan that is

[48]Cancian, Mark F., et al. "The First Battle of the Next War: Wargaming a Chinese Invasion of Taiwan." *CSIS*, www.csis.org/analysis/first-battle-next-war-wargaming-chinese-invasion-taiwan. Accessed 29 Sept. 2024. (p. 103)
[49] Easton, Ian. *The Chinese Invasion Threat: Taiwan's Defense and American Strategy in Asia*. Eastbridge Books, 2019.

well informed by sources from within the PRC. Overall, the view is that a Chinese invasion of Taiwan would be extremely costly for the PRC and that, even without U.S. intervention, the PRC could fail if Taiwanese forces put up stiff resistance on the ground, in the air and at sea.

While Easton does not specifically call for updating wargames he explains,

> "It is not enough for American strategists to think about whether or not they could fight and win a war. They must also think about how their adversary thinks about war so that they can effectively induce him or coerce him away from it, to do things to make it less tempting. Because this problem is unlikely to go away and will only get more acute over time, it is essential to think in terms of a competitive strategy."[50]

Thinking about how an adversary thinks is one key advantage of conducting wargames as they require at least one side to play the enemies role.

World on The Brink

Dmitri Alperovitch's book *World on The Brink: How America Can Beat China in the Race for the Twenty-First Century*[51] begins with a "Dispatch from the Future" prologue set in November 2028, depicting a PRC invasion of Taiwan that includes aerial assaults, amphibious assaults, missile strikes and cyber operations. In this introductory narrative, Alperovitch writes of the years of United States war game assessments of the PRC which concluded that,

> "Tens of thousands of American personnel would be killed within days, while hundreds of aircraft and dozens of naval ships would be lost. In addition, air bases - such as Kadena Air Base on Okinawa, Marine Corps Air Station Iwakuni on Japan's main

[50] Easton, Ian. *The Chinese Invasion Threat: Taiwan's Defense and American Strategy in Asia*. Eastbridge Books, 2019. (p 227)
[51] Alperovitch, Dmitri, and Garrett M. Graff. *World on the Brink : How America Can Beat China in the Race for the Twenty-First Century*. First edition., PublicAffairs, 2024.

> island, and Andersen Air Force Base on Guam - would be bombed, and worse ballistic missiles might even target sites in the continental United States, like Naval Air Station North Island on Coronado in San Diego Bay and Whiteman Air Force Base in Missouri, the base of the long-range B-2 bombers."[52]

In short, this narrative corroborates the idea that a war between the U.S. and the PRC would be devastating, but does not corroborate the idea that war would necessarily be long.

Alperovitch agrees that the threat of a PRC attack on Taiwan is not likely to go away anytime soon. Chinese leaders say they will not let the Taiwan question go unanswered indefinitely from generation to generation.[53] Alperovitch contends that the PRC is unable and will continue to be unable to force the Taiwan issue without resorting to war.[54] He asserts that a blockade or gray zone effort to convince Taiwan to integrate with the mainland would fail and could very well lead to a military effort to seize the island by force.

One key way to ensure that American leaders can learn to think like their adversary is through wargaming. Wargames, by their nature, put players in the shoes of their adversaries by having one side play the simulated enemy 'red' team. Thinking about what your enemy might do and is capable of doing are important components of games that can help build competitive strategies.

Commercial Games

One underappreciated resource for testing assumptions about the possible trajectory of future conflicts is over-the-counter wargames. Commercially available wargames are intended to

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[52] Alperovitch, Dmitri, and Garrett M. Graff. *World on the Brink : How America Can Beat China in the Race for the Twenty-First Century*. First edition., PublicAffairs, 2024. (prologue, oddly no mention of Hawaii in this section)
[53] Alperovitch, Dmitri, and Garrett M. Graff. *World on the Brink : How America Can Beat China in the Race for the Twenty-First Century*. First edition., PublicAffairs, 2024. (Taiwan Dilemma Chapter)
[54] Alperovitch, Dmitri. "A Chinese Economic Blockade of Taiwan Would Fail or Launch a War." *War on the Rocks*, 6 June 2024, warontherocks.com/2024/06/a-chinese-economic-blockade-of-taiwan-would-fail-or-launch-a-war/.

offer up entertaining experiences for those who buy them. They include detailed scenarios, assumptions about combat, projected loss rates, and many other relevant factors. The game designers have often grounded these games in reality to such a great extent that military officials find them useful for table-top training exercises.[55] In particular, GMT Games' *Next War: Taiwan*[56] and Compass Games' two board games *South China Sea*[57] and *Breaking the Chains - War in the South China Sea*[58] offer rules and scenarios that are advanced in their considerations of combat, while also being free for researchers and game designers to use, analyze or critique. Chinese commercial wargames would also be an interesting place to look for assumptions about how a future U.S.-PRC war might unfold because they may provide a unique perspective, reveal priorities, and identify potential PRC red lines. Chinese commercial games seem to be unavailable, but future research could explore this further.

