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We Need to Rethink Reality: The War Nexus and Complexity

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Abstract: Concepts such as complex adaptative systems, networking and chaos have been around over much of the twentieth century in many fields and disciplines. Yet, complexity thinking is mostly overlooked in the education of future military leaders. Consistent with the traditional Newtonian reductionist approach, the world is still presented in a linear and causal fashion with ready-made problem-solving methodologies. In this paper, we challenge this linearity and argue that to address complex challenges in a complex world, we should shift to complexity thinking as the principal cognitive imprint. With the multidimensional reorganization of global society, the metaphorical boundaries circumscribing military interventions, the battle-space, become porous and difficult, if not impossible to isolate. Today's battle-space expands into a complex environment encompassing all societal domains to create the war nexus. Yet we still think of the battle-space as a closed system. To understand this evolving paradigm, leaders at all levels need to process reality in terms of complexity while retaining their operational focus. In time, this shift will provide the institutional capacity to understand, analyze, plan, and act in the current multidimensional war nexus.

Keywords: Complexity War; Military Education; Battle-space; Systems Theory; Total War; Whole of Government; War Continuum.

Introduction

"To accept that the world is complex rather than predictable and controllable is to change our approach to everything: our approach to change, to management, to policy development, to evaluation, to leadership—and to living."[1]

Over the last four hundred years, the realm of the soldier, the battlefield, has expanded dramatically. From the fields of Agincourt to the battle-spaces of Afghanistan and Iraq, the representation of war has grown from a relatively simple, well-defined place to a complex, multilayered environment. Yet, our doctrines retain, for the most part, war as an autonomous domain, a closed system — the clausewitzian extension of politics bringing closure to a dilemma by its decisiveness.[2] This representation, however, is increasingly met with contradictions: the capacity to bring decisive closure through victory on the battlefield, or battle-space, has eroded gradually. Winning wars in the twenty-first century is a soft notion defined by its multiplicity and evasiveness.

As military might is increasingly a tool in the arsenal rather than the last resort, waging war encapsulates a complex and multidimensional environment. It involves many interdependent domains, or systems, creating the conditions of success for a national security strategy. This is not "total war," as the mobilization of national resources to support the war effort, but rather the coordination of a complex set of assets—political,

economy, information, to name a few—in a complex environment. This shift is first and foremost ontological: from a closed battle-space where victory can be achieved, we shift our representation of war and conflict to a complex environment, multilayered and multidimensional, in which victory is not defined by armistice but by relative positioning of the actors involved. Although this complexity is upon us, our policies, doctrines, education, and training systems remain strongly anchored in a classical, closed system, battle environment. How can we acknowledge the paradigmatic change of complexity? In this article, we argue that to act within the complex security environment, we must first learn to think and see the world as a complex environment and engage a complete paradigmatic intellectual shift at all levels.

Anchored in a Newtonian approach to knowledge, our ontological understanding of our world and its challenges is driven by our epistemological foundations. From childhood education, we learn to find solutions in a world that is given to us. In the military context in particular, critical thinking and reflexivity are recent additions and remain peripheral. For the most part, we are taught not to challenge the framework—the box—and to find solutions to problems by reducing the issue to components that we can then repair. This competence-based approach to education and training reduces knowledge to performance objectives, providing for highly skilled individuals and groups. Most, if not all, western defense and military organizations perpetuate this modernist approach to knowledge, and young soldiers, non-commissioned officers (NCOs), and officers learn to view, analyze, plan, and act within a generic environment—their battle-space—which they transpose and adapt to their specific environment of operation.

