Through the Lens of Systems Thinking: Operation Bagration and the Insights on Contemporary Operational Art

A Monograph

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2019

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*	**2. REPORT TYPE**	**3. DATES COVERED** *(From - To)*
23-05-2019	Master's Thesis	June 18-May 19

4. TITLE AND SUBTITLE

Through the Lens of Systems Thinking: Operation Bagration and the Insights on Contemporary Operational Art

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)

Major Wassim Merhi, Lebanese Army

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
U.S. Army Command and General Staff College
ATTN: ATZL-SWD-GD
Fort Leavenworth, KS 66027-2301

8. PERFORMING ORG REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)
Advanced Military Studies Program

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION / AVAILABILITY STATEMENT
Approved for Public Release; Distribution is Unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

During the interwar period, the Soviet Union witnessed an intellectual revolution that created new patterns of thought and changed the paradigm of how the Red Army approached warfare. Being the first to theorize, define, and codify operational art, Soviet military theorists replaced the concepts of annihilation and attrition by that of operational maneuver to create operational shock. In June 1944, during Operation Bagration, the Red Army put its theory into practice and was able to inflict a catastrophic defeat on Germany's Army Group Center. Given the fact that US Army shifted its focus to large-scale combat operations against peer and near-peer adversaries, this monograph argues that analyzing the Soviet operational art, in theory and application from a systems perspective, can give military planners insight into the nature and practice of contemporary operational art. The monograph will address five core questions: How did systems thinking and operational consciousness constitute the cognitive forces behind the Soviet paradigm shift? How do systems theory and the principles of chaos and complexity feed into the concept of operational shock? How did the Soviet conduct of Operation Bagration reflect the core principles of systems logic? How do systems thinking and operational shock fit within contemporary large-scale combat operations? Finally, what insights do they provide on contemporary operational art? Today, US peer adversaries approach war in the same way the Soviets did during WWII. They have already acknowledged that winning wars does not necessarily require annihilating the enemy's operational forces. To win is to shock and paralyze the rival system, deprive it of its purpose, and neutralize its will to fight. Systems thinking enables military planners to devise novel approaches that can exploit the enemy's mental gaps, prevent its system from adapting, and achieve cognitive surprise, all while empowering subordinate commanders.

15. SUBJECT TERMS
Operational Art; Systems Theory; Complexity Theory; Chaos Theory; Operational Shock; Large-Scale Combat Operations; Operation Bagration

16. SECURITY CLASSIFICATION OF:			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON**
a. REPORT	**b. ABSTRACT**	**c. THIS PAGE**		42	**19b. PHONE NUMBER** *(include area code)*
(U)	(U)	(U)	(U)		

Monograph Approval Page

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Monograph Title: Through the Lens of Systems Thinking: Operation Bagration and the Insights on Contemporary Operational Art

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Abstract

Through the Lens of Systems Thinking: Operation Bagration and the Insights on Contemporary Operational Art, by MAJ Wassim Merhi, Lebanese Army, 42 pages.

During the interwar period, the Soviet Union witnessed an intellectual revolution that created new patterns of thought and changed the paradigm of how the Red Army approached warfare. Being the first to theorize, define, and codify operational art, Soviet military theorists replaced the concepts of annihilation and attrition by that of operational maneuver to create operational shock. In June 1944, during Operation Bagration, the Red Army put its theory into practice and was able to inflict a catastrophic defeat on Germany's Army Group Center. Given the fact that US Army shifted its focus to large-scale combat operations against peer and near-peer adversaries, this monograph argues that analyzing the Soviet operational art, in theory and application from a systems perspective, can give military planners insight into the nature and practice of contemporary operational art. The monograph will address five core questions: How did systems thinking and operational consciousness constitute the cognitive forces behind the Soviet paradigm shift? How do systems theory and the principles of chaos and complexity feed into the concept of operational shock? How did the Soviet conduct of Operation Bagration reflect the core principles of systems logic? How do systems thinking and operational shock fit within contemporary large-scale combat operations? Finally, what insights do they provide on contemporary operational art? Today, US peer adversaries approach war in the same way the Soviets did during WWII. They have already acknowledged that winning wars does not necessarily require annihilating the enemy's operational forces. To win is to shock and paralyze the rival system, deprive it of its purpose, and neutralize its will to fight. Systems thinking enables military planners to devise novel approaches that can exploit the enemy's mental gaps, prevent its system from adapting, and achieve cognitive surprise, all while empowering subordinate commanders.

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Acknowledgments

First, I want to thank Dr. Butler-Smith for her guidance, insight, and perspective in shaping the direction of the research and assisting me in completing this monograph. I have had the privilege and honor of being a member of her syndicate. Second, I thank my seminar leader, COL Yannick Michaud, for his constructive comments, suggestions, and invaluable feedback. I owe a thank you to my parents who, through their phone calls, were constantly inspiring me with the spirit of success. Most importantly, I would like to thank my wife Siwar and my daughter Leanna for their enduring patience. You are a graceful blessing, and without your motivation and support, I would never have finished this monograph.

Above all, I thank God for giving me the will and strength to carry on and accomplish this goal.

Acronyms

A2/AD	Anti-Access/Area Denial
ADRP	Army Doctrine Reference Publication
CAS	Complex Adaptive System
COA	Course of Action
EA	*Eshelon Ataki* (Leading Echelon or the Holding Element)
EBO	Effects-Based Operations
ERP	*Eshelon Razvitiia Proryva* (Echelon of the Development of the Breakthrough or the Striking Maneuver)
FM	Field Manual
JP	Joint Publication
LSCO	Large-Scale Combat Operations
MDMP	Military Decision Making Process
OE	Operational Environment
OKH	German Army High Command
OODA	Observe – Orient – Decide – Act
PLA	People's Liberation Army
PU	Provisional Field Regulations for the Red Army
PZ	Panzer

Illustrations

Introduction

Operational art is a contentious subject among military historians, theorists, and members of the profession of arms. Still today, they argue whether operational art initially manifested itself in the Napoleonic warfare or in the conflicts that followed. However, it is widely acknowledged that the Soviets, between 1921 and 1937, were the first to explicitly articulate the concept of operational art.[1] Currently, *Army Doctrinal Reference Publication (ADRP) 3-0* defines operational art as a "cognitive approach" that enables commanders and their staffs to achieve strategic objectives through "the arrangement of tactical actions in time, space, and purpose."[2] However, that term did not enter the US military doctrine until 1986 with the publishing of the refined version of *Field Manual (FM) 100-5*, which emphasized the idea of deep attack.[3] To appreciate the influence that Soviet operational art had on US Army doctrine, Major General L. D. Holder, the co-author of *FM 100-5*, stated that "it [Airland Battle] enlarged that idea by adding Marshal Mikhail N. Tukhachevsky's concept of simultaneous attacks in depth, the pattern that gave birth to the Army's deep operations."[4]

Following WWI, the Russian Civil War, and their defeat in the Polish-Soviet War in 1920, Soviet military theorists identified a gap between strategy and tactics and believed that a transformation in the conduct of war was required. Alexander Svechin was the first to refer to operational art as a critical conceptual linkage between tactical engagements and strategic

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[1] Wilson C. Blythe, "A History of Operational Art," *Military Review* (November-December 2018): 37-43; Jacob W. Kipp, "The Tsarist and Soviet Operational Art, 1853-1991," in *The Evolution of Operational Art: From Napoleon to the Present*, ed. John Olsen and Martin Creveld (Oxford: Oxford University Press, 2011), 65; James J. Schneider, "Theoretical Implications of Operational Art," *Military Review* (September 1990): 25.

[2] US Department of the Army, *Army Doctrine Reference Publication (ADRP) 3-0*, *Operations* (Washington, DC: Government Printing Office, 2017), 2-1.

[3] Antulio J. Echevarria, "American Operational Art, 1917-2008," in *The Evolution of Operational Art: From Napoleon to the Present*, ed. John Olsen and Martin Creveld (Oxford: Oxford University Press, 2011), 155.

[4] L. D. Holder, "Offensive Tactical Operations," *Military Review* 12 (December 1993): 49.

objectives.[5] In 1924, he defined this link as the "totality of maneuvers and battles in a given part of the theater of military action directed toward the achievement of the common goal, set as final in the given period of the campaign."[6] The absence of cognitive constraints paved the way for an intellectual revolution on how to conduct future wars. By studying previous conflicts, theorists found that the expansion of the battlefield, in breadth and depth, made the concept of a single, climactic battle of annihilation, obsolete; an idea that had dominated military art at the time. To tackle this problem, the Soviets formulated the concept of continuous, coherent, and successive operations, which Mikhail Tukhachevsky later developed into deep operations theory.[7]

The theory of deep operations shifted the focus from the paradigm of Clausewitzian annihilation to that of operational maneuver, which, when executed throughout the entire depth of the enemy, caused operational shock, termed *udar*. Even though the Soviets saw in their new approach an interrelation between attrition and maneuver, their ultimate objective was to shock, physically and psychologically, the opposing military forces. In turn, *udar* disrupted the enemy's system, fractured its coherence, neutralized its rationale, and prevented it from attaining its operational and strategic aims. Consequently, the new reality imposed on the enemy would break its will, induce a feeling of helplessness, and bring about its surrender.[8]

In the summer of 1943, the Soviets regained the operational consciousness that they had previously lost with Stalin's purges in the late 1930s. The theory of deep operations, which the Red Army abandoned in the first three years of war, reemerged as the ultimate tool to defeat the German's Blitzkrieg. On 22 June 1944, exactly three years after the German Army launched

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[5] Kipp, "The Tsarist and Soviet Operational Art," 65.

[6] Aleksandr A. Svechin, *Strategy*, ed. and trans. Kent D. Lee (Minneapolis, MN: East View Publications, 1992), 38.

[7] David M Glantz, *Soviet Military Operational Art: In Pursuit of Deep Battle* (Portland, OR: Frank Cass, 1991), 20-25.

[8] Shimon Naveh, *In Pursuit of Military Excellence: The Evolution of Operational Theory* (Portland, OR: Frank Cass Publishers, 1997), 11, 16.

Operation Barbarossa, the Soviets conducted Operation Bagration, a masterpiece of their operational art, that resulted in the destruction of the German Army Group Center and opened the corridor for the advance toward Berlin; a defeat from which the *Wehrmacht* would never recover.[9] The scale and tempo of the operation were unprecedented. In almost two weeks, four Soviet Army Fronts, with more than 178 divisions, destroyed 28 German divisions and killed more than 300,000 German soldiers. While many military historians attributed the German defeat to Hitler's flawed strategic thinking and the clear Soviet superiority in manpower and technology, their point of view ignores the operational ingenuity of the Soviets and oversimplifies the interpretation of a very complex series of events.