Next War: Taiwan

The commercial board game *Next War: Taiwan* does something that many games do not; it prioritizes logistics. Players in the game need to secure supply sources, airfields and ports in particular. This reflects reality well, as securing ports and airfields as logistical centers will be crucial in any future conflict, especially in a conflict where ports and airfields have been severely damaged, as is likely in a future war in the Pacific.[59] Cruise missile supplies are tracked in the game using missile points - and, once spent, cannot be used again. Scarcity of important missile supplies could be emulated in other more advanced games like this, as it allows participants to

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[55] Lacey, James. "How Does the next Great Power Conflict Play Out? Lessons from a Wargame." *War on the Rocks*, 23 Apr. 2019

[56] Land, M., Billingsley, G. and Simonitch, M.: Next War: Taiwan, 2nd ed., GMT Games, Hanford, CA., 2014.

[57] Gorkowski, J.: South China Sea, Compass Games, LLC, Hartford, CT., 2017.

[58] Gorkowski, J.: Breaking The Chains - War in the South China Sea, Compass Games, LLC, Hartford, CT., 2022.

[59] Grieco, K. A., Slingbaum, H. and Walked, J. M.: Cratering effects: Chinese missile threats to US air bases in the Indo-Pacific • Stimson Center, Stimson Center [online] Available from: https://www.stimson.org/2024/cratering-effects-chinese-missile-threats-to-us-air-bases-in-the-indo-pacific/

track a scarce resource in a simple way. While this game does not take into account long-term defense industrial capacity, its emphasis on logistics and missile scarcity is a step in the right direction. *Next War: Taiwan* also assumes that about half of the missiles used in a strike will reach their target. This is an oversimplification of an extremely complex and variable process, as there are many factors that go into cruise missile success, but it is closely aligned with the 50% hit rate in more advanced analysis. This also aligns with the idea that with enough missiles anything can be killed as it is simply a matter of probability.[60]

Each turn in the game represents about three days or half a week of combat, the same as both the CNAS and CSIS games. Seven weeks is the longest scenario included in the game; however, there is the option to include Japan and Korea in a large overlapping conflict in East Asia that would greatly expand the game, but could better reflect reality as a U.S.-PRC conflict could easily take place across all of the western Pacific.

Breaking the Chains - War in the South China Sea

Next War: Taiwan is similar to Compass Games' *Breaking the Chains - War in the South China Sea* in that 30 days is the longest running scenario.[61] There is a common thread among commercial and think tank produced games, with the thirty-day scenario being the longest running conflict. *Breaking the Chains - War in the South China Sea* is unique however, in that it assumes drones and unmanned aircraft will operate with manned aircraft, making this game reflective of near-future capability more than other games, but similar to recent novels depicting near-future conflict.[62] The shortest game scenario is only eight days long, and assumes that the PRC can take Taiwan or the Spratly Islands in as little as three days. Taking Taiwan in three days

[60] Barrick, T.: Wargame Design: The Marine Corps' Operational Wargame System w/ Tim Barrick, YouTube [online] Available from: https://www.youtube.com/watch?v=3A7JZ4MjIMM
[61] Gorkowski, J.: Breaking The Chains - War in the South China Sea, Compass Games, LLC, Hartford, CT., 2022.
[62] Bruns, David and Olson J.R. *Counter Strike*. Severn River Publishing, 2021.

represents a 'fait accompli'[63] for the PRC. In the longer thirty-day game scenario, the PRC generally does well initially, then U.S. counterattacks gain steam around simulated day seven, then peak in strength after twenty one days. The game assumes the U.S. is weakest at the start of a conflict, but gains strength over time. Missiles drastically thin both sides' forces in theater and cannot be re-supplied for ships at sea. The U.S. Navy's inability to resupply missiles while at sea in the game reflects an ongoing real world issue for the U.S. fleet,[64] although recently U.S. ships have shown that they can reload their missile systems while at sea.[65] This is a technical innovation that should be taken into account in the future. Even if the at sea missile replenishment system cannot be used inside a threat environment, playing games with this capability can demonstrate its potential strengths and weaknesses.

South China Sea

Compass Games produces another board game called simply *South China Sea*[66] that is smaller in scale and scope. Specifically, the game has turns that represent hours rather than days and takes place in a smaller area of operations than other commercial or policy games. One unique assumption in this game is that cruise missiles can only be used in the first turn of the game as it is presumed that their targeting satellites will be knocked out almost immediately after the start of hostilities. An interesting assumption for policy-makers or others who want to

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[63] A 'fait accompli' refers here to the PRC invading and seizing Taiwan before the U.S. can effectively respond.
[64] "Unprecedented: Dwight D. Eisenhower Carrier Strike Group Returns from Combat Deployment." *United States Navy*, www.navy.mil/Press-Office/News-Stories/Article/3838261/unprecedented-dwight-d-eisenhower-carrier-strike-group-returns-from-combat-depl/. Accessed 29 Sept. 2024.
[65] Rogoway, T.: Navy just reloaded a vertical launch system for the first time while underway at sea, The War Zone [online] Available from: https://www.twz.com/news-features/navy-just-demonstrated-reloading-vertical-launch-system-at-sea-for-the-first-time, (Accessed 27 February 2025), 2024.
[66] Gorkowski, J.: South China Sea, Compass Games, LLC, Hartford, CT., 2017.

stimulate imaginative thought might be to consider including a scenario with no space-based assets in future games like this game does.

An interesting assumption might be to consider scenarios with no space-based assets in `future games.