In a recent guidance document, the U.S. Joint Chief of Staff states that "we must shift our professional military education (PME) curricula from a predominately topic-based model to outcomes-based approach [that] emphasize[s] ingenuity, intellectual application, and military professionalism in the art and science of warfighting." Coherent with mission command,[3] this shift is directed toward mid-career level officers at the joint level,[4] and sometimes NCOs, depending on their national training system, engaging implicitly, and sometimes explicitly, with complexity thinking at the operational art level. In short order, these students of complexity are required to completely reverse their onto-epistemological lenses and view, analyze, plan, and act in terms of "uncertainty," "feedback loops," and "emergence." The leap is considerable. Moreover, the structure to which they are returning mostly operates within the traditional assumptions of methodological reductionism, inside a pre-set box.

This paper argues for a profound intellectual shift embracing complexity thinking as the onto-epistemological framework for the defense establishment and the security environment. But how can we challenge four hundred years of Newtonian reductionism[5] and engage the most dramatic reversal in cognitive approaches to planning and problem solving? From Newton to Einstein, we are trying to bridge classical and quantum physics, combining the small and the big, the complicated and the complex.[6] It is a dramatic

undertaking for which many thinkers have dedicated their lives. Command and staff colleges are the usual breeding grounds for "Design Thinking," the complexity version of the Operational Planning Process. But without a deeper systemic change and the creation of a continuum in the battle-space conceptualized without regards of size or origin, we will keep on fighting the last war. There is no box, except the one we create.

Mirroring Concepts: War and Warfare in the Twenty-first Century

Before we move on, let's take a moment to consider the ontological shift proposed. The concept of war has existed since the dawn of time and the idea tends to be the timeless representation of an organized violent struggle between political units using military means. Yet a contingent analysis of the phenomena demonstrates variations and changes throughout history. The passage from western pre-modern to modern times, characterized by the state system, rational thinking, and individualism, was accompanied by the creation of an international legal framework. This legal apparatus established the norms of state-on-state affairs and created the separation between the domestic and international realm. Sovereignty over territory, and legitimacy in acting in the international realm, became the standard. The control of violence regulated either through policing at home or military at the borders and the western rules of violence dominated the judicial world: only states declared, won, or lost wars. In this contingent form, war represented controlled violence between legally recognized opponents, and any divergence from this created a new vocabulary: insurrection, revolution, war on terror, etc. Definitionally, we saw warfare as the enactment of national militaries to wage violence to support national strategies and gain decisive victory where diplomacy failed.[7]

Characterizing the dominant organizational logic of the political world during the last few hundred years, this arrangement began faltering during the twentieth century. Since World War II, conflicts and wars are rarely, if ever, declared, and victory became a fleeting concept. These conflicts challenged the fundamental concepts regulating the international system.[8] Territorial integrity was violated regularly, and the legitimacy of violent action included preventive strikes.[9] At the domestic level, in the name of national security, the war on terror initiated internationally a wave of policies infringing basic democratic rules such as privacy and, more importantly, habeas corpus. In many democratic countries, the legislative branch has been circumvented giving the executive branches carte blanche to wage war. What does it mean to be at war in the twenty-first century? How do we define its conceptual boundaries? Does war as a concept lose its strength and usefulness?

If we mirror the concept of war to its alter ego, warfare, we see that they are not aligned. Representing the enactment of war, the study of warfare gives us an insight on the contingent definition of war. From the perspective of the conduct of war, military thinkers, intellectuals, and strategists sensed the change induced by the impact of exponential development in technology and the multiplicity and variations in the threat. Doctrinally, battle-space dominance and victory as the tangible end in the form of a tactical, operational,

or strategic accomplishment remains the principal assumption. To this end, organizational doctrines such as network-centric warfare and methodological approaches such as the operational planning process are the primary tools in the toolbox.

Epistemologically and methodologically, the widening and deepening of the battle-space led to serious research in novel approaches such as "Design Thinking," or its synonyms, "Military Design" and "Systemic Operational Design," "…an attempt to rationalize complexity through systemic logic employing a holistic approach that translates strategic direction and policy into operational level designs."[10] Forward looking as it integrates "…signs indicative of complex behavior, it divides warfare into two epistemological distinctions: reductionism at the tactical level and complexity at the level of operational art.[11] But the box itself remains unchanged: warfare is conducted within the battle-space with military means; victory, by design, is the end-state sought.

