The Underdog Problem

A working hypothesis

by The Staff, Marine Corps Warfighting Laboratory

"In strategy prophecy may only be charlatanism, and even a genius is incapable of seeing how a war will unfold. But he must put together a perspective in which he will evaluate the phenomena of war. A military leader needs a working hypothesis." **[1]**

—Aleksandr R. Svechin
Strategy

How we train is how we expect to fight. Training is firmly grounded in the present and current conflicts. Yet, it must build toward a continuously reimagined future. These are bets about the nature of wars that we anticipate fighting. Fighting with one hand while drawing the fist of the next, like M.C. Escher's *Drawing Hands*. As Escher's lithograph visually demonstrates, there is no beginning, no origin from which reorient for the next fight. Soviet strategist Aleksandr R. Svechin's quote equally underscores the plight. How to develop a perspective that is not charlatanism? These are not specific predictions about the future of warfare. These are, as Svechin notes, part of a necessary "working hypothesis." Or, in other words, shift from a known point.

The Marine Corps will never enjoy overall numerical superiority. In fact, our best assumption is that when we land on some foreign shore, we will be outnumbered and outgunned. For myriad reasons—including fiscal realities, the throughput capacity of the Navy to transport Marines and their gear, and the nature of expeditionary operations—we must never presume to have numerical superiority. Our size will never be massive enough when push comes to shove. This is the Marine Corps' "*underdog problem*." Marines know that this is a strength as much as it is a weakness; as an elite force, we may be more selective when it comes to personnel, more intense when it comes to training, and more adaptable.

Stalin claimed quantity, or mass, has a quality all its own.[2] But so does quality itself; the Marine Corps has long recognized this. The first answer was conceptual: *MCDP 1, Warfighting*. Our philosophy recognizes that a battle of attrition is not one we should fight head on. Instead, to compensate, we must rely on speed, tempo, and initiative aimed at gaps in the opponent's system to dismember and dislocate it, upending the hard math of the attrition fight psychologically, rather than physically. *Warfighting* remains sound as a conceptual answer to the underdog problem. However, advances in technology since the publication of *Warfighting* offers even more opportunities. There is a sense that mass will be utilized in the future fight, but this use of mass will be paired with maneuver.

This is technologically informed but not technologically determinant. The quality of the individual Marine, paired and integrated with the technology, is what animates this capability. Narrow artificial intelligence and robotics may be used to augment Marines, closing the gap between Marines and the numerical superiority of enemy forces. In particular, artificial intelligence closely resembles 'enabling' technologies such as the combustion engine or electricity than a specific weapon," as Michael C. Horowitz explains in "Artificial Intelligence, International Competition, and the Balance of Power."[3] Investing in cheap and simple automated platforms and unmanned system offsets the numerical inferiority. The Marine Corps is providing an aspect of numerical superiority without diluting its quality as an elite Marine force. The hard math of an attrition battle becomes much less difficult if a large portion of that attrition is absorbed by robotic platforms.

Unmanned systems will be ubiquitous. These assets will extend throughout and within all domains. Manned units vary and are tailored for diverse mission sets; thus, unmanned assets will vary in size, scope, power, and mission sets. But this will be more than simple hardware differences; software will fluctuate where, how, and if humans remain within, on, or starting-the-loop. These assets transcend domain boundaries. Identifying how to maintain positive, procedural, or autonomous control will be essential for deconfliction and mission effectiveness. There will not be time to relay from air to ground to surface to cyberspace and beyond. Instead there must be fusion; these assets cannot be isolated to their specific domains without considerations for how they will interact amongst themselves and between domains. The difference between interoperability, which is necessary but not sufficient, and interdependence is the difference between reacting to and acting with initiative. Given the expected unmanned proliferation, the question remains how these assets will be wholly integrated. Manned and unmanned teaming is one route to ensure that unamend systems augment Marines and add another mitigating factor to the underdog problem.

Swarming technology and swarming concepts. For our purposes, a swarm is an aggregate individual agents that may be tasked as a whole. These individuals may both be humans or machines. Marines need to operate at this level of abstraction: tasking a whole and not each individual element. Whether or not swarming develops from collaboration, cooperation, or another form of communications matters when considering how best to employ a swarm. Technology will determine a swarm's capabilities and limitations, but at the tactical level, a swarm is an aggregate unit. Swarming entails elements of maneuver warfare. It requires rapid, focused, unexpected actions directed against the enemy's cohesion. As Sean J. Edwards explains in "Swarming and the Future of Warfare," swarming, though similar to encirclement, distinguishes itself by "continuous maneuver."[4] Swarm warfare is the employment of a swarm, or swarms, to either cognitively or physically overwhelm the enemy. Swarming will be one of the most efficient and effective ways to leverage our robotic mass consistent with the tenets of our warfighting philosophy.

Everything will be sensed, and everything will become a sensor. Hiding signals, for instance using emission control, will no longer be sufficient. Surprise and deception will come from increasing the noise surrounding the myriad signals or modulating them at certain times and in certain places. It is not hiding the needle in a haystack, but hiding the needle in a stack of similar needles; or diverting the attention, for a specific period of time, from the pile in the first place. Uniqueness, often in the form of few, exquisite systems, is now a vulnerability. The quotidian becomes camouflage. All action will be public, but that does not mean that it will be noticed; the systems watching will likely be algorithmic and autonomous. Exploiting algorithmic notches will create ways to be observed but not seen.