The Soviets' operational creativeness, whether in the development or practice of operational art, originated from their holistic approach to warfare. The definition of operational art as "the totality of battles," the appreciation that depth had both mechanical and cognitive aspects, and the concept of disrupting the enemy's system rather than directly destroying it, are clear indications that systems logic guided the Soviet operational thinking.[10] What stands out is their foresight and appreciation of systems thinking; a concept that would only be introduced by Ludwig von Bertalanffy it in 1968.[11]

Even though systemic thinking and the disruption and paralysis of the enemy's system can be traced back in history to the writings of Sun Tzu, Carl von Clausewitz was the first in

[9] Kipp, "The Tsarist and Soviet Operational Art," 81.

[10] Naveh, *In Pursuit of Military Excellence*, 174.

[11] Bertalanffy was an Austrian biologist and the founder of *General System Theory*. The next chapter will introduce him, along with the nature and purpose of his work.

Europe to codify the concept of influencing the enemy and subduing him without fighting.[12] Despite being the father of the strategy of annihilation, Clausewitz advocated not only breaking the will of the enemy but also creating conditions that would render him unable to fight.[13] He appreciated war as being complex and nonlinear in nature. In fact, his definition of destruction is applicable to both concepts of disruption and annihilation.

By the end of WWI, two British veterans also supported the concept of shocking and paralyzing the system – Basil Liddell Hart and J.F.C. Fuller. In 1919, Fuller warned against the dangers of using only brute force to destroy the fighting strength of the enemy.[14] He insisted that "brain warfare," resembling the effects of a "shot through the head," was the most effective way of destroying the enemy's military.[15] Similarly, his fellow citizen, Liddell Hart, the unwavering strategist of the indirect approach, strongly advocated the concept of paralysis. He wrote, "On a higher plane of warfare, the impression made on the mind of the opposing commander can nullify the whole fighting power his troops possess."[16] Both theorists sought to cognitively disrupt the rival system and create a distorted perception of reality as the key to defeat, which for the Soviets represented the essence of *udar*.

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[12] Sun Tzu viewed war as a system formed of dynamic interrelationships, which he described as "the constant shifting disposition of anything or event is constituted in tension with environing others, where their dispositions condition one's own." See Roger T. Ames, ed. and trans., *Sun Tzu: The Art of Warfare* (New York, NY: Ballantine Books, 1993), 76. Additionally, he advocated what he called "acme of skill," which represented the commander's ability to subdue the enemy without fighting. See Samuel B. Griffith, ed. and trans., *Sun Tzu: The Art of War* (London: Oxford University Press, 1971), 77.

[13] Clausewitz states, "The fighting forces must be destroyed: that is, they must be put in such a condition that they can no longer carry on the fight. Whenever we use the phrase "destruction of the enemy's forces" this alone is what we mean." See Carl von Clausewitz, *On War*, ed. and trans. by Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1984), 90.

[14] J.F.C. Fuller, *On Future Warfare* (London: Sifton Praed & Co, 1928), 83.

[15] J.F.C. Fuller, *The Foundations of the Science of War* (London: Hutchinson and Company, 1925), 292, 314.

[16] B.H. Liddell Hart, *Strategy* (New York, NY: First Signet Printing, 1974), 212.

US military doctrine embraced very similar concepts through the works of Colonel John Boyd and Colonel James Warden, both from the United States Air Force. Warden's depiction of the enemy as a system of systems provided the theoretical foundations of effects-based operations (EBO). The essence of his systemic approach was the concentric five-ring model, with the center ring representing the enemy's leadership. Warden believed that disrupting and destroying the command nodes, symbolizing the brain of the enemy's system, would cause paralysis and render the enemy unable to coordinate any effective resistance. However, his work lacked the essence of complexity theory and regressed to that of linear thinking since the enemy, as a complex adaptive system, can quickly adapt to the newly imposed reality.[17]

Boyd's work addressed complexity more genuinely and entailed a coherent systemic approach for creating the shock. His view of the strategic aim was to "diminish adversary's capacity while improving our capacity to adapt as an organic whole so that our adversary cannot cope while we can cope with events/efforts as they unfold."[18] He also emphasized the importance of disorienting the mental images of the enemy and overloading his system, rendering him incapable of coping with the ever-changing situation. Through his famous "observe – orient – decide – act (OODA) loop," Boyd illustrated that by operating at a faster tempo, friendly forces can interrupt the enemy's decision cycle and have the ability to manipulate time and space while denying it to the enemy.[19]

Currently, US military doctrine adopts systems thinking in its *Joint Publication (JP) 5-0*, *Joint Planning*, and *JP 2-01.3*, *Joint Intelligence Preparation of the Operational Environment*, but falls short on how to act on the enemy system to produce shock and paralysis. It focuses more

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[17] Milan N. Vego, "Systems versus Classical Approach to Warfare," *Joint Force Quarterly* 52 (First Quarter, 2009): 41.

[18] Frans P.B. Osinga, *Science, Strategy and War: The Strategic Theory of John Boyd* (New York, NY: Routledge, 2007), 101.

[19] Ibid., 27.

on analyzing the systems, through a holistic approach, to ensure a better understanding of the operational environment (OE) through the "operational design methodology."[20] *JP 2-01.3* calls for identifying nodes (elements that make up the system) and links (relationships between the nodes) as a way to help planners with their operational approach.[21]

FM 3-0, *Operations*, the capstone of US Army doctrine, fares no better. While it emphasizes the importance of inducing shock, it does not give a clear definition of it or the mechanisms to achieve it, whether physically or cognitively.[22] To simplify complex problems, planners tend to break down the enemy's system into parts, particularly when executing the Military Decision Making Process (MDMP). Consequently, they increase the risk by neglecting the uncertainty and complexity of war. This can result in reductionist thinking and lead to a lack of a holistic understanding of the enemy's system.

Today, the US Army has shifted its focus to large-scale combat operations (LSCO).[23] However, the stunning decisive victories of the last LSCO, Operation Desert Storm and Operation Iraqi Freedom, might not be the impending reality in today's operational construct. Operations at the end of the conflict continuum against peer adversaries mean that future wars may be protracted in time and attritional in casualties and resources. In risk and casualty-averse societies, like that of the United States, the approach toward a calibrated elimination of enemy's resistance will prove more beneficial and practical than direct annihilation or attrition.

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[20] *JP 5-0* offers two frameworks to understand the OE: PMESII-PT (Political, Military, Economic, Social, Infrastructure, Information, Physical environment, and Time) and ASCOPE (Areas, Structures, Capabilities, Organizations, People, and Events). See US Department of Defense, Joint Staff, *Joint Publication (JP) 5-0, Joint Operation Planning* (Washington, DC: Government Printing Office, 2017), IV-6 – IV-11.

[21] US Department of Defense, Joint Staff, *Joint Publication (JP) 2-01.3, Joint Intelligence Preparation of the Operational Environment* (Washington, DC: Government Printing Office, 2014), I-4.

[22] *FM 3-0* mentions the word 'shock' only two times. See US Department of the Army, *Field Manual (FM) 3-0*, *Operations* (Washington, DC: Government Printing Office, 2017), 2-41.

[23] Michael D. Lundy, "Meeting the Challenge of Large-Scale Combat Operations Today and Tomorrow," *Military Review* Special Edition (September-October 2018): 111-18.

Accordingly, due to the gravity of the consequences of fighting in a LSCO environment, military planners should ask two critical questions: What is shock and how to induce it within the enemy's system?

This monograph argues that analyzing the Soviet operational art from a systems perspective will provide insights on the nature and practice of contemporary operational art in LSCO. The Soviet conduct of Operation Bagration, through the lens of system shock framework, illustrates the correlation between the Soviet operational art and systems theory, including the principles of chaos and complexity. Thus, the monograph addresses both a historical research and a theoretical analysis. By integrating the principles of complexity and systems logic, the concept of system shock provides military practitioners with a framework that offers tangible advantages in devising novel approaches in planning, preparing, and executing large-scale combat operations.

Systems Thinking and the Theories of Chaos and Complexity

> Simplicity achieved by idealized isolation of systems and of variables within systems, deterministic laws, clearly delineated boundaries, linear causal chains, and other tools with which to forge analytical prediction have become the hallmarks of a good theory. By using such techniques, rooted in the parsimonious and deductive power of logic, we have searched for – and therefore overwhelmingly found – static equilibria, constant explanations, periodic regularities, and the beauty of symmetry.
>
> —Alan Beyerchen, "Clausewitz, Nonlinearity, and the Unpredictability of War"

Even though nonlinearity dominates almost all aspects of life, people regard this phenomenon and its unpredictable nature as a misfit to their catalog of norms. People prefer linear behavior because it enables predictions, ensures proper planning, and offers control. Additionally, through linear thinking, people tend to manipulate their selectively perceived reality with whatever tools they have available.[24] Linearity, which is often associated with Sir Isaac Newton, hinges on three main principles. The first is the proportionality of inputs and outputs; small inputs lead to small outputs and vice versa and, consequently, cause and effect are

[24] Alan Beyerchen, "Clausewitz, Nonlinearity, and the Unpredictability of War," *International Security* 17, no. 3 (Winter, 1992-1993): 64.

demonstrable. The second is the linear principle of replication, which means that people can obtain the same results if they apply the same action under the same conditions. The final principle, and which legitimizes reductionism, is additivity. It suggests that the whole is the sum of its parts and that, by dissecting the problem into smaller chunks, people can easily understand it. However, the real world is not that simple. Uncertainty and unforeseeable effects result from nonlinear and dynamic interactions, a principal characteristic that linear thinking disregards.[25]

General System Theory

The Austrian biologist Ludwig von Bertalanffy started working on a systems approach to biology in the early twentieth century.[26] In 1968, he published his seminal work, the *General System Theory*, and planted the first seed in the rise of the systems thinking. His main concern was to come up with an alternative foundation for the mechanistic and reductionist theories that treated wholes as nothing more than a linear aggregate of their components.[27] The importance of systems thinking is that it sees interrelationships and interactions rather than things. It is concerned with a shift of mind to see wholes rather than parts and patterns of change rather than "snapshots."[28] Two main characteristics identify a system: the existence of interconnections, which means that any change in an element produces changes in other components of the system; and the properties of the entire system are different from those of its parts.[29] By incorporating

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[25] Tom Czerwinski, *Coping with the Bounds: Speculations on Nonlinearity in Military Affairs* (Washington, DC: National Defense University, 1998), 8-9.

[26] Alex Ryan, "What is a Systems Approach?," Arxiv, September 10, 2008, accessed August 25, 2018, https://arxiv.org/abs/0809.1698.

[27] Ibid., 10.

[28] Peter M. Senge, *The Fifth Discipline: The Art and Practice of the Learning Organization* (New York, NY: Currency Doubleday, 1994), 8-9.