In the twenty-first century, war's traditional modernist conceptual boundaries—the state, sovereignty, legitimacy, and territory—are challenged. New political and non-political units act transnationally and virtually, using new approaches to political violence, transcending borders, and defying traditional political legitimacy. Hence, war in the twenty-first century happens beyond the battlefield creating a complex environment encompassing all societal domains: the war nexus.[12] In contrast, warfare, although embracing the idea of "environment in becoming," remains within the closed boundaries of the battle-space.[13] With the expansion of war as an environment encompassing many interacting systems, of which the battle-space is but one, we need to ontologically represent conflict as a complex system at all levels. Hence the operational level of war is not a boundary between the tactical and the strategic, but a system within systems, in an environment. As such, complexity thinking is not a hinge between levels but a norm that views war as a nexus.

The Fear of Fighting the Last War

"It has been said critically that there is a tendency in many armies to spend the peace time studying how to fight the last war."[14]

This section discusses the intellectual shift between Newtonian recurrence and Einsteinian relativity from an ontological point of view, considering their impact on our intellectual representation of war. Western society's intellectual mapping from the primary school onwards is built on the mechanistic cartesian scientific method of problem-solving. The extension of the scientific method in the eighteenth and nineteenth centuries to social science created an intellectual imprint on our approach to predict the future, making the search for laws through recurrences an integral part of the mechanistic scientific method. To understand a phenomenon, the scientist, natural or social, creates a hypothesis that (s) he tests in a controlled environment. Based on the recurrence of the results, laws explaining the functioning of our world emerge. When applied to social phenomena, e.g., elections, mobilization, or war, to name a few, we create a permanent image of a complicated system

that we can understand by reducing it into its component parts. Once in the world of recurrences and laws, change becomes a friction, rather than the norm.

On the other side of this spectrum, relativity, complexity, and chaos engage with non-linearity and uncertainty. This means that although laws might work at the mechanistic level and/or in controlled environments, there is a level at which the amount of interacting actors/systems and external contradictions render any form of prediction impossible. In this realm, change is the norm, and as we attempt to understand the environment, its systems, and their interactions, our capacity to foresee the outcome, or emergence, remains limited to trends and possibilities. Few are educated to seeing and dealing life in general from a complexity perspective, instability, and unpredictability. For many, change is an exception and returning to equilibrium is sought.[15] In contrast, for complexity thinking "equilibrium is another word for death."[16] Observing systems and emergence leads us to an uncertain future, one we do not control.

Complex and complicated systems exist side by side in our intellectual arrangement of the world and we all engage with both, consciously and unconsciously, daily. Because of our education, formal and informal, complexity is rarely, if ever, a conscious part of our intellectual process. As a result, although we recognize the complexity of a problem through metaphors, our reflex is to deconstruct and treat the broken part.

Are these approaches incommensurable? The scientific world is still exploring this question, some excluding both domains while others are attempting to bridge quantum and classical physics.[17] Both approaches provide answers within their respective realms and the question is not one of either/or, but rather of striking the proper balance. This balance, however, is not struck through a clear demarcation line between "levels" within a "hierarchical" structure, as between the tactical and the operational portions of war. Rather, these approaches are often overlapping, even fused.

For the soldier and sailor to operate efficiently, the battle-space is reduced to manageable dimensions of objectives and resources.[18] Using standard operating procedures (SOPs) at the lower levels, the battle-space is deconstructed vertically to create imbrication and coherence in action. At the higher end, policy and doctrine encapsulates this integration, seeking the harmonious action of all parts involved. In the United States' capstone publication for all joint operations, we can read:

"Unified action synchronizes, coordinates, and/or integrates joint, single-service, and multinational operations with the operations of other United States government (USG) departments and agencies, Nongovernmental organizations (NGOs), Intergovernmental organizations (IGOs) (e.g., the United Nations (UN)), and the private sector to achieve unity of effort. Unity of command within the military instrument of national power supports the national strategic direction through close coordination with the other instruments of national power."[19]

Within this reductionist paradigm, the battle-space continuum extends through a series of overlapping levels. Problem solving is a question of identifying and dealing with a dependent variable upon which an action is required. In this process, independent variables become risk factors and uncertainty mitigated by various human and technological tools leading to planning for contingencies.