The Marine Corps can commit highly trained capable small forces if we maintain our competitive edge. *(Photo by LCpl Preston Morris.)*

Consider how, miles from shore, a naval ship will electromagnetically light up when all the Sailors and Marines begin to use their personal cellular phones. Rather than attempting to prohibit that—not because it would not be possible, but because the adversary would know that we were coming anyway—it becomes more advantageous to find a way to mimic those emissions and project them along the coast line at multiple possible landing sites to induce more uncertainty into the enemy's calculations. This is just one example, but maneuvering in this information space is imperative.

Instead of fighting the inevitable hacking, spillage, breaching, or managing the flow of information, we must train for it as we train for marksmanship. Modulating the signals or the noise will prove far more effective and viable for future maneuver and force protection. Unhinging a numerically superior opponent's system requires understanding it. Advances in information warfare technology, sensing and sensors, electronic warfare, and others can help to solve the underdog problem by identifying enemy surfaces and gaps while helping to conceal our own. Narrow artificial intelligence systems will take on some of the cognitive burden of sensing and making sense of the opponent's system and its interaction with the environment.

Some algorithms are weapons. These weapons have limitations based on physics and design ingenuity. In algorithms, these gaps emerge from how the software performs its computations, how the sensors accumulate data and information, and how the software runs on the hardware, among others. Given narrow artificial intelligence, tasks are computed beyond what is humanly possible and logarithmically improve the "observe, orient, decide, and act loop." This is acting at machine speed. Thus, to disrupt such a system requires introducing doubt; the more doubt permeates, the more likely that the software will question its outputs, slowing down as it pushes decisions back to the human level. To defeat machines that outperform humans in very specific tasks requires pressuring the software's fringe cases. The goal is to create a dilemma that forces the human back in- or on-the-loop. Exploiting these algorithmic notches becomes a subset of a larger problem: defeating specific artificially intelligent systems' software and hardware.

Power is fuel. The logistics tail plugs in. Not only will the tooth-to-tail ratio evolve but so will the composition of the tail. Combat power will require a new class of supply: computational and electrical power. Given more power and more speed, we will be able to leverage our machines to outpace the enemy and increase mass, maneuver, and tempo. As we leverage these computers, they must be robust enough to withstand the requirements of combat: weather, terrain, and Marines. But as we continue toward a cloud-computing network, we must consider where the information is processed. Where are the servers? Are they floating, cooled by nuclear power, or stateside? How are the algorithms trained? How are we managing the data sets? These are the new petroleum, oil, and lubricants sites, since electrical and computational power is the primary fuel for these machines.

Distributed long-range precision fires. On a battlefield characterized by massive quantities of precision-guided munitions, dispersion is a prerequisite for survival. Dispersion is especially key for a military force with an underdog problem. The qualitative edge of Marines allows Marine forces to disperse more and assume more risk in doing so because that edge enables even small Marine Corps units to outmatch numerically-superior units provided that they have both the long-range precision firepower and platforms—like small boats at sea and small vehicles on land—to disperse and concentrate at will. Narrow artificial intelligence and robotics contribute to this ability too as robotic platforms may augment Marines both numerically and in terms of firepower. These systems are able to disperse on their own, meet up with Marines only when called, and provide space for smaller units to maneuver under the cover of fires. This will continually challenge the enemy and disrupt their orientation.

The Marine Corps and Navy operate forward to enhance partnerships, protect national interests, and forge capabilities that deter potential adversaries. As an integral part of a joint campaign, naval forces compete to maintain freedom of action in forward areas. In competition with potential adversaries, multiple forms of conflict will occur. The naval force is charged with meeting these challenges with persistent and scalable capability projecting power through the maritime domain. The Marine Corps must reshape its ability to operate forward, inside the adversary threat to deny their freedom of action and enable sustained naval power. Distributed and sustainable intelligence, surveillance, and reconnaissance, lethality, and maneuver are only effective if the dispersed units have the firepower to seize and hold key maritime terrain and fight as a collective force.

Marines can be more selective when it comes to personnel and training. ***(Photo by Sgt Devin Andrews.)***

Svechin, in 1927, noted, "The boundaries between preparations and execution have a tendency to become blurred."[5] Training is competition and exercises are competitive. He would certainly understand the urgency described in the *National Defense Strategy*. The battlefield is global. This means that even as we are learning, refining, and refitting ourselves toward the trends discussed above, we must be prepared at a moment's notice, because that exercise might just become real—from virtual reality to reality itself. But we cannot be everywhere all the time. We must prioritize and select based on where we expect events to transpire. So not only do we take bets on what that future might look like, but also on where they might happen. Maps—whether digital or paper—still provide the answers. "Key maritime terrain is any maritime area whose seizure, retention, or control enables influence over the traffic, flow, or maneuver of military, commercial, illicit and civilian vessels, communication networks, and resources."[6] Operating in and around this terrain provides another point from which to shift.

The underdog problem is solvable only through an asymmetric approach. The Marine Corps will always be a smaller Service