[29] Robert Jervis, "Complex Systems: The Role of Interactions," in C*omplexity, Global Politics, and National Security*, ed. David S. Alberts and Tom Czerwinski (Washington, DC: National Defense University, 1997), 20.

systems thinking, it becomes clear that every element of the system shares responsibility for the problems generated by that system since all components are interacting.[30]

Bertalanffy illustrated his theory by differentiating between closed and open systems. Closed systems are self-contained: they do not interact with their environment and are not subject to outside influences. Such systems, with their linear internal dynamics, constituted the paradigm of reductionist and inward-focused thinking.[31] Closed systems are non-living systems that, in practice, cannot exist.[32] Open systems, however, are living systems; they interact dynamically with the environment, receiving inputs and exporting outputs.[33] They can adapt to their surroundings, change their internal structure, and survive by feeding on a continual flux of energy and matter.[34] Since closed systems are linear and predictable, focusing on them will simplify analysis and distort the perception of reality.[35]

General System Theory provides military practitioners with a lens to understand and appreciate the relations and interactions that exist within any living system, to include military ones. Since no system can exist without exchanging energy with the environment, military planners should grasp systems theory from the perspective of open systems. While Bertalanffy

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[30] Senge, *The Fifth Discipline*, 78.

[31] Osinga, *Science, Strategy, and War*, 65.

[32] Geoff Peters, *Systems Behaviour*, ed. Open Systems Group (London: Harper Row, 1981), 17.

[33] Ludwig von Bertalanffy, *General System Theory: Foundations, Development, Applications* (New York, NY: Eleventh Printing, 1993), 39.

[34] Osinga, *Science, Strategy, and War*, 73.

[35] A key aspect for understanding open and closed systems is the concept of entropy, which represents "the measure of the degree of disorder in a system," and is directly proportional to the lost energy. A closed, isolated system will have its entropy increasing until no more energy transfer is possible. At this point, the system is at a state of equilibrium where actions turn linear, productive activity diminishes, and death for living systems becomes imminent. On the contrary, and through the exchange of information and energy, open systems maintain themselves away from equilibrium where nonlinear, unpredictable, and different patterns of behavior arise. See Andrew Ilachinski, *Land Warfare and Complexity, Part I: Mathematical Background and Technical Sourcebook* (Alexandria, VA: Center for Naval Analysis, 1996), 66; John F. Schmitt, "Command and (Out of) Control: The Military Implications of Complexity Theory," in C*omplexity, Global Politics, and National Security*, ed. David S. Alberts and Tom Czerwinski (Washington, DC: National Defense University, 1997), 103.

introduced a new paradigm of viewing the world, he did not explain how open systems tend to behave as they move away from equilibrium. It was not until the discovery of cybernetics and the questions of self-organization and self-production in the 1980s, that new scientific approaches emerged with the theories of chaos and complexity.[36]

Chaos Theory

Rooted in physics and chemistry, chaos theory emerged as one of the most visible aspects of nonlinear sciences. Scientists realized that the farther an open system is from equilibrium, the higher is its degree of nonlinearity and the greater is its complexity. The fate of the system is determined by minimal inputs that become amplified over time and result in unpredictable and irregular behavior. Chaos deals with turbulence that drives the system to become highly disordered and almost impossible to either predict, manage, or control; it exhibits the characteristics of instability and randomness.[37] Neither equilibrium nor chaos is a tempting place for a system to thrive. While equilibrium halts innovation and progress and increases predictability, chaos deals with an overwhelming number of actions lacking understanding, adaptation, logic, and purpose.[38] To better grasp this theory, one should understand its main principle of bifurcation.

As the system moves away from equilibrium, it becomes more sensitive to a process known as bifurcation. It represents a fork in the road, where perturbations exist, encompassing a wide range of possibilities, choices, or paths.[39] The first bifurcation takes place at the "Edge of Equilibrium," the conceptual boundary between linearity and nonlinearity, or between order and

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[36] Antoine Bousquet, *The Scientific Way of Warfare* (New York: Columbia University Press, 2009), 34.

[37] Robert Axelrod and Michael D. Cohen, *Harnessing Complexity: Organizational Implications of a Scientific Frontier* (New York, NY: Basic Books, 2000), xv.

[38] Czerwinski, *Coping with the Bounds*, 42.

[39] Ibid., 41.

complexity. The more the complexity, the faster the bifurcations, the shorter the time available, and the closer the system is to the realm of chaos (see Figure 1). The path that the system chooses depends on its history, its internal models, and various external conditions. Depending on the ability of the system to self-organize and adapt, bifurcation causes either its evolution or devolution. In the military realm, bifurcations represent the decisions and the following courses of action (COA) that a commander chooses to execute in response to the enemy's COAs.

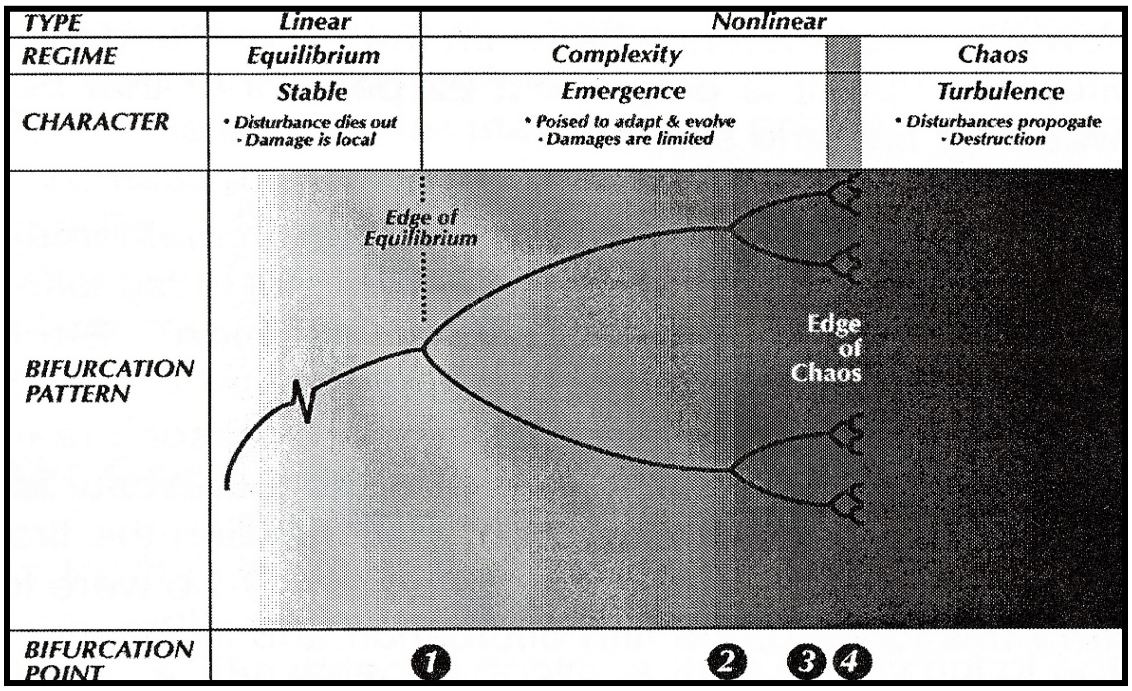

Figure 1. The Zones of Dynamic Systems and Bifurcations. Tom Czerwinski, *Coping with the Bounds: Speculations on Nonlinearity in Military Affairs* (Washington, DC: National Defense University, 1998), 43.

Chaos theory builds on *General System Theory* by describing how an open system can either evolve or devolve as it exchanges energy with its surroundings. It represents a conceptual framework that enables military practitioners to understand how pushing an enemy's system toward either equilibrium or chaos can result in its destruction. However, the theory did not illustrate how open systems can thrive in the complexity zone that exists between equilibrium and chaos. It was not until the discovery of complexity theory that scientists were able to define complex adaptive systems.

Complexity Theory

> But in war, as in life generally, all parts of the whole are interconnected and thus the effects produced, however small their cause, must influence all subsequent military operations and modify their outcome to some degree, however slight. In the same way, every means must influence even the ultimate purpose.
>
> —Carl von Clausewitz, *On War*

Complexity theory represents another systems approach that copes with the dynamics of nonlinearity. While accepting and building upon the principles of chaos theory, to include bifurcation, complexity explains the behavior of systems as they move closer to the edge of chaos. Scientists in biology observed that instead of falling into chaos, systems acquired the ability to create a special kind of balance between order and chaos.[40] Thus, instead of becoming chaotic and ripping themselves apart, systems adapted and thrived.

The idea of a complex system suggests that "a great many independent agents are interacting with each other in a great many ways."[41] Complexity theory deals with the interconnectedness between the agents or the elements of the system so that any change in one of them has the potential to change all others. It is worth mentioning that the words "complicated" and "complex" are not synonymous. While complicated problems can be controlled, predicted, and broken down into smaller pieces, complex problems resist such approaches due to the interdependencies among its constituents.[42]

Complex adaptive systems (CAS) represent the core of the complexity theory. In addition to sharing the same principles of any other complex system, a CAS contains agents that seek to change and adapt to their environment over time; a process by which the agents and the

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[40] M. Mitchell Waldrop, *Complexity: The Emerging Science at the Edge of Order and Chaos*. (New York, NY: Touchstone, 1992), 12.

[41] Ibid., 11.

[42] Alex Ryan, "The Foundation for an Adaptive Approach: Insights from the Science of Complex Systems," *Australian Army Journal* 6, no. 3 (Summer 2009): 86.

environment are continuously affected by each other.[43] Such systems have a brain-like network structure and are in a continuous process of reorganizing their internal connection patterns; they learn and adapt in order to survive.[44] Understanding complexity theory requires explaining the characteristics of CAS, which include emergence, feedback loops, self-organization, and adaptation.

Emergence implies that the behavior, function, or characteristic of the system as a whole is different from those of its individual components. The appearance of a previous unobserved emergent behavior is the result of the dynamic interactions of numerous independent agents producing higher-level properties of the system. Even with the complete knowledge of the properties of the constituent agents, the prediction of the resulting macro-behavior remains inconceivable. Thus, emergence is "the movement from low-level rules to high-level sophistication" after the "agents that reside on one scale start producing behavior that lies one scale above them."[45] This characteristic is the hallmark of CAS and represents the main reason why reductionism does not apply to such systems.

Since the agents within a complex system are interacting internally among themselves and externally with the environment, the emerging global behavior, while directly affecting the latter, is in turn influencing the agents. This reciprocal relation creates a synergetic feedback loop. It represents the control of the system based on its actual performance rather than the expected one.[46] The information relating to the difference between the actual performance and the ideal pattern forms a new input, and the system takes the actions to make the necessary corrections and

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[43] Steven M. Rinaldi, "Complexity Theory and Airpower: A New Paradigm for Airpower in the 21st Century," in C*omplexity, Global Politics, and National Security*, ed. by David S. Alberts and Tom Czerwinski (Washington, DC: National Defense University, 1997), 115.

[44] Everett Carl Dolman, *Pure Strategy: Power and Principles in the Space and Information Age* (New York, NY: Penguin Books, 1988), 110.