In contrast, complex systems exemplified by insect colonies, the immune system, economy, or the world wide web, seem to operate with a different set of tenets,[20] which Mitchell summarizes with the following definition: "A system in which large networks of components with no central control and simple rules of operation give rise to complex collective behavior, sophisticated information processing and adaptation via learning or evolution."[21] These parameters for complexity, characteristics, and definition are not, inherently, in contradiction with the unified and synchronized action sought by the SOPs and doctrinal integration presented above. In fact, rules, structures, and processes are part and parcel of any complex system as they define their autonomy and differentiate them from other complex systems. Whether it is an ant colony or a military organization, rules and guidelines direct the conduct of the component parts. It is the number of components and the external influence—other systems and the environment—that create non-linearity and uncertainty. Survival or obsolescence is dependent on the system's capacity to adapt to a changing environment.

Ontologically, the battle environment is not controlled, and objectives are not "dependent" variables, but rather elements subject to unpredictability and non-linearity. The reality of the battle environment at any level is closer to a complex system than a laboratory subject to analytical reduction. Special operations units, cyber cells, drone operators all operate at the strategic level in this complex environment. Even a small tactical unit on a mission is placed in a complex environment with multiple systems potentially interfering with its progression. In contrast, a large formation may find itself in a complicated rather than a complex situation, operating in relatively well-controlled environment with few interacting systems. And it is possible that the small tactical unit mentioned is part of this latter large formation.

The segmentation of the battle environment into tactical, operational, strategic, and political (or grand strategy) levels require reflexive analysis in a historical context as they represent a spatial and structural breakdown of the battle-space, conditioning the system's structure and processes. From a systemic perspective, these levels represent a complex continuum of operations regardless of size and positionality. Moreover, as argued earlier in the text, with the expansion of the concept of war embracing multiple domains to create a complex battle environment, the battle-space as closed system is de facto opened to interact with others. This creates a true complex continuum within which, regardless of size, all levels and domains are bound to interact. The creation of the systemic continuum that embraces change, with non-linearity and emergence as the norm, begins with the intergenerational capacity to think in those terms. Only then will we prepare for the next crisis.

Creating the Capacity for Complexity Thinking

The expansion of the battle-space beyond the sole realm of the military does not question the current doctrinal foundations such as systemic disruption[22], nor does it insert itself in the debates such as maneuver versus attrition. It reinforces the non-linear nature of war as understood by Clausewitz[23] and Boyd's disruption of the decision cycle (OODA loop)[24] as they have expanded our understanding of the concepts of war and warfare. Rather, it opens the dialogue concerning the battle-space becoming increasingly permeable to other systems at all levels of command. From chaoplexity[25] emerges an environment expanding from the military/defense system to include functional systems of the state that traditionally have been stove piped.

The amalgamation of reductionism and complexity thinking can lead to the synchronization of a battle-space. This space exists within a battle environment and requires a synergic knowledge system engaging both the end state and the emergent. The necessity for this synergistic integration is not bound by tactical, operational, or strategic/political levels but is rather overlapping and fused. Hence, the introduction of complexity as an ontology at the very early stages of education is not only advantageous, but part and parcel of understanding the battle environment. Exposing young leaders to both reductionist and complexity thinking induces the intellectual flexibility, discernment, and ontological flexibility[26] necessary to face their immediate challenges and build their collective capacity to transform and adapt.