Past commercial and think tank produced wargames do not adequately take into account the rate of expenditure of munitions, nor the wearing down of equipment and personnel that would happen in a great power war. Even though losses are high in the wargames previously described, they do not use the most current data on munitions usage rates. This is especially the case for a war that lasts longer than anticipated. The assumptions around resource availability mirror the idea that water will always come out of the faucet when you turn the handle. Water always comes out until it doesn't. Games can help anticipate how long scarce resources will last.

The Red Sea Case Study

Naval combat in particular is difficult to model as there has not been a large-scale naval conflict since the Second World War to base weapons usage rates and duration upon. In contrast, ground warfare is easier to make assumptions about in part because the world has seen many ground wars in the same timeframe. Although there have been naval conflicts, like the Falklands War (1982), operations against Qaddafi's Libya in the Gulf of Sidra (1986) or Operation Praying Mantis (1988) against Iran, there have been no extensive maritime conflicts for the U.S. Navy in particular. The recent operations in the Red Sea against the Houthis in Yemen are an exception.

The U.S. Fifth Fleet commander, Vice Admiral George Wikoff, has said that the recent (ongoing) operations against the Houthis are the "Navy's finest moment since WWII."[67] Others have described the combat operations as "the most intense naval combat since WWII."[68] This fierce fighting is not something enviable or desirable. However, it offers a great chance to improve upon previous assumptions that have been built into wargames. Fifth Fleet combat operations against the Houthis are the most up to date example of naval warfare available for analysis.

Operations in the Red Sea consist of naval forces fighting land based militants. These Houthi militants are attacking with drones and missiles. The naval forces strike back at land-based targets while defending themselves and commercial shipping from land-based attacks.

Contemporary combat taking place in the Red Sea provides extremely useful data on weapons usage rates, including modern naval combat against drones of all types, as well as data on missiles, both incoming and outgoing.

In particular, contemporary combat taking place in the Red Sea provides extremely useful data on weapons usage rates, including modern naval combat against drones of all types, as well as data on missiles, both incoming and outgoing. A conflict with the People's Republic of China would not look like this. The comparison is nowhere near 1:1, but the fighting should inform

[67] Unprecedented: Dwight D. Eisenhower Carrier Strike Group Returns from Combat Deployment." *United States Navy*, www.navy.mil/Press-Office/News-Stories/Article/3838261/unprecedented-dwight-d-eisenhower-carrier-strike-group-returns-from-combat-depl/

[68] Gambrell, Jon. "US Navy Faces Its Most Intense Combat since World War II against Yemen's Iran-Backed Houthi Rebels." *AP News*, AP News, 15 June 2024

new wargames. This data is especially useful as the fighting against the Houthis has been a months-long operation. Any war between the U.S. and the PRC would likely be protracted, as great powers often underestimate the lengths of their wars.[69]

The fight against the Houthis, a relatively small and poorly supplied enemy in comparison to the PRC, has consumed a surprisingly large number of U.S. weapons.[70] Hundreds of missiles have been used to shoot down incoming Houthi missiles and drones. There have also been extensive U.S. missile and aircraft attacks to attempt to neutralize the Houthi threat at its source on the ground. Although relatively small in scale, there are many reports about the battle against the Houthis depleting U.S. munitions stocks in ways that impact force readiness more broadly.

The PRC would be better trained and supplied than the Houthis. The Chinese armed forces have superior technology, faster missiles, longer range missiles, and advanced targeting and radar systems. The PRC possesses more of every type of weapon than the Houthis. The Houthis don't even have an air force, outside of their limited drone capabilities. By contrast the PRC possesses one of the best and largest air forces in the world. If the U.S. Navy is being strained by fighting the Houthis, which should be akin to drilling a well in sand, then fighting the PRC would be like drilling a well in granite.

The fight against the Houthis also fails a simple cost benefit analysis or what the U.S military calls the cost-exchange ratio. The U.S. is using multiple $2 million missiles to shoot

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[69] Priebe, Miranda, et al. *The Aftermath of a Great Power War | Rand*, www.rand.org/pubs/research_briefs/RBA591-1.html. (Priebe writes "Incorrect predictions about the length, intensity, or cost of conflict: Great powers have frequently underestimated the conflict's duration and the scale of military losses. Perhaps the most infamous example is World War I and the European powers' prediction in July 1914 that the conflict would be over by Christmas.")

[70] Mcleary, Paul, et al. "Cost Rising for US as It Fights off Houthi Drones." *Politiconews.Com*, Politico, 8 July 2024,

down cheap drones. The Italian Navy[71] and the U.S. Navy[72] have both reported shooting down Houthi drones and missiles using rapid firing cannons with shells that cost a fraction of even the cheapest missiles.

The cost benefit analysis informed by the fight against the Houthis is most useful in an analysis of PRC wargame assumptions, especially when used alongside the new weapons usage data. The fight against the Houthis shows that the U.S. Navy would use immensely more munitions than current U.S.-PRC conflict scenarios portray, especially in anti-air missiles. Current scenarios, like the CSIS Taiwan wargame, assume that these munitions will be available in sufficient, basically limitless, numbers. Good wargames should assume that all missile supplies are limited, because they are. Using rapid firing cannons to shoot down incoming threats would preserve the smaller, more expensive, supply of missiles for priority targets. Playing out in wargames the use of cheaper (than missiles) rapid firing cannons to shoot down cheap drones is important and would be an innovation.