[45] Steven Johnson, *Emergence: The Connected Lives of Ants, Brains, Cities, and Software* (New York, NY: Scribner, 2004), 18.

[46] Osinga, *Science, Strategy, and War*, 72, 95.

redirect the courses of events. In other words, feedback is "the property of being able to adjust future conduct by past performance."[47] Everett Dolman distinguishes between two kinds of feedback, negative and positive. Negative feedbacks keep the system at equilibrium despite the changing external conditions, while positive feedbacks allow for additional inputs and a consequent change in the system behavior.[48] Accordingly, negative feedbacks can lead the system to predictability and death, whereas positive ones can drive the system that is unable to adapt into chaos and self-destruction. The ability to process the information and control the evolution of the system is dependent on a set of internal models that help in anticipating the future by basing current actions on expected outcomes.[49] The continuous hierarchical flow of information from top to bottom and vice versa constitutes the lifeblood of CAS.

Through feedback loops, the richness of the interactions among the system's agents enables the system to undergo two interdependent mechanisms – self-regulation and adaptation. A complex adaptive system will self-regulate to overcome any external disturbances or barriers. It changes its rules, structure, and internal models in order to adapt to its externally imposed environment. Therefore, it is evolving and learning to survive. The system, instead of responding passively to events, will try to turn, in a purposeful manner, whatever happens to its advantage.[50] Evolution and adaptation are what prevent the CAS from slipping into the chaos end zone from the place in which it thrives best, the edge of chaos.[51] When a system adapts to its surroundings, it changes the environment and influences the evolution of any other existing system, a process that

[47] Dolman, *Pure Strategy*, 123.

[48] Ibid.

[49] Rinaldi, "Complexity Theory and Airpower," 116.

[50] Waldrop, *Complexity*, 11.

[51] Czerwinski, *Coping with the Bounds*, 48.

theorist Robert Jervis calls "coevolution."[52] Since self-organization drives adaptation, and since the latter is dependent on the connections and interactions among the elements within a system, a variety within the population of agents becomes a requirement.[53] The greater the variety, the more states the system can have as it moves within the complexity zone, and the more it is able to adapt.

Complexity theory illustrates how military systems constitute CAS that can learn, adapt, and survive. It informs military practitioners that any plan that does not approach enemy systems as a whole and does not account for complexity could lead to failure. Additionally, complexity theory provides a valuable lens to analyze enemy systems and the OE and devise an operational approach that can exploit the interconnectedness and interrelations that exist between the two.

The logic of systems and the principles of chaos and complexity represent a conceptual framework to help understand how the Soviet operational art evolved and how the Red Army commanders viewed their enemies holistically. They also provide a valuable lens to analyze the concept of operational shock and how it tied directly to the aforementioned principles in theory as well as in practice.

The Soviet's Systemic Operational Art

> Without changing our patterns of thought, we will not be able to solve the problems that we created with our current patterns of thought.
>
> —Albert Einstein, *Managing Innovation and Change*

Following WWI, the interwar period represented the golden age for military theorists to integrate the scientific and industrial developments into future warfare. They aimed to restore lost maneuverability and prevent the deadlock caused by trench warfare that dominated the

[52] Robert Jervis, *System Effects: Complexity in Political and Social Life* (Princeton, NJ: Princeton University Press, 1998), 48.

[53] Axelrod and Cohen, *Harnessing Complexity*, 32.

battlefields throughout the four years of WWI.[54] The Soviet Union was definitely part of that evolutionary process. However, the way its military theorists approached war was drastically different from those of the West. The renaissance in the Soviet military thought, reflected in both operational awareness and systems consciousness, made the Soviet military one of the world's most progressive in theory and, to a large extent, in practice.

In addition to sharing the same concerns with their Western counterparts about the immobile trench lines of WWI, Soviet theorists enriched their thought by the experiences of the Russian Civil War and the Polish Campaign of 1920. Their operational perception was the result of synthesizing the quite different aspects of their previous experiences. While WWI was positional warfare lacking mobility, the Civil War witnessed high maneuverable tactics on extended scale and scope but did not defeat the enemy.[55] The Soviets saw the drastic increase in the number of the troops, the improved lethality of new weapons, and the expansion of the battlefield as anomalies that violated the expectations of the prevailing Clausewitzian paradigm of annihilation. Accordingly, the professional debates in the years following 1921 initiated a paradigm shift of tactical consciousness to that of an operational one.[56]

The Soviets' operational perception stemmed directly from their understanding of the concept of depth. According to Georgii Isserson, a prominent Soviet military theorist in the interwar period, the operations in WWI were not continuous because they dealt only with the tactical depth of the enemy and disregarded the depth of its operational deployment.[57] The idea of

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[54] Richard W. Harrison, *Architect of Soviet Victory in World War II: The Life and Theories of G.S. Isserson* (Jefferson, NC: McFraland and Company Publishers, 2010), 7.

[55] Glantz, *Soviet Military Operational Art*, 56; Kipp, "The Tsarist and Soviet Operational Art," 68.

[56] Paradigm shift is a concept popularized by Thomas Kuhn. It explains how anomalies turn into an intellectual crisis that causes a revolutionary process, which in turn initiates the replacement of irrelevant paradigms. See Thomas S. Kuhn, *The Structure of Scientific Revolutions* (Chicago, IL: University of Chicago Press, 1996), xi-xii.

[57] G. S. Isserson, *The Evolution of Operational Art*, trans. Bruce W. Menning (Fort Leavenworth, KS: School of Advanced Military Studies Theoretical Special Edition, 2005), 46.

depth put into question the validity of destroying the enemy in a climactic linear battle by means of a single decisive blow. Svechin addressed the theoretical solution to the problem. By defining the operational art as the cognitive tension between strategy (abstract) and tactics (mechanical), the totality of combat operations, distinct in time and space yet unified by a common aim, can be orchestrated into a continuous, coherent, and purposeful occurrence.[58] Similar to viewing the operation as a whole of interrelated and non-self-contained battles, Svechin also identified that the three branches of military art formed a universal system: strategy, operational art, and tactics. The system is hierarchical in structure and has vertical interactions among its interrelated elements. Svechin proved that when he said, "tactics take the steps that make up an operational leap, and strategy points the way."[59]

Building on Svechin's leaps and influenced by the offensive nature of the Red Army, Tukhachevsky, the real dynamo behind the mechanization of the army, began working on the theory of successive operations. Tukhachevsky considered that future armed combat would consist of an aggregate of successive blows throughout the entirety of the enemy's depth. Those blows would form a system of successive operations that, in addition to having strategic importance, were united by a common aim.[60] By harnessing the factor of depth, Soviets approached their new operational dilemma from a systems perspective. The prevailing non-linear and in-depth deployment of enemy forces drove Tukhachevsky and Isserson to find an alternative theory to that of direct annihilation or attrition in order to better achieve operational and strategic objectives. They viewed the paradigm of attacking the enemy in a classical linear manner as flawed. Thus, by recognizing friendly and adversary armies as systems, their new approach called

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[58] Naveh, *In Pursuit of Military Excellence*, 9.

[59] Svechin, *Strategy*, 269.

[60] M. V. Zakharov, "Problems of Strategy and Operational Art in Soviet Military Works (1917-40)," in *The Evolution of Soviet Operational Art, 1927-1991*, trans. Harold S. Orenstein (Portland, OR: Frank Class, 1995), 11-17.

for targeting the rival system's operational ability to pursue its strategic aims, while protecting their own.[61] The theory of deep operations was born.

The theory of deep operations called for an operational maneuver that could exploit more than just the tactical depth of the enemy's formations. The Soviets' comprehension of depth encompassed more than its physical definition of the distance from front to rear. They saw depth as a paramount cognitive realm where system interactions took place and where the conceptual bridge between strategy and tactics existed.[62] Since Soviet theorists viewed the enemy as a complex adaptive system capable of adjusting to multiple physical setbacks, they identified the overarching aim of the theory of deep operations as the achievement of simultaneous shock or disruption, *udar*, throughout the entire breadth and depth of the enemy's formations.[63] The result would neutralize the rationale of the rival system by a deep operational maneuver, exploiting the cognitive tension, breaking the coherence and the harmony of the system, and isolating tactical actions from their strategic context. Hence, when paralysis materialized, further annihilation was possible.

Since the aim is the compass that steers the system as a coherent whole, defines its interactions, and provides it with the self-regulatory ability to overcome external disturbances, preserving one's operational aim is as crucial as attacking the enemy's.[64] Accordingly, the Soviet operational maneuver had two aspects: a positive aspect to achieve friendly's operational aim,

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[61] Naveh, *In Pursuit of Military Excellence*, xviii.

[62] Ibid., 18.

[63] Triandafillov warns of an unavoidable change in both the environment and the rival system as a result of the enemy's efforts to adapt to friendly actions. See V. K. Triandafillov, *Nature of Operations of Modern Armies*, ed. Jacob W. Kipp, trans. William A. Burhans (Portland, OR: Frank Class, 1994), 110.

[64] Naveh, *In Pursuit of Military Excellence*, 14-15, 211-12.

and a negative aspect to deny it to the enemy and thus protect one's own. The two aspects represented the conceptual and physical objectives of the theory of deep operations.[65]

To achieve such objectives, the Soviets approached the operational maneuver and concept of depth from a systems perspective. The hierarchal structure of the enemy's disposition and the necessity of successive blows meant that the elements of the maneuver system had to be echeloned in depth with a column configuration. Tukhachevsky and Isserson established a universal system composed of three elements: leading echelon or the holding element – *eshelon ataki* (*EA*), echelon of the development of the breakthrough or the striking maneuver – *eshelon razvitiia proryva* (*ERP*), and air mechanization (*desant*).[66] If the essence of any system centers on the dynamic interaction between its elements, then the structure of the Soviets' system best personified this concept.

The *EA* represented the system's horizontal element. It was predominantly attritional in nature with the objective of penetrating the enemy's tactical depth, isolating its tactical formations from their operational context, and creating a window of opportunity for the *ERP* to pass through the enemy's operational depth. The latter represented the vertical element, which had the property of depth and maneuver, with the objective of exploiting *EA's* tactical breakthrough into an operational breakout, putting the friendly mass behind the enemy's main one, breaking the strategic-tactical cognitive bond, and creating *udar*. The *desant*, also representing a vertical element, aimed at reinforcing the *ERP* and reducing the enemy's maneuverable space by advancing from rear to front.[67] Even though these elements were independent agents, their dynamic interaction determined the outcome of the whole process (see Figure 2).

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[65] Naveh, *In Pursuit of Military Excellence*, 211-19

[66] Ibid., 209-10.

[67] Ibid., 209-38.