To create a transgenerational capacity in complexity thinking, introducing complexity early in the educational is necessary. Complexity, before it becomes an applicable epistemology and method, is a metaphor, or metaphors, encapsulated in several concepts such as emergence, non-linearity, feedback, etc. Learning the vocabulary and connecting the concepts to visualize complexity in their daily lives is the initial step to creating a shift. Students are extremely open to these concepts as they can apply and see them in action almost immediately in their close surrounding. For example, for officer-cadets and naval-cadets, transforming the exercise of conceptualizing a hierarchical military academy into a complex system within an environment opens their mind to possibilities of such intellectual opening.[27] In order to build the institutional capacity to think in terms of complexity, its inception is required at the source and integrated throughout a career. This inevitably requires time, patience, and determination.

The Challenges of Change

The implementation of this type of foundational change requires we address epistemology, or the way of knowing.[28] As part of building its capacity, military training typically follows a reductionist approach to programming education. Every trade and specialty required to create a capability are deconstructed into performance objectives at the individual and collective level. These performance objectives add up to create "qualified" individuals capable of working within a structure, itself "qualified" to accomplish several

specific missions. The military training system is highly effective, integrating technical and tactical changes through experimentation and lessons learned via feedback loops. Moreover, sophisticated militaries actively engage in strategic visioning, an exercise providing educated options for the future battle-space.

In contrast, systems thinking cannot be reduced to a set of knowledge nuggets added to the whole. To the contrary, its pedagogy must be treated as a holistic, systemic undertaking. Intellectual and cognitive silos must be broken down to create the truly common vision of a complex world with a complex security environment. Although seemingly incommensurable, the challenge of building this new knowledge system does not reside within the intellectual capacity to integrate these approaches, but rather with the systemic capacity to undertake this change. In other words, we do not suggest that the training system is obsolete or inefficient, quite the contrary. Instead, we argue that educating in complexity should be conceptualized as the other side of the same coin.

Shifting culture in the defense environment, as in any institutions, is a challenge. Overcoming resistance to change will require vision, strong leadership, good planning, and patience. More importantly, the main hurdle facing this ontological shift resides in the system's capacity to educate the younger generation. As our western education system perpetuates the reductionist view, institutions find themselves in a knowledge gap. It is a chicken-and-egg conundrum: as we do not have an organized knowledge base to educate, we cannot initiate the next generation of thinkers to carry forward. The challenge is to find ways to circumvent this knowledge gap. It begins with relationships and networking.

Within any social system, relationships play a dominant role in the bridging of formal structure/process arrangements and informal cross and transdisciplinary arrangements. Relationships and the creation of networks is essential for creating the baseline for change. To initiate and implement complexity thinking as the ontological baseline, networking of like-minded leaders and thinkers at the national and transnational level is essential to create the necessary momentum. The mobilization of knowledge-hubs from neighboring sectors versed in this transformational approach, such as business management, environmental projects, and others, can expand the knowledge base in education, implementation, and planning. These formal and informal nodes of communications can become the initial intellectual laboratories and breeding grounds for new ideas, possibly creating the condition of emergence to temporary arrangements such as working groups and research networks. Across the defense systems and beyond, national and transnational, there are several individuals and intellectual centers working semi-independently on the topic of complexity. Harnessing these potentials, creating the synergy, and initiating a momentum seems to be the approach to crystallize the idea of change toward complexity thinking.

Emergence

In an earlier debate, a general and an academic debated whether we "should teach junior members what the 'box' is before we teach them at mid-career level to think outside of it or reshape it?"[29] This question entraps the question into an either/or, or yes/no. Once we adopt complexity thinking as the foundational element, the ontological trap of the "box" disappears. It is the creation of the box that traps the mind into thinking within that framework, and it follows that we adjust our epistemological stance and methodological approaches to deal with the box. Complexity thinking eliminates the said box and engages with creativity and design from the get-go. Change has been upon us, within the defense establishments and beyond, encompassing all domains in the security environment. There is no "independent action" or hierarchy in conflict. Our minds need adjust to this already existing ontology. Creating the battle environment continuum continuously re-emerging frees us to think about the ways to acquire knowledge and engage with the proper set of tools.