Wargames should assume that all missile supplies are limited, because they are.

When looking at weapons usage rates from the Red Sea it is obvious the U.S. industrial base is not producing the needed munitions for a sustained fight against the PRC. Industrial choices are important as one U.S. aircraft carrier costs the same as 10,000 missiles.[73] You fight

[71] Newdick, T.: Italian destroyer guns down Houthi drone with 76mm “super rapid” cannon, The War Zone [online] Available from: https://www.twz.com/sea/italian-destroyer-guns-down-houthi-drone-with-76mm-super-rapid-cannon
[72] Schogol, J.: In 15 months, the Navy fired more air defense missiles than it did in the last 30 years, Task & Purpose [online] “The Navy also revealed in January that it had fired 160 rounds from ships' five-inch main guns as part of combat operations in the Red Sea.” (7)
[73] Yoshihara, Toshi, and James R. Holmes. *Red Star Over the Pacific: China's Rise and the Challenge to U.S. Maritime Strategy*. Naval Institute Press, 2011,. (p.102)

with what you have, not what you want.[74] The U.S. needs more of everything if it is serious about fighting and winning a protracted conventional war against the PRC. Maybe the U.S. is not serious about fighting and winning a protracted conventional war against the PRC.

Policy Recommendations

- ***U.S.-PRC War Should Be Avoided***

First and foremost, the exploration of PRC-U.S. wargames reveals that this war should be avoided if at all possible. As Gompert, Cevallos and Garafola wrote in *War with China: Thinking Through the Unthinkable,* "War between the two countries could begin with devastating strikes; be hard to control; last months, if not years; have no winner; and inflict huge losses on both sides' military forces."[75] War between the United States and the People's Republic of China should not be fought. A war between these two powers would be unlike anything since the Second World War. Even the current war in Ukraine would pale in comparison to the potential destruction of a great power war in the western Pacific, especially if the conflict escalated to the use of nuclear weapons. The population density in east Asia, where most of the fighting would be, would result in massive civilian casualties in addition to the huge military casualties. Well done table-top exercises show the risks of escalation and demonstrate the immense losses that would result in a war so that policy-makers understand that if they choose the path of the sword the costs will be monstrous.

[74] Barrett, John. "You Go to War with the Industrial Base You Have, Not the Industrial Base You Want." *War on the Rocks*, 15 Aug. 2023

[75] Gompert, David C, et al. "War with China: Thinking through the Unthinkable | Rand." *War with China Thinking Through the Unthinkable*, RAND, 28 July 2016, www.rand.org/pubs/research_reports/RR1140.html.

Well done table-top exercises show the risks of escalation and demonstrate the immense losses that would result in a war.

Building better wargames that more realistically reflect war between the U.S. and the PRC would help avoid sleepwalking into such a war. If policy-makers are given a chance to see, through wargaming, what war with China looks like they will be more likely to adopt policies that reduce the likelihood of war. While wargames help prepare for war, they also show policy-makers the consequences of choosing to go to war. These games can always be improved. Future wargames depicting conflict between the United States and the People's Republic of China should emphasize increased variety, logistics, and learning considerations.

- ***Variety -*** The U.S. needs to produce a variety of wargames that test out new and varied assumptions.

One variation is that wargames must be allowed to run longer than a mere 10, 14 or even 30 simulated days. While recognizing that the beginning of a conflict is often considered the most vital for decision-makers, stopping after this short amount of time, which amounts to four or six turns in the game, will not provide leaders the lessons they need, especially in relation to the usage of all types of assets. Games that go on longer would better reflect reality as there is no reason to believe that the U.S. and the PRC would simply stop fighting after two weeks once a war has begun.[76]

Games should portray at least 90 days of conflict. When the U.S. planned a hypothetical invasion of Taiwan during WWII, Operation Causeway, the initial assault phase was an estimated

[76] Priebe, Miranda, et al. *The Aftermath of a Great Power War | Rand*, www.rand.org/pubs/research_briefs/RBA591-1.html. Accessed 29 Sept. 2024.

90 days.[77] Planners in 1944 abandoned Operation Causeway after it was deemed too difficult and costly. Wargames today should use that same initial 90 days as a baseline for length. That time frame importantly allows for logistical considerations to come into play, such as moving forces from one theater to the western Pacific or building a coalition of nations who then have time to move their forces to the region.

Longer running games also allow for the increased risk of nuclear weapons use, a horrible, yet plausible prospect. The 1983 U.S. exercise called Proud Prophet highlights the importance of including nuclear weapons in wargames. Proud Prophet was designed to test assumptions about the nuclear escalation ladder during the Cold War. The game is an example of a well executed wargame for many reasons. One worth highlighting here is that it "was allowed to play out to its natural conclusion: global devastation."[78]

The game started with the Cold War going hot as NATO and Warsaw Pact forces fought a conventional battle in Germany. By the fifth simulated day of combat, NATO forces were being pushed back and 11 "tactical nuclear weapons" were used to stop the inexorable advance of Soviet forces. The Soviet team responded in kind that same day. Over the course of the next seven simulated days, the nuclear exchanges grew larger and larger until the casualties were in the tens of millions (see map reference 3, p47), at which point, according to prevailing doctrine and defense policy, a General Nuclear Response was ordered. William Langewiesche, in his New York Times Magazine Article, *The Secret Pentagon War Game That Offers a Stark Warning for Our Times,* calls the General Nuclear Response "the end of history." The final message sent over