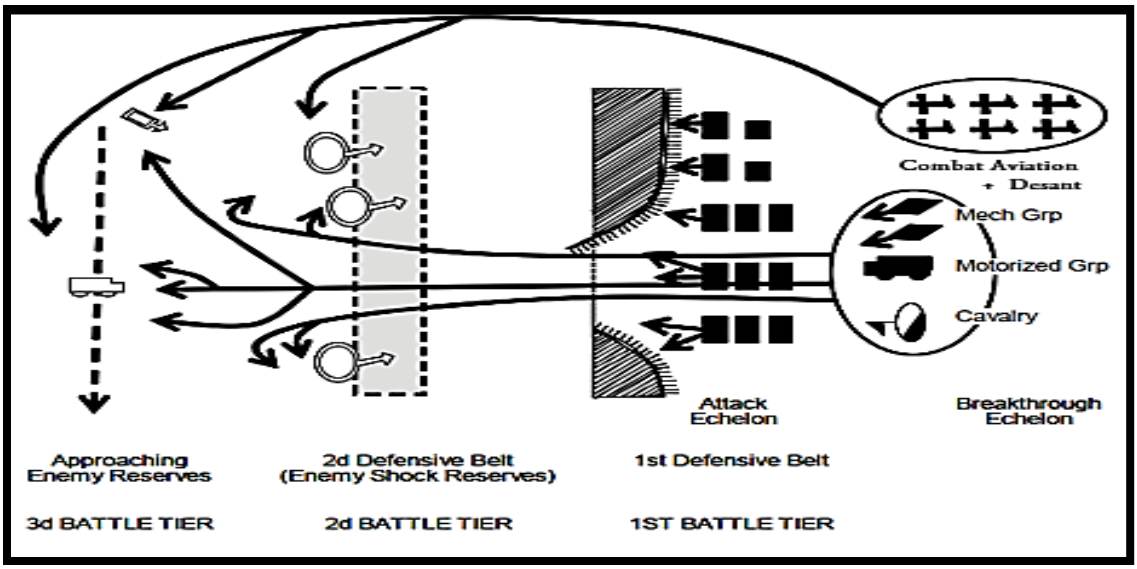

Figure 2. The Concept of Deep Operations. G. S. Isserson, *The Evolution of Operational Art*, trans. Bruce W. Menning (Fort Leavenworth, KS: School of Advanced Military Studies Theoretical Special Edition, 2005), 67.

Soviet military thinkers outlined synergy, fragmentation, simultaneity, momentum, and cognitive deception and surprise as a set of universal principles or mechanisms for attaining the operational shock or *udar*.[68] Synergy relates to the emergent property of complex systems. It concerns the development of the processes that produce interaction and cooperation and make the whole greater than the sum of its parts.[69] The interaction between horizontal and vertical elements, between attrition and maneuver, and between rear and front, implied that the sum of the qualitative characteristics of those elements would not necessarily equal the sum of their individual properties. Additionally, the tactical and operational cooperation that existed between the combined-arms formations, representing the subsystems of the three elements, reflected the principle of synergy.

The principle of fragmentation corresponded to both the horizontal and vertical dimensions of the rival system. In addition to its mechanical aspects of isolating enemy tactical

[68] Naveh, *In Pursuit of Military Excellence*, 189, 261.

[69] Jamshid Gharajedaghi, *Systems Thinking: Managing Chaos and Complexity* (Burlington, MA: Morgan Kaufmann, 2011), 312.

formations and segregating operational reserves and command, the systemic aspect of fragmentation lay in the neutralization of the rival system cohesiveness. By separating the tactical, operational, and strategic realms from each other, fragmentation disrupted the interactions among the elements of the opposing system and prevented its synergy from materializing. The system actions became predictable after the whole was broken down into its independent parts and the manifestation of *udar* became possible.

An additional principle, building on that of synergy, was the principle of simultaneity. As a means of creating depth, the application of simultaneity was "as an essential ingredient to deep battle and deep operations."[70] As Isserson explained, "… in the sense of simultaneous neutralization of the enemy's entire depth. This idea was the key to our thinking on military theory."[71] Simultaneity aimed at overwhelming the enemy's capacity to react, disrupting its dynamics of command and control, and frustrating its maneuvering capability. Furthermore, this principle emphasized the importance of the *desant* element and the simultaneous synergy existing between it and the elements of *EA* and *ERP*.

Momentum constituted the fourth principle for the creation of *udar*. It represented the relation between mass and space, corresponding to a striking maneuver attacking the system with enough combat power at every point in time.[72] Momentum highlighted the significance of synchronization due to the difference in tempo between the holding force and the striking force. It aimed at manipulating time and space by depriving the defender the ability to control the operational time and to coordinate any movement in its operational depth. By recognizing the

[70] Kevin M. Brisson, "Ten Principles of Soviet Operational Art: Red Army Operations in Theory and Practice, 1936-1942" (master's thesis, University of Calgary, 2014), 17, accessed October 13, 2018, https://prism.ucalgary.ca/handle/11023/1872.

[71] Richard Simpkin, *Deep Battle: The Brainchild of Marshal Tukhachevskii* (London: Brassey's Defence Publishers, 1987), 34.

[72] Naveh, *In Pursuit of Military Excellence*, 217.

presence of a significant kinetic mass in its rear, the enemy would lack the ability to reinforce its shattered front before its forces can even retrograde.

The last principle for inducing shock was deception and surprise, representing the cognitive aspect of all the principles. Deception, or *maskirovka*, intended "to amplify the effects of *udar* (operational shock), by means of manipulating surprise."[73] The *Provisional Field Regulations for the Red Army* (PU-36), the apogee of deep operations theoretical development, highlighted the importance of deception in creating surprise and disrupting the opposing system. It stated, "Surprise paralyzes. That is why all combat actions must be conducted with maximum camouflage and speed."[74] However, deception related less to the idea of concealing friendly forces than to the logic of the rival system. Its primary role was to create a cognitive gap in the enemy's mind and exploit it through surprise. This gap between the perceived and actual realities produced an operational vulnerability for the opposing system and a window of opportunity for the friendly one.[75] Accordingly, if achieved successfully, deception reinforced the application of the principles of fragmentation, simultaneity, and momentum by surprising the enemy, thus reducing his ability to react and adapt at the correct time and place.

By introducing the logic of systems into the field of warfare, whether consciously or not, Soviet military thinkers were able to transform their operational consciousness into an institutionalized theory that was years ahead of their Western counterparts. However, their

[73] Naveh, *In Pursuit of Military Excellence*, 27.

[74] Joint Publications Research Service, *Provisional Field Regulations for the Red Army 1936*, (Springfield, VA: National Technical Information Service, 1986), 2.

[75] Naveh, *In Pursuit of Military Excellence*, 19.

creativity suffered repression in 1937 with Stalin's abrupt purges.[76] It liquidated the intellectual and innovative minds behind the Red Army's conceptual breakthroughs, to include Svechin and Tukhachevsky. Inevitably, their creative theories were cast to the shadows. The Red Army military setbacks in the first three years of WWII were the result of it being "caught between a preparation for the war of maneuver and the war of position, and not ready for either."[77] It was not until the summer of 1943 that the Red Army regained its operational consciousness. Operation Bagration represents a LSCO that reflects Soviets' rational application of both the principles of systems thinking and the mechanisms of inducing an operational systemic shock.

Operation Bagration: The *Wehrmacht's* Worst Defeat

> There were two D-days in June 1944. The landings in Normandy on 6 June, Operation Overlord… The other D-day [Operation Bagration] remains virtually unknown both here [United Kingdom] and in America… Overlord and Bagration together delivered the double whammy that knocked out the Thousand-Year Reich.
>
> —David Reynolds, *The Guardian*

> Operation Bagration was the most strategically important combat operation of World War II For the simple reason that it epitomized the Soviet revolution in warfare.
>
> —Douglas Macgregor, *Margin of Victory*

After nearly three years of war, the situation at Eastern Front had shifted from Germany nearly achieving victory in 1941, to an almost stalemate in the spring of 1944. Despite remaining a strong army, the *Wehrmacht* faced a number of defeats and lost large parts of the areas it had occupied since Operation Barbarossa. Nevertheless, it retained the strategic initiative and forced the Red Army to resort to a strategic defense. However, after its defeat at the Battle of Kursk in

[76] Stalin's Purges, also known as the Great Terror, constituted a campaign of political and military repression that took place in the Soviet Union between 1936 and 1938. Within a period of eighteen months, almost one-third of the Red Army's entire officer corps was either executed, imprisoned, or exiled. The campaign had catastrophic consequences on the Soviet Union as it entered WWII. Operationally, it left the Red Army in a vulnerable position with crippled leadership, morale, and effectiveness. Strategically, it undermined the usefulness of the Soviet Union as a western ally. See Stuart D. Goldman, *Nomonhan, 1939: The Red Army's Victory That Shaped World War II* (Annapolis, MD: Naval Institute Press, 2012), 28-43.

[77] Condoleezza Rice, "The Making of Soviet Strategy," in *Makers of Modern Strategy: From Machiavelli to the Nuclear Age*, ed. Peter Paret (Princeton, NJ: Princeton University Press, 1986), 669.

the summer of 1943, Germany could not even pretend to hold that initiative anymore.[78] At the Tehran Conference, following the brilliant Soviet counteroffensive in Kursk, Stalin promised President Theodore Roosevelt and Prime Minister Winston Churchill that "at the moment the landings begin, our troops will be preparing a major assault on the Germans."[79] It was the genesis of the massive offensive that would be later codenamed Operation Bagration after the Russian prince who died while fighting Napoleon in Borodino in 1812.[80]

The Soviet offensives continued from the winter of 1943 to the spring of 1944 and represented the first five of the "Ten Stalinist Crushing Blows of 1944."[81] They defined the frontlines for the upcoming summer campaign. By May 1944, the Red Army had liberated Leningrad, Ukraine, and Crimea and reached the Dnepr River with the majority of operations taking place in the southern part of the strategic front, which stretched from the Gulf of Finland in the north to the Black Sea in the south. The success of the offensives in setting the conditions for the major summer assault motivated the Soviet Army General Headquarters (*Stavka*) to start the planning phase. Despite the previous failures in the Belorussian sector during the winter and spring offensives, the *Stavka* decided that the destruction of the German forces in that region should be the ultimate priority.[82] For the Soviets, Belorussia encompassed the shortest and most

[78] David Glantz and Jonathan House, *When Titans Clashed: How the Red Army Stopped Hitler* (Lawrence: University Press of Kansas, 2015), 229.

[79] Paul Adair, *Hitler's Greatest Defeat: The Collapse of Army Group Center, June 1944* (London: Arms and Armour Press, 1994), 13-14.

[80] Steven J. Zolga, *Bagration 1944: The Destruction of Army Group Centre* (Oxford: Osprey Publishing, 1996), 37.

[81] Glantz and House, *When Titans Clashed*, 244.