Structure and process work inherently together, and the hallmark of any defense environment is to have a strong and sturdy arrangement. In the context of change, experience demonstrates that inertia and resistance is strong unless it is backed by the people enacting it every day. Hence, introducing structural and procedural change begins by educating people and building the intellectual capacity to incorporate, think, analyze, and create change. This process of education is inherently complex and unpredictable. Hence, doctrinal solutions cannot be forced fed, but rather harnessed through the incremental integration of knowledge.

Accepting change as the endless journey of emergences is a colossal undertaking. It challenges the very core of our collective and individual beliefs about reality and the ways to know. Systems thinking creates the intellectual space where change is the norm and status quo is non-existent. Shifting our gaze to include non-linearity and emergence, we conceptualize the contemporary battle environment made of multiple interacting systems, of which the military is but one. Understanding, analyzing, planning, and acting within this complex environment requires an open-minded generation of leaders capable of integrating complexity as the norm.

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Endnotes

1. Jean G. Boulton, Peter M. Allen, and Cliff Bowman, *Embracing Complexity: Strategic Perspectives for an Age of Turbulence*, 1st ed. (Oxford: Oxford University Press, 2015), 123.

2. "War is socially sanctioned violence to achieve a political purpose. War can result from the failure of states to resolve their disputes by diplomatic means." U.S. Joint Chiefs of Staff, "Joint Publication 1, Doctrine for the Armed Forces of the United States", 2017, ix.

3. Mission command is the conduct of military operations through decentralized execution based upon mission-type orders.

4. "Joint operations are military actions conducted by joint forces and those service forces employed in specified command relationships with each other, which of themselves do not establish joint forces. A joint force is one composed of significant elements, assigned or attached, of two or more Military Departments operating under a single joint force commander,..." U.S. Joint Chiefs of Staff, "Joint Operations (3-0)", 2018, p. ix.

5. Newtonian reductionism relates to the mechanistic knowledge of the whole by understanding its parts.

6. A system is deemed "complicated" when, regardless of the number of components and sophistication of tasks, it can be analyzed by reduction or analysis of the component parts (e.g., an engine). In contrast, a complex system cannot be reduced to the sum of its parts (e.g., mayonnaise – one cannot deconstruct mayonnaise to its component parts). Hence the dictum, "the whole is more than the sum of its parts."

7. This is a clausewitzian view of war. There are variations on the theme (e.g., Charles Tilly, Max Weber, etc.), they all reach back to the anarchical nature of the international system or the absence of a supranational authority to regulate violence.

8. For more on change at the international level and the concept of "Grotian Moment," see Michael P. Scharf, "How the War against ISIS Changed International Law," *Case Western Reserve Journal of International Law* 48, no. 1–2 (2016): 15–67.

9. Preventive war is an attack launched to defeat a potential opponent and is an act of aggression violating international law. Not to confuse with preemptive war. See Matthew J. Flynn, *First Strike: Preemptive War in Modern History* (New York: Routledge, 2008).

10. Paul Blakesley et al., "Systemic Operational Design: An Introduction" (Fort Leavenworth, Kansas, School of Advanced Military Studies, 2005).

11. War nexus means the coordinated and uncoordinated meeting of different domains (military, economy, diplomacy, information etc.). All these domains, or systems, operate within the complex war environment. Hence, nonlinearity, unpredictability and feedback loops create "becoming", or emergence, rather than decisive finality.

12. Manabrata Guha, *Reimagining War in the Twenty-first Century: From Clausewitz to Network-Centric Warfare*, 1st edition (Abingdon: Routledge, 2010), 6.