[77] Jensen, Benjamin. "Not so Fast: Insights from a 1944 War Plan Help Explain Why Invading Taiwan Is a Costly Gamble." *War on the Rocks*, 8 Sept. 2022,

[78] Langewiesche, W.: The secret pentagon war game that offers a stark warning for our times, The New York Times [online] Available from: https://www.nytimes.com/2024/12/02/magazine/nuclear-strategy-proud-prophet.html (Accessed 27 February 2025), 2024.

the in-game hotline from the U.S. team to the U.S.S.R. team said “May you burn in hell like you are going to burn here.”[79]

The relevance to the present-day is clear. Nuclear weapons need to be included in wargames depicting potential conflict between nuclear armed states; the risk of a nuclear holocaust is real. The People’s Republic of China and the United States are both nuclear-armed states. Excluding the possible use of nuclear weapons does not provide a valid picture to decision-makers. Nuclear weapons are the ultimate fear in any U.S.-PRC conflict and current policies may encourage a new great power nuclear arms race that lowers the threshold of nuclear exchange.[80] The long-term aversion to their use would be tested in a conflict between the two great Pacific powers. Military commanders may be tempted to request that nuclear weapons be used if the only alternative is catastrophe. The fear of nuclear weapons use and the decision to use nuclear weapons should be crucial components of wargames that train decision-makers. Ignoring nukes is folly.

The fear of nuclear weapons use and the decision to use nuclear weapons should be crucial components of wargames that train decision-makers. Ignoring nukes is folly.

Including nuclear weapons in U.S-PRC wargames does not advocate for their use. On the contrary, by including nuclear weapons people have the chance to resist their use in a realistically valid setting. On the other hand people may see the devastating results of nuclear weapons use.

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[79] Langewiesche, W.: The secret pentagon war game that offers a stark warning for our times, The New York Times [online] Available from: https://www.nytimes.com/2024/12/02/magazine/nuclear-strategy-proud-prophet.html (Accessed 27 February 2025), 2024.

[80] Wilson, G., Preble, C. and Ruiz, L.: Gambling on Armageddon - How US Nuclear Policies Are Undercutting Deterrence and Lowering the Threshold for Nuclear War, Stimson Center [online] Available from: https://www.stimson.org/2025/gambling-on-armageddon-nuclear-deterrence-threshold-for-nuclear-war/

In addition to including nuclear weapons, another wargame variation should depict a range of conflicts in the western Pacific, including scenarios where the United States fires the first shot. Wargames allow variations in assumptions where the war is accidental or unintended. The PRC has conducted and will likely increase its gray zone operations in the region.[81] These short of war[82] actions may put the United States in a position where firing the first shot is tempting and or necessary. One of the reasons wargames are an excellent policy making tool is that they can be used to test such scenarios, however unlikely or unsavory they may sound.

Variability includes replicability as the most valuable games are reproducible, meaning that, like their interwar Naval War College cousins who fought War Plan Orange, they must be able to be run multiple times, preferably year after year, with updates, changes and variations as deemed necessary by experts. Nimitz had it right that good games require many players and many different iterations for decision-makers to gain insights that can be valuable in a war. However, when updating assumptions, experts and leaders must refrain from putting their thumbs on the scale or inserting unreasonable bias into wargames that color outcomes. Games must be allowed to flow to their own conclusions. New assumptions can be tested by running a wargame again, similar to how the scientific method emphasizes repeatability, so too should wargaming emphasize repeatability.

Another variety of game should be fighting with limited goals, rather than a desire for total victory, as in the 1961 Berlin game. The last time the United States and the People's

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[81] Kuo, Raymond, Christian Curriden, Cortez A. Cooper III, Joan Chang, Jackson Smith, and Ivana Ke, Simulating Chinese Gray Zone Coercion of Taiwan: Identifying Redlines and Escalation Pathways. Santa Monica, CA: RAND Corporation, 2023. https://www.rand.org/pubs/conf_proceedings/CFA2065-1.html. Also available in print form.

[82] Blumenthal, Dan, and Frederick W Kagan. "Exploring a PRC Short-of-War Coercion Campaign to Seize Taiwan's Kinmen Islands and Possible Responses." *Institute for the Study of War*, www.understandingwar.org/backgrounder/exploring-prc-short-war-coercion-campaign-seize-taiwan%E2%80%99s-kinmen-islands-and-possible. (In particular the authors point out that the Taiwan Relations Act does not authorize the U.S. to defend the outlying Taiwanese islands, like Kinmen, thus the U.S. may face a test of if they are willing to 'shoot first' to defend these outlying islands.)

Republic of China fought a war it ended in a draw on the Korean Peninsula.[83] Although this was before the PRC possessed nuclear weapons, the Korean War shows that the two countries can fight a limited war where neither side achieves an outright victory, but neither side suffers a complete defeat either. Policy- and decision-makers in the United States should conduct wargames focused on limited war with the PRC where the goal is not the utter destruction of the enemy, but achieving victory that may look more like a draw or a return to the status quo.

- ***Logistics*** - U.S. wargames should emphasize logistics as logistics wins wars.