[82] Adair, *Hitler's Greatest Defeat*, 50-51.

critical routes to Germany's political centers and, accordingly, victory would have strategic and political significance.[83]

The final Soviet plan called for what Dr. James Schneider defined as the "distributed campaign."[84] It consisted of five successive and interdependent operations with Operation Bagration as its centerpiece. The opening diversionary offensive on the Finnish borders would begin on 10 June. Following the first shaping operation, the main offensive, Operation Bagration, would target Army Group Center on 19 June. The *Stavka* planned for the Germans to commit their strategic reserves before launching the L'vov-Sandomierz and Lublin-Brest offensives. The purpose of these offensives, when combined with Bagration, was to reach the Vistula and the borders of Poland and East Prussia. After the successful conclusion of these operations, the *Stavka* launched the Jassy-Kishinev Offensive toward the Balkans.[85]

Once the Soviets selected the strategic plan for the summer offensive, they considered how to augment the forces on the Belorussian Front and how to deceive the Germans on the scale and aims of the operation. The *Stavka* devised a robust deception plan to reinforce the German conviction and appreciation that the main attack would commence in Ukraine toward the Balkans littoral, and not in Belorussia.[86] The *maskirovka* was also critical for the enormous scale of Soviet armies' movements. Building on the success of previous winter and summer offensives in the south, the *Stavka* kept their six tank armies and the bulk of their strategic bombers in the Third Ukrainian Front's sector until mid-May. The massive Soviet concentrations in the south, in addition to the swampy and wooded terrain in Belorussia, convinced Hitler and the German Army

[83] David Glantz and Harold S. Orenstein, *Belorussia 1944: The Soviet General Staff Study* (London: Frank Cass, 2001), 4.

[84] James J. Schneider, "Vulcan's Anvil: The American Civil War and the Foundations of Operational Art," School of Advanced Military Studies Theoretical Paper No. Four (Fort Leavenworth, KS: School of Advanced Military Studies/US Army Command and General Staff College, 1992), 36.

[85] Adair, *Hitler's Greatest Defeat*, 51-53.

[86] Douglas A. Macgregor, *Margin of Victory: Five Battles That Changed the Face of Modern War* (Annapolis, MD: Naval Institute Press, 2016), 87.

High Command (*OKH)* that an attack in that area, if it happened, would not be more than a fixing one for the main southern attack. Consequently, the *OKH* stripped Army Group Center of its LVI Panzer (Pz) Corps, which constituted for almost 15 percent of its divisions and 82 percent of its tanks.[87] The Soviets not only achieved strategic but also operational and tactical surprise. As the Army Group Center war diary stated, "The major attack by the enemy northwest of Vitebsk has taken the German command completely by surprise... intelligence had not indicated any concentration on this scale there."[88]

By mid-May 1944, Army Group Center deployed four armies (Second, Ninth, Fourth, and Third Pz) along a 1,100 kilometers front, which stretched from Kovel in the south to Polotsk in the north (see Figure 3).[89] The Germans had 56 divisions, 29 of which were on the front lines, with 800,000 men in the Belorussian sector, one-third of all their troops on the Eastern Front.[90] Convinced that the sector would witness nothing more than a local attack, Hitler ordered Field Marshal Ernst Busch, the commander of Army Group Center, to designate the cities of Vitebsk, Orsha, Mogilev, and Bobruisk, which were located in the forward area, as fortified places, *feste platze*.[91] The aim was to break the enemy's momentum, tie its forces down, block their supply routes, and gain time for reinforcements to arrive.

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[87] Gerd Niepold, *Battle for White Russia: The Destruction of Army Group Centre June 1944*, trans. Richard Simpkin (Mclean, VA: Pergamon-Brassey's International Defense Publishers, 1987), 15.

[88] Ibid., 73.

[89] Adair, *Hitler's Greatest Defeat*, 51.

[90] Walter S. Dunn, *Soviet Blitzkrieg: The Battle for White Russia, 1944* (Boulder, CO: Lynne Rienner Publishers, Inc., 2000), 32; Niepold, *Battle for White Russia*, 7, 28.

[91] Adair, *Hitler's Greatest Defeat*, 67.

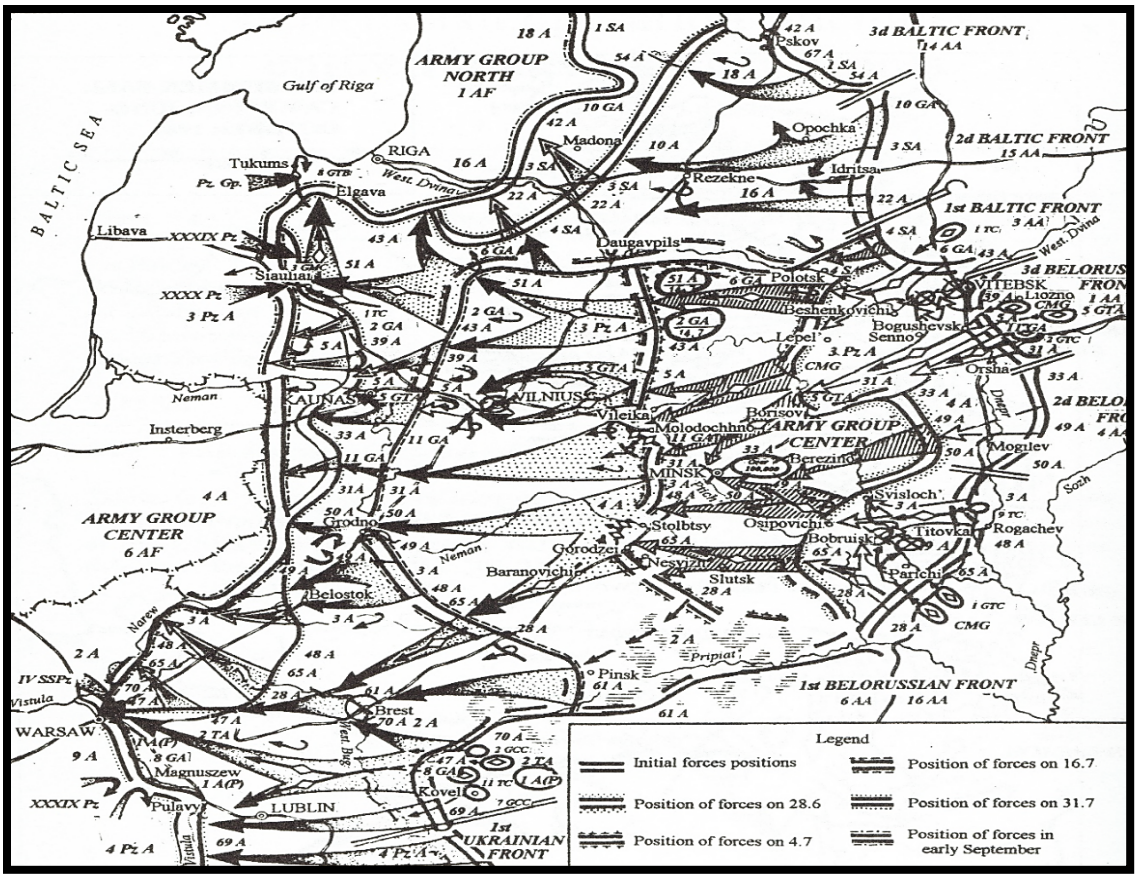

Figure 3. Operation Bagration with L'vov-Sandomierz and Lublin-Brest Offensives. David Glantz and Harold S. Orenstein, *Belorussia 1944: The Soviet General Staff Study* (London: Frank Cass, 2001), 240.

Along the strategic Eastern Front, the Red Army organized its units in fronts, with combined-arms armies as the major subordinate units. By that time of the war, the echelonment of the attacking forces "had become the rule and not the exception."[92] Along the Belorussian sector, the *Stavka* tasked the First Baltic Front, Third Belorussian Front, Second Belorussian Front, and First Belorussian Front, deployed from the north to the south respectively, to conduct Operation Bagration. The four fronts had fourteen combined-arms armies, one tank army, and four tank corps with almost 2.3 million men (the six armies in the first Belorussian left wing

[92] Kipp, "The Tsarist and Soviet Operational Art," 82.

would later participate in the Lublin-Brest offensive).[93] The operational plan envisioned the conduct of a large-scale offensive involving the close cooperation among the four fronts with the aim of destroying Army Group Center, liberating Minsk as an intermediate objective, and reaching Warsaw as the final operational-strategic objective.[94]

The *Stavka* planned to deliver deep and concentric blows against the German dispositions, and they designed the operation in three phases. The first phase entailed six simultaneous penetrations of the enemy's tactical depth along four axes to neutralize the *feste platze* of Vitebsk, Orsha, Mogilev, and Bobruisk. Phase two called for the fronts to exploit the tactical breakthroughs by launching their mobile groups and achieving operational breakouts to unite their forces west of Minsk, deep into the German's rear area. In the third phase, the fronts were to pursue relentlessly the remnants of the defeated enemy as they retreated west toward the Vistula.[95] The First and Third Belorussian Fronts were to carry the burden of the deep breakouts throughout the whole operation and were augmented with additional armored and mechanized forces. Stalin signed the directive for Operation Bagration on 31 May 1944. Interestingly, the front commanders received their immediate and subsequent missions up to the depth of Lepel-Borisov-Slutsk line. The *Stavka* did not want to issue the orders for Minsk and Warsaw until they saw how the situation was unfolding.[96]

On 19 June, the planned day for the attack, the *Stavka* sent orders to the partisans to conduct operations in the German rear area. Belorussia was the site of the most vigorous partisan movement in the Soviet Union; they counted for more than 270,000 men and women organized in

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[93] Niepold, *Battle for White Russia*, 59.

[94] Macgregor, *Margin of Victory*, 86.

[95] Glantz and Orenstein, *Belorussia 1944: The Soviet General Staff Study*, 7.

[96] Ibid., 14; Niepold, *Battle for White Russia*, 262.

157 brigades and smaller detachments.[97] They played a significant role throughout the operation, planting around 10,000 demolition charges and destroying more than 11,000 railway cars and 34 armored trains. Consequently, they made the German resupply, retreat, and lateral troop movements almost impossible and forced Marshal Busch to commit 15 percent of his forces to combat partisans in a counter-guerrilla warfare.[98]

After a delay of three days due to logistical shortfalls, Operation Bagration commenced on 22 June with the four fronts conducting reconnaissance-in-force, probing the German's forward defenses, and achieving some tactical penetrations. The main attack took place on 23 June with the fronts attacking simultaneously to achieve tactical penetrations. By 28 June, which marked the end of phase one, the First Baltic Front had pushed its armies to the west and southwest, cutting Army Group North from Army Group Center, and isolating and encircling Vitebsk with the support of the right wing of the Third Belorussian Front. The latter's Tank Army and Cavalry/Mechanized Group, which formed the front's mobile group, had advanced aggressively to the Berezina River beyond the enemy's tactical formations while its left wing liquidated the Orsha grouping. Simultaneously, the Second Belorussian Front, in a secondary role, had liberated Mogilev and continued pressing toward the west. The First Belorussian Front had encircled and destroyed Bobruisk strong point and sent its mobile groups to the flanks and rear of the enemy's central grouping.[99] In six days, the Red Army had advanced a minimum of one hundred and twenty kilometers, and its high tempo prevented the Germans from adjusting and consolidating. Additionally, by 28 June, Busch had committed all his operational and tactical reserves, sometimes with contradictory orders.[100]

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[97] Zolga, *Bagration 1944*, 34.