13. J. L. Schley, "Some Notes on the World War," *The Military Engineer* 21, no. 115 (1929): 55–68.

14. The current pandemic is a significant example. Largely viewed as an exception, the return to "normal" is part of the common discourse, https://www.voanews.com/covid-19-pandemic/many-americans-anxious-about-returning-normal-after-pandemic. Yet, there are conversations about a path forward, https://www.weforum.org/agenda/2020/04/covid-19-three-horizons-framework/.

15. Paul Cilliers, *Complexity and Postmodernism: Understanding Complex Systems*, 1st ed. (London; New York: Routledge, 1998), 4.

16. Brian Greene, *The Elegant Universe: Superstrings, Hidden Dimensions, and the Quest for the Ultimate Theory*, 2nd ed. (New York, London: W. W. Norton & Company, 2010), 117-131.

17. From the tactical level battle procedure to the operational planning process, the objective is to eliminate uncertainty and risk while maneuvering resources to achieve the end-state. Lack of absolute knowledge creating the residual uncertainty at the onset of an operation is integrated as the Commander's flair or intuition (committing the reserves in battle is one known moment).

18. US Joint Chiefs of Staff (JP-1) op. cit., II-8.

19. Regardless of size, complex systems have the following main characteristics: 1:They consist of a large number of interacting elements rendering the understanding of the system difficult; 2: Interactions are non-linear in that the outcome of the interaction is unpredictable; 3: Interactions lead to feedback loops acting on the system; 4: Complex systems are open as they interact with their environment (hence the importance to define the environment); 5: Complex systems operate far from equilibrium, i.e. change in the modus operandum; 6: The historical context of the complex systems is determinant for understanding the current status.

20. Melanie Mitchell, *Complexity: A Guided Tour*, 1st ed. (Oxford University Press, 2009), 13.

21. Marinus Era Novum, "Marine Corps Maneuver Warfare: The Historical Context," *Marine Corps Gazette*, 2020, September edition.

22. Alan Beyerchen, "Clausewitz, Nonlinearity, and the Unpredictability of War," *International Security* 17, no. 3 (1992): 59-90, https://doi.org/10.2307/2539130.

23. Col John Boyd (1927-1997), pilot in the United States Air Force and strategist, generally known for the "Boyd Cycle" or OODA (Orient-Observe-Decide-Act) loop and the idea that the essence of victory lies in the capacity to enter the opponent's decision cycle. For more, see Frans P. B. Osinga, *Science, Strategy and War: The Strategic Theory of John Boyd*, 1st ed. (Cheltenham: Routledge, 2006).

24. Antoine Bousquet, *The Scientific Way of Warfare: Order and Chaos on the Battlefields of Modernity*, Critical War Studies ; v. 1 (New York: Columbia University Press, 2009). "Chaoplexity refers to the amalgamation of chaos and complexity."

25. Michael C. Jackson, *Critical Systems Thinking and the Management of Complexity*, 1st ed. (Hoboken, NJ: Wiley, 2019).

26. The author integrates complexity to its undergraduate course curricula. It proves highly effective.

27. M. G. Piety, *Ways of Knowing: Kierkegaard's Pluralist Epistemology* (Waco, Texas: Baylor University Press, 2010).

28. Simon Bernard, Ben Zweibelson, and Aaron P. Jackson, "Teachers, Leave Them Kids Alone: Debating Two Approaches for Design Education in Military Organizations," *The Blue Knight* (January 2018), https://www.cmrsj-rmcsj.forces.gc.ca/cb-bk/esse/2018/e2/e2-eng.asp?idpage=6.

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REFERENCES: JPWS uses *The Chicago Manual of Style's* notes and bibliography system with endnotes. For further information on references, please consult The Chicago Manual of Style, 17th edition.

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For multiple notes referencing the same work, please use the following shortened note form after the first reference.
Feldman, *Germany's Foreign Policy of Reconciliation,* 73-78.
Roehrig, "Stability or Instability?," 131.

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