Getting weapons, fuel, food, medicine and other supplies to the right place at the right time is critical during a conflict. Future wargames need to include the non-sexy, logistical, side of war. Things like quick dry concrete, bulldozers, and supply convoys will play a key role in any future conflict with the PRC. Aerial refueling capabilities, especially in a contested environment where tanker aircraft are extremely vulnerable, should also be taken into account. Games often do not focus enough on the logistical aspects of warfare. Emphasizing the adage that 'professionals talk logistics' is important if U.S. leaders are truly serious about being prepared for a war with the PRC rather than simply talking about being prepared. The last war in the Pacific was won with large scale logistical planning that came out of gaming War Plan Orange. Current games need emphasis on large scale logistics that is informed by the most recent naval combat in the Red Sea.

Logistics includes wargaming that reflects the current lack of munitions availability and the speed with which current munitions would be used up, especially as a conflict continues or runs longer than most games run. There are ways to build this insight into wargame scenarios

[83] Hastings, Max. *The Korean War*. Simon and Schuster, 1987.

and assumptions so that decision-makers conducting those wargames come away with the right lessons. If, however, decision-makers are not given a realistic scenario they will not have the chance to learn clearly applicable lessons.

Gaming with a realistic quantity of munitions and likely usage rates is key because decision-makers need to practice choosing when to use, and when to conserve, their resources.

To yield valuable knowledge for policy-makers, U.S.-PRC wargames must take into consideration not only the exceptional speed with which munitions, equipment and personnel would be used in conflict between the two nations armed forces, but also the fact of contested logistics. The U.S. has had largely uncontested military logistics for decades; that would not be the case in a war with the PRC and games should show this.[84] Supplies in a highly contested environment are often destroyed before having the chance to be used in combat. Not only would supply chains be disrupted, but existing infrastructure and bases would be rendered inoperable, thus eliminating even more material from usable stocks.[85] Games cannot assume that all supplies available or stockpiled will be available for use in wartime[86] or that having 'several days' of anti-ship missile stocks are enough.[87] Gaming with a realistic quantity of munitions and likely

[84] Dougherty, Chris Former Senior Fellow, C.: Buying time: Logistics for a new American way of war, CNAS [online] Available from: https://www.cnas.org/press/press-release/buying-time-logistics-for-a-new-american-way-of-war
[85] Grieco, K. A., Slingbaum, H. and Walked, J. M.: Cratering effects: Chinese missile threats to US air bases in the Indo-Pacific • Stimson Center, Stimson Center [online] Available from: https://www.stimson.org/2024/cratering-effects-chinese-missile-threats-to-us-air-bases-in-the-indo-pacific/
[86] Cancian, Mark F., et al. "The First Battle of the Next War: Wargaming a Chinese Invasion of Taiwan." *CSIS*, www.csis.org/analysis/first-battle-next-war-wargaming-chinese-invasion-taiwan. P.68
[87] Ochmanek, D. and O'Hanlon, M.: Here's the strategy to prevent China from taking Taiwan, The Hill [online] Available from: https://thehill.com/opinion/national-security/584370-heres-the-strategy-to-prevent-china-from-taking-taiwan/

usage rates is key because decision-makers need to practice choosing when to use, and when to conserve, their resources. Wargames that emphasize logistics could also inform larger industrial policy, such as whether building an aircraft carrier is worth the opportunity cost of 10,000 missiles.[88]

- ***Learning*** **-** Wargames need more participants and better systems for capturing insights.

Games need to be played by many people at many levels of decision-making.[89] Not only is involving many players from many levels of decision-making good policy, but including non-military participants should be encouraged. While the Nimitz quote referenced at the very beginning of this piece talks about wargames being played "by so many people" in uniform at the Naval War College, it could just as well refer to many current policy or decision-makers, both in uniform and out of uniform, playing wargames today. Players should include members of the diplomatic corps, intelligence community, academics and legislators in particular.

In the same way that more people should take part in and learn from wargames, wargames also need systems to ensure that lessons learned are not left by the wayside. The Russian army ran a wargame that produced insightful lessons in the spring of 1914, but there was no system in place to ensure those lessons were implemented in war plans or tested out again in future games. In contrast, the wargaming undertaken as part of War Plan Orange showed that, for example, invading Taiwan (Operation Causeway) was undesirable, as its mountains and rough terrain would absorb hundreds of thousands of troops; high-end estimates counted 500,000.[90] In

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[88] Yoshihara, Toshi, and James R. Holmes. *Red Star Over the Pacific: China's Rise and the Challenge to U.S. Maritime Strategy*. Naval Institute Press, 2011,. (p.102 "A single U.S. cruiser is worth around $1 billion, whereas the sums invested in one U.S. aircraft carrier would literally buy ten thousand missiles.")
[89] Bae, Sebastian J. "Put Educational Wargaming in the Hands of the Warfighter." *War on the Rocks*, 15 July 2023, warontherocks.com/2023/07/put-educational-wargaming-in-the-hands-of-the-warfighter/.
[90] Miller, Edward S. *War Plan Orange : The U.S. Strategy to Defeat Japan, 1897-1945*. Naval Institute Press, 1991. (p.363)

this case, wargaming showed decision- and policy-makers of the Second World War what *not* to do and they implemented those lessons. Wargames are a tool for learning in a risk free environment, but they need surroundings where people analyze and learn from the games, learning both what to do and what not to do.