[98] Ibid., 34; Glantz and House, *When Titans Clashed*, 267.

[99] Glantz and Orenstein, *Belorussia 1944: The Soviet General Staff Study*, 56-109.

[100] Niepold, *Battle for White Russia*, 78-94.

Despite reinforcing Army Group Center with formations from its neighboring northern and southern groups, the Germans were unable to establish a good defense along the Berezina River. On 28 June, the *Stavka* sent new orders to the four fronts. It called for the offensives on the Polotsk-S'ventsiany, Minsk, and Slutsk-Baranovichi axes to liberate Minsk and encircle the Germans on the eastern side of the city.[101] By 4 July, the mobile groups of the First and Third Belorussian Fronts had achieved the outer encirclement of Minsk, cutting the supply and communication lines to the north, west, and south and positioning their forces twenty kilometers west of the city.[102] Their rifle armies had the task of liquidating the Minsk pocket that contained the majority of the German Fourth Army with the remnants of the Third and Ninth Armies, numbering more than one hundred thousand enemy troops. By the end of the first and second phases, which lasted a total of twelve days, Army Group Center had lost more than twenty-eight divisions and three hundred thousand men.[103] The Red Army achieved a four hundred kilometers breach in the *Wehrmacht's* strategic front that the *Stavka* was going to exploit.

The orders for 4 July called for the fronts to pursue the remnants of the German units westwards. The offensive continued along the Vilnius, Grodno, Baranovichi-Brest, and Pinsk axes. By 13 July, the *OKH* had committed thirteen divisions to reinforce Army Group Center, most from Army Group North Ukraine.[104] Exploiting the vulnerability of the latter, the *Stavka* put the First Ukrainian Front into action on 13 July, initiating the L'vov-Sandomierz offensive. The left wing of the First Belorussian Front initiated the Lublin-Brest offensive on 18 July. By the end of the month, the Red Army had advanced five hundred kilometers, reaching Warsaw and the

[101] Glantz and Orenstein, *Belorussia 1944: The Soviet General Staff Study*, 111.

[102] Glantz and House, *When Titans Clashed*, 268.

[103] Ibid., 272.

[104] Glantz and Orenstein, *Belorussia 1944: The Soviet General Staff Study*, 176.

Vistula River. The following month, Soviet forces reorganized on the borders of East Prussia, ready to carry the new offensives towards Berlin by the beginning of January 1945.[105]

Operation Bagration not only brought about the destruction of the German Army Group Center, but also brought the Soviets far closer to Berlin than the Allies. It achieved the decisive results that both Stalin and the *Stavka* planned for. The tempo and depth of the operation were remarkable. In five weeks, the Red Army inflicted more casualties in the German ranks than the three-month-long Battle of Stalingrad; it was indeed the single worst defeat of the *Wehrmacht*. In the words of Dr. Kipp, Operation Bagration represents "the most outstanding example of Soviet operational art."[106]

Systemic Analysis of Operation Bagration

A pure mechanistic analysis of Operation Bagration may correlate the *Wehrmacht's* worst defeat to the Soviet's superiority in numbers, whether in troops, weapons, or equipment. However, a number of previous operations in which the Red Army, while enjoying similar superiority, failed to impose such a considerable defeat on the Germans. In late 1942, the *Stavka* failed miserably after launching a massive offensive, with more than 700,000 troops and 2,000 tanks, against the inferior German Army Group Center in the Rzhev salient.[107] Additionally, between December 1943 and March 1944, the Red Army conducted no less than eleven offensives against the same opponent they fought in Operation Bagration, but with very little progress.[108] Therefore, attributing the Soviet victory solely to numerical superiority ignores the ingenuity of the *Stavka* and simplifies a very complex series of events. The answer to the question of how the Red Army crushed the triumphant Wehrmacht of 1941 lies in the fact that the Soviets

[105] Macgregor, *Margin of Victory*, 96.

[106] Kipp, "The Tsarist and Soviet Operational Art," 81.

[107] Macgregor, *Margin of Victory*, 81.

[108] Glantz and House, *When Titans Clashed*, 240.

not only appreciated systems thinking in theorizing their operational art, but also reflected the core principles of chaos and complexity in inducing *udar* in the rival system.

The cornerstone for the planning and conduct of Operation Bagration was the Soviets' holistic view of their enemy and their appreciation of the interconnectedness that existed within its system. They viewed Army Group Center as a CAS, a system that could think and adapt. Accordingly, they related to the enemy from that perspective and oriented on its logic to understand how it functioned operationally. They exploited its ability to work as a system and disrupted its paradigm in both time and space. The Soviets wanted to influence the entire rival system, not just the tactical periphery.

To achieve the depth, in which the rival system's components interacted in time and space, the *Stavka* initiated a distorted perception within the Army Group Center's command system by executing the *maskirovka.* Through their deception plan, the Soviets imposed a cognitive blindness on Hitler and the *OKH*, reaffirming their cognitive biases and mental models. This increased the disparity between their perceived and that of the actual operational reality. By manipulating the feedback, in terms of intelligence, the Soviets caused their opposing system to make sub-optimal decisions by shifting the bulk of its armored forces to the south. These decisions not only reduced the Germans' flexibility, resilience, and adaptability, but also created a window of opportunity that the Soviets exploited in order to invalidate the relevance of their enemy's aim. Despite the urging requests from the frontline commanders for reinforcements in the first day of battle, Hitler took five days, as late as 28 June, to fully recognize that the real threat was against the Belorussian sector. By that time, the full tactical front that stretched from Vitebsk to Bobruisk had crippled, and the defeat was almost inevitable.

The Soviets' implicit recognition of complexity and operational consciousness compelled them to plan the deep thrust into the west without initially laying down the details for the front commanders. The *Stavka* appreciated the prevalence of uncertainty and the futility of long-term predictions. They avoided issuing detailed orders until they saw how the situation was unfolding.

The Soviet command was concerned with the ability of the rival system to adapt, a quality that required managing the system's feedback and adjusting the disposition of friendly forces accordingly. The *Stavka* only issued new directives, like the ones of 28 June and 4 July, when the fronts fulfilled their previously assigned missions. They planned in terms of conditions, not timetables and were successful in avoiding the *Wehrmacht's* mistakes by adapting to the enemy, not the plan.

The way the Soviet front commanders task-organized their forces reflected the principle of variety, which constitutes a requisite for complex systems to improve and sustain adaptability. The old paradigm called for the infantry to fulfill the role of the holding force and achieve the penetration on its own. However, in Operation Bagration, the Red Army provided 38 percent of its tank force to augment the holding echelon.[109] This proved greatly beneficial especially in Orsha and Bobruisk axes where army commanders deployed their tank formations whenever their infantry struggled in achieving a penetration.

By thinking of the enemy as a system, the Soviets understood its actors as relative to the whole—each actor within that system had a role and that no one agent acted alone. Therefore, acting on the enemy CAS as a whole, in this case Army Group Center, required either pushing its open subsystems, the four armies, into chaos or pulling them back into equilibrium by transforming them into closed systems. In the first phase of the operation, the Soviets used both approaches. In achieving the penetrations, the armies sent their armored and mechanized corps to cut the railroads that connected Vitebsk, Orsha, and Bobruisk to each other as well as those that connected them to the operational rear. Simultaneously, the fronts sent their mobile groups and exploited the use of partisans to cut the strategic railroads that connected Minsk with Vilnius and Baranovichi. By fragmenting the enemy's subsystems and isolating its tactical and operational fronts from their respective operational and strategic context, the Soviets prevented the opposing

[109] Niepold, *Battle for White Russia*, 263.

system's synergy from materializing and its aim from forming a coherent whole. Additionally, they prevented the feedback, in term of information, from flowing hierarchically. Therefore, the German system was not able to assess the results of its previous allocation of energy, a factor that made it easier to fall into chaos.

The ultimate objective of *udar* was to push the rival system into chaos where it was unable to act and react in a coherent method. It meant forcing the rival system toward more bifurcation points where it made more and more decisions on an ever-decreasing time scale. Bifurcating at the edge of chaos, coupled with the already scarce feedback-analysis timeframe, impeded the internal models of the German system from developing, and forced it to make fast and incorrect decisions. It also decreased its resiliency by preventing it from quickly adapting and self-organizing. The overwhelming Soviet attacks in the first six days of the operation, the isolation of the tactical front, and the German orders to hold the front at strong points pushed Marshal Busch to commit all of his reserves in piecemeal. It is worth mentioning the contradictory orders he sent to the 20th Panzer Division, the only tank division in the Army Group Center. In less than two days, he ordered the division to defend north of Bobruisk, then south of the city, and finally divided it into two forces, after which it ceased to exist.[110] This highlights the effect of operational shock in denying Busch the ability to control the system. Eventually, the Soviets not only manipulated time and space to their advantage, but also interrupted their enemy's decision cycle.

To facilitate the task of driving the rival system into chaos, the Soviets exploited the internal logic of the German system. The Germans had studied the previous attacks of the Red Army and updated their internal models accordingly. However, in Operation Bagration, the Soviets, by acting in unpredictable and novel ways, created conditions with which the Germans could not comply; they devoted more energy in reacting to the changing environment than in

[110] Niepold, *Battle for White Russia*, 93-94, 122.

fighting the Soviet CAS. As a German Nine Army report puts it, "He [the enemy] no longer attacked, as in the past… Behind these assault groups, undisclosed until needed, lay tank forces to follow on a breakthrough."[111]

Operation Bagration represents a LSCO where the application of systems thinking, in both planning and conduct, resulted in a systemic defeat of the German Army Group Center. By reflecting the principles of chaos and complexity theories, the Soviets operationally shocked the opposing system, disrupted its coherency, forced it into chaos, and made its destruction more attainable. For military planners and practitioners, the Soviets' systemic approach of 1944 offers insights on the nature and practice of operational art in contemporary LSCO.

Insights on Contemporary Operational Art

In October 2017, the US Army published its newest doctrinal manual, *FM 3-0*, *Operations*, which represents the Army's capstone in the execution of unified land operations. For seventeen years, the Army had focused on defeating insurgencies and terrorist organizations instead of defeating peer threats. The new tactics manual renewed the concept of combined-arms operations in large-scale ground combat against peer and near-peer adversaries such as Russia, China, Iran, and North Korea. The current OE is becoming more complex than ever before with great power competition and adversaries that are adapting and modernizing their capabilities to counter US advantage and superiority.[112] Accordingly, future wars will be intense, brutal, protracted in time, and attritional in casualties and resources; most likely different from the rapid US decisive military victories of Operation Desert Storm and Operation Iraqi Freedom. The shift back to the first grammar of war asserts that combined-arms ground forces will remain "the dominant asset within the military system's inventory to accomplish these [strategic-political]

[111] Niepold, *Battle for White Russia*, 65.