Learning from games also means leaving out political influence and bias. Millennium Challenge was a bad wargame for many reasons, but it demonstrated that bias and putting a finger on the scale changes outcomes in ways that are not helpful for decision-makers or policy-makers. Future wargames need systems that keep out biases that warp lessons and assumptions as incorrect assumptions may lead to unnecessary surprises or even catastrophe in a conflict. Creating a system like the one that existed at the interwar Naval War College, but that extends beyond uniformed military officers, would generate the needed environment.

Conclusion

The United States military has been wargaming for decades. Wargaming trained a victorious U.S. Navy for the last great Pacific war, in no small part because those wargames gave a realistic picture of what a conflict would look like. The two think tank games referenced in this work, CNAS's *Dangerous Straits* and CSIS's *The First Battle of the Next War,* could be adapted and improved to give a more realistic picture of potential conflict. The CNAS game is excellent in its inclusion of nuclear weapons and the extremely costly fighting that it portrays. If that game were played for longer than six simulated days it could provide much more information for policy- and decision-makers, especially if it were run many times with various assumptions and numerous players. The CSIS game also does an excellent job of showing the cost, both human and material, of war between the U.S. and PRC. The dozens of playthroughs with many players

and various assumption scenarios that CSIS did for this game are also excellent. However, the game always starts with a PRC attack on Taiwan, only runs for a maximum timespan of about 30 days, and assumes many munitions are available in sufficient numbers for U.S. use. A future improvement for this game would be to run it longer, at least 90 simulated days, portray more munitions as scarce resources, and potentially start with a U.S. attack rather than a PRC attack.

Wargames going forward must emphasize variability, logistics and learning. Future wargames need to run longer, be replicable, include nuclear weapons, and entertain unsavory conflict scenarios. They need to include weapons, equipment and personnel usage rates that have been informed by recent pertinent conflict. They need to keep political bias out so that outcomes are realistic and ensure that lessons learned in wargames inform policy. If decision-makers are serious about preparing for a real conflict, the assumptions of wargames need to be realistic. People do not miss their well until their water runs dry. They assume the water will always flow when the tap is turned. A navy does not miss its missiles until the ammunition is gone and the enemy is still floating. Better to learn this lesson in a game than at sea.

This paper centers on wargaming, but the valuable lessons gained through games are not limited to military contexts. By offering a space to examine intricate situations, challenge assumptions, and refine decision-making skills, wargaming's benefits can be applied across numerous sectors, such as business, diplomacy, or crisis management. One space that could benefit from future wargaming research may be U.S. military industrial policy. While beyond the scope of this paper, future research could be done on how wargaming can influence U.S. military industrial policy. Well-executed wargames could help policy- and decision-makers understand what technologies and equipment would be most useful in a potential conflict between the U.S. and the PRC. For instance, wargaming could reveal if more Ford-class aircraft carriers are worth

their multibillion dollar cost, or if increased production of drones and missiles are a more efficient use of scarce resources. By simulating effectiveness, technological advancement, and industrial capability such research could inform strategic investments in the defense industrial base.

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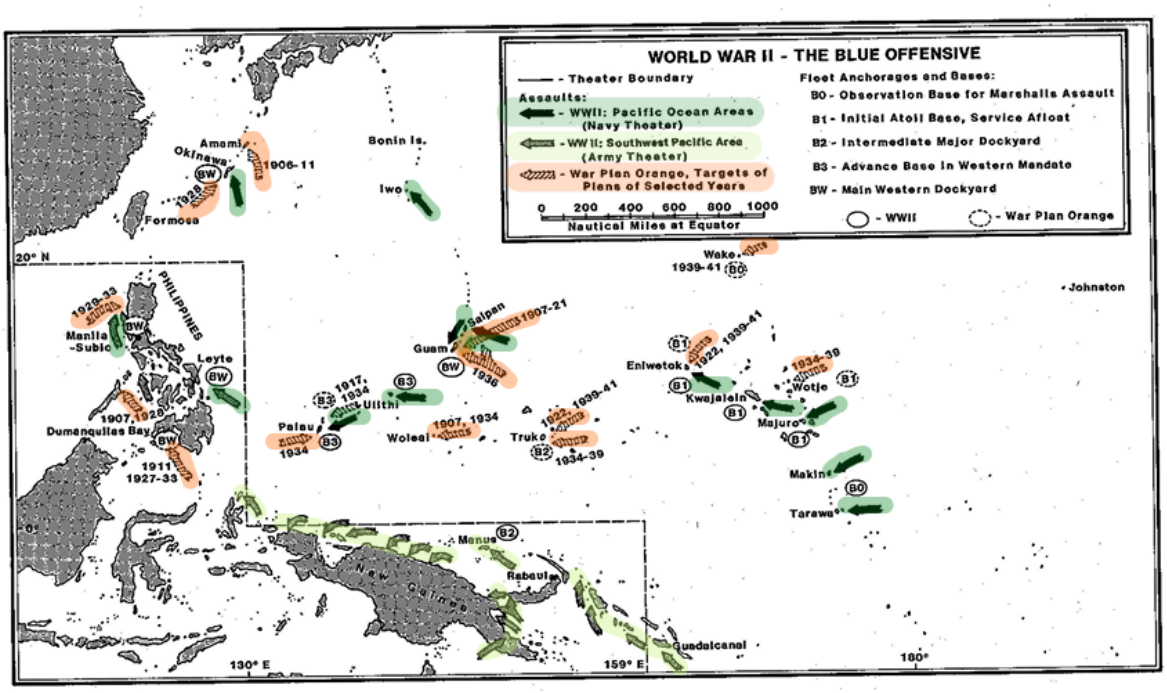
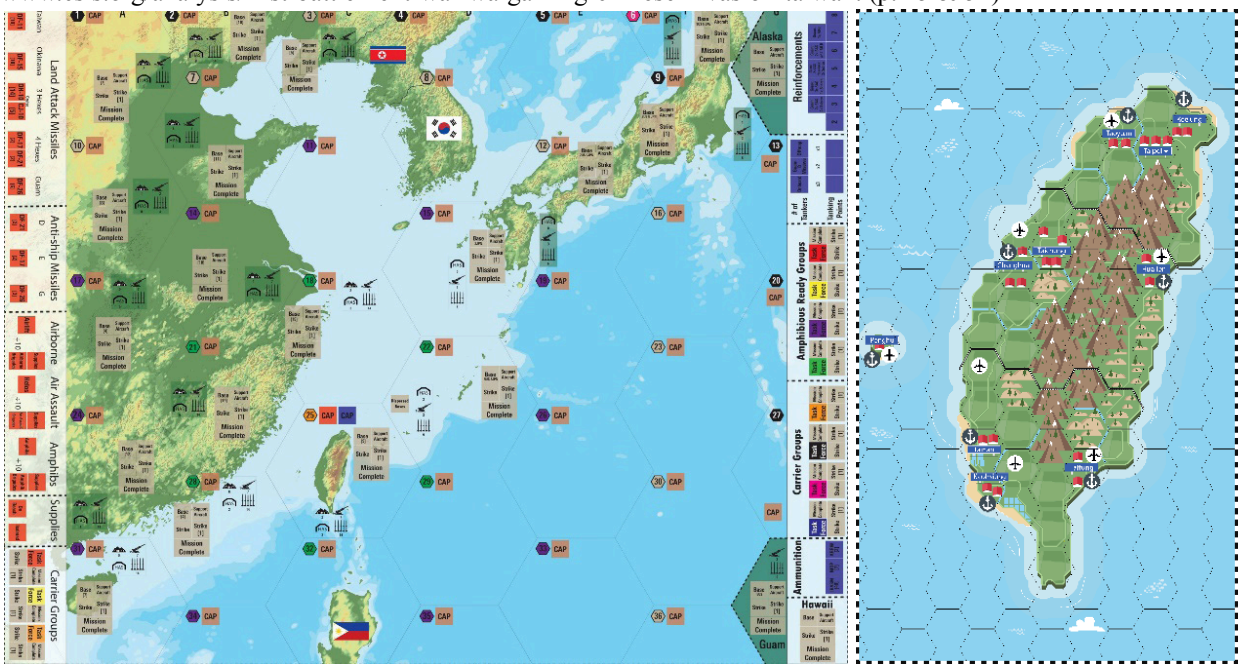


MAP 28.1

2 - Cancian, Mark F., et al. “The First Battle of the Next War: Wargaming a Chinese Invasion of Taiwan.” *CSIS*, www.csis.org/analysis/first-battle-next-war-wargaming-chinese-invasion-taiwan. (p. 45 & 51)



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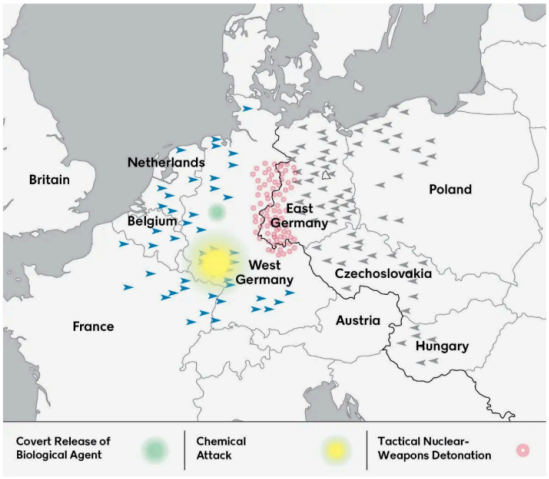

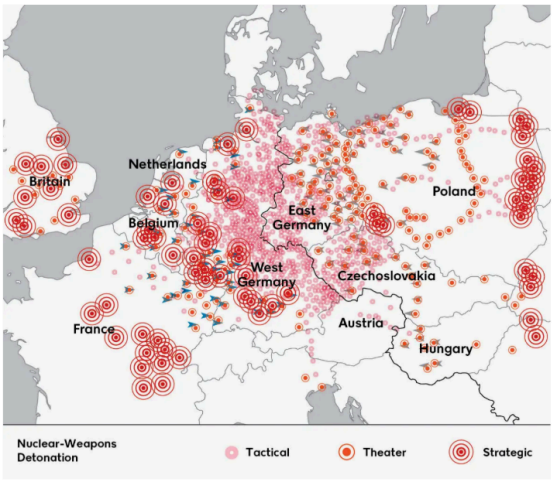

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