[112] US Army, *FM 3-0* (2017), ix.

objectives."[113] Operational reality indicates that uncertainty and complexity are more prevalent in the land domain, where people live, than in those of the sea, air, space, or cyber. In such a reality, achieving strategic objectives in the first grammar of war through an operational approach that is based on attritional or decisive operations may yield unfavorable results.

A recent study by RAND Corporation argues that the Chinese People's Liberation Army (PLA) characterizes future wars as a confrontation between rival operational systems. The PLA method for conducting modern warfare relies on "system destruction" as opposed to attrition or annihilation.[114] The theory of victory for the PLA lies in the operational disruption and paralysis of the rival systems, after which the enemy loses the ability and will to resist.[115] Interestingly, the Soviets applied the same theory seventy-four years ago in Operation Bagration. If systems thinking and operational perception are now dominating the approach of US peer adversaries in waging war, then western military planners and practitioners should consider the same logic. The Soviet approach to warfare in WWII can provide those planners with new insights on the nature and practice of operational art in future wars.

The current Western paradigm in war is still rooted in the illusion that decisive battles can achieve quick results. Today, adversaries are more difficult to defeat than expected, and if decisive victories are to take place, they will be the exception and not the norm. Additionally, the technology and superior firepower that won the battles of the twentieth century may prove insufficient in future LSCO. Therefore, military planners should start by questioning the validity of the existing paradigm. Unfortunately, history proves that this process usually takes place after a catastrophic defeat.

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[113] Echevarria distinguishes between two grammars of war. The fist grammar relates overthrowing the opponent by armed force in conventional warfare, while the second deals with irregular warfare. See Echevarria, "American Operational Art," 137; Naveh, *In Pursuit of Military Excellence*, 324.

[114] Jeffrey Engstrom, *Systems Confrontation and System Destruction Warfare: How the Chinese People's Liberation Army Seeks to Wage Modern Warfare* (Santa Monica, CA: RAND Corporation, 2018), 119.

[115] Ibid., x.

The Soviets did not fall into this trap in 1944-45. Through extensive analysis of past experiences, they were able to forecast that a new paradigm had to replace the old one. Planners should keep in mind that, as the *Wehrmacht* paradigm proved, tactical excellence does not replace the lack of operational cognition; on the contrary, it creates operational vulnerability and predictability. The blind faith and obsession in technology give a perception that war is no more than a technical and linear problem, the more superior technology an army possesses, the easier it gets. Uncertainty and complexity lay beyond technological superiority. While technology enables tactical excellence that helps in winning battles, it does not necessarily guarantee winning wars. Planners should step away from technological and capability biases and appreciate the importance of systems thinking and operational perception. They should base their plans on a coherent operational theory that approaches the enemy holistically and aims at shocking and disrupting its system, thus providing a rational framework for tactical action.

Deception and surprise become critical elements in any plan that aims at inducing paralysis and shock in the rival system. The importance of those two interrelated principles lies in their cognitive effects, rather than purely physical ones. The influence on the enemy's mind disorients his perception of reality and makes it difficult to either act or react to the unfolding situation. However, for this to work, planners should understand the enemy's internal mental models, which define how he sees the world and thus perceives reality. Without such an understanding, a surprise that aims at creating a window of opportunity in the rival system, might, on the contrary, create an operational vulnerability in the friendly one. It is only through creating and exploiting the mental gap between the enemy's perceived and actual realities that surprise can amplify the effects of operational shock.

Since war is a competition between two contending operational and open CAS that are constantly adapting to improve their fit to the environment, an adaptive operational approach becomes necessary to achieve efficiency and relevance. Planners should seek to improve the operational and tactical adaptation of the friendly system while striking the enemy's ability to

adapt to change. Forcing the rival system to bifurcate at the edge of chaos, in a very short time scale, ensures that the enemy lacks situational awareness, understanding, and the time to reflect-in-action and reframe the problem. Complexity and the enemy's ability to adapt pose a challenge to military practitioners on how to define and plan objectives and end states. They must accept the fact that end states are not static, they might change as the friendly and rival systems are coevolving. Additionally, they should not think of intermediate operational objectives as an incremental progress that will lead to achieving the end state. Instead, they should plan those objectives with the intent of enhancing the freedom of action of friendly forces and building depth while denying it to the enemy. Moreover, military practitioners should devise their approaches, as the Soviets did in Operation Bagration, according to conditions and not timetables. They should also ensure that their forces are continually adapting to the enemy and not the plan, since the latter will prove of limited use as friction and complexity inherently dominate.

The principle of adaptation sheds lights on the importance of Mission Command in contemporary LSCO. One of the reasons that helped in the defeat of Army Group Center in Operation Bagration was Hitler's insistence on holding the front to the last man. From a systems perspective, such centralization facilitated the fragmentation of the system, prevented the synergy among its agents, and pushed it into chaos. Had the German commanders maintained the initiative, they would have probably traded time for space, kept their system open, and denied the Soviets' ability to manipulate feedback. The fact that peer and near-peer adversaries will rely heavily on anti-access and area denial (A2/AD) systems emphasizes the importance of Mission Command in future conflicts. Complexity, with its unforeseeable and unintended effects, calls for communicating clear intent but not detailed control. In addition to empowering their subordinates to take tactical initiative, operational commanders should devise creative ways to achieve the overall aim. In other words, they should exploit their cognitive tension.

The final insight on contemporary operational art is novelty in action, which relates to deception, surprise, and creativity. The latest US National Defense Strategy states that planners

should create unpredictability for adversary decision-makers in planning for future operations.[116] In other words, they should come up with novel and creative approaches that the enemy will not expect. Strictly following doctrine and applying past successful approaches unadapted to the current situation may set planners up for failure. Opposing systems will adapt their logic and internal models not only on previous US military experiences but also on the publicly available US doctrinal manuals. Facing such a challenge, planners should question the prevailing paradigm to allow novel ideas to emerge. Novelty does not necessarily mean creating completely different ways of doing things. It represents what is unexpected to the enemy and can include cognitive and physical means. Planners bring novel actions to life when they approach their enemy holistically. Systems thinking enables them to appreciate the interconnectedness within the rival system, orient on its logic, and devise novel approaches that can induce shock and paralysis within its system.

Shifting the focus to LSCO requires a new approach to how militaries understand and practice operational art. The Red Army's planning and conduct of operation Bagration provide significant insights on how planners can better prepare for, plan, and execute future operations. US peer adversaries have already acknowledged that winning wars does not necessarily require annihilating the enemy's operational forces. To win is to shock and paralyze the rival system, to deprive it of its purpose, and neutralize its will to fight. It requires military planners to devise novel approaches that can exploit the enemy's mental gaps, prevent its system from adapting, achieve cognitive surprise, all while empowering subordinate commanders.

Conclusion

Almost a century ago, the Soviets were the first to define and codify the term "operational art" in their doctrine. Through extensive discussions and debates, and with a unique cognitive ability of foresight and anticipation, they initiated an intellectual revolution of how to

[116] James N. Mattis, *Summary of the 2018 National Defense Strategy (NDS) of the United States of America* (Washington, DC: Government Printing Office, 2018), 4.

conduct future wars. Armed with both systemic perception and operational cognition, Soviet military theorists appreciated the importance of depth in both the cognitive and physical aspects. In addition to depth being the physical space where the enemy concentrated his reserves, its conceptual realm held the tension between strategy and tactics. For the Soviets, the aim of the campaign shifted from annihilating the enemy by destroying his forces piecemeal, to exploiting the cognitive tension through system shock.

Soviet military theorists did not only theorize the nature of operational art, but they also put it into practice. Operation Bagration, which started on 22 June 1944, is an excellent example of how the Red Army, through its implicit recognition of systems thinking, was able to destroy Germany's Army Group Center. By applying the principles of cognitive deception and surprise, synergy, fragmentation, simultaneity, and momentum, the Soviets were successful in shocking their rival's system and exploiting the operational and cognitive tensions that held it together. As a result, Field Marshal Ernst Busch, the commander of Army Group Center, as well as *OKH*, were unable to reflect on the actual reality of how the operations were unfolding, bringing about the destruction of their army.

System shock has its roots in systems thinking, particularly in chaos and complexity theories. Systems thinking provides the foundations by shifting the focus from seeing only parts to seeing the whole and appreciating the interrelationships and interconnections that exist within. It also elucidates that living systems are open systems, which are always exchanging energy with their surroundings. Building on systems theory, chaos theory introduces the concepts of bifurcation and the edge of chaos. It illustrates how bifurcations increase the more the system moves away from equilibrium and closer to the edge of chaos. Complexity theory introduces complex adaptive systems that thrive away from equilibrium. CAS can learn, adapt, and self-reorganize by interpreting feedback loops. Accordingly, system shock is pushing the rival system into chaos by forcing it to bifurcate continuously on a decreasing time scale, manipulating its feedback loops, and preventing its internal models from updating coherently.

Today, contemporary operational art is still very much rooted in checklists and primarily seeks decisive battles. Through MDMP, military planners seek refuge for certainty by breaking down the rival system into smaller parts for the ease of process. While such reductionist thinking worked well in previous conflicts, it may prove disastrous in the anticipated LSCO. The nature of future conflicts compels military planners to understand the complexity and nonlinearity of war. By appreciating systems thinking, operational artists can better understand their enemy's logic – how it functions operationally, and how it perceives reality. Good operational art will be inherently the one that can exploit the rival system logic by inducing system shock and paralysis, not the one that aims at annihilation or decisive battles.

Operational artists should always question their paradigms. Beliefs and biases should be "hypotheses to be tested, not treasures to be guarded."[117] Complexity informs planners that yesterday's approaches are not necessarily today's methods for victory. They need to appreciate systems thinking in addition to technology and high-end capabilities. Through the lens of systems thinking, they can understand that war is a duel between two complex adaptive systems that seek to evolve and adapt. Accordingly, planners should devise novel approaches that can increase their adaptability while denying it to the enemy. Such novelty in action requires empowering subordinate leaders to be creative and, when necessary, take the initiative to maintain the synergy among the system. It also requires understanding the mental models of their enemies and creating a plan that, through cognitive deception and surprise, can exploit the vulnerability of those models.

If operational artists design their approaches through a unifying systemic theory to achieve operational and cognitive shock and paralysis, then translating abstract, nonlinear strategy into mechanical, linear tactics becomes more likely. An approach that fails to achieve

[117] Philip E. Tetlock and Dan Gardner, *Superforecasting: The Art and Science of Prediction* (New York, NY: Crown, 2015), 127.

system shock will likely lead to mutual attrition. Against contemporary adversaries, such an approach may ultimately result in strategic failure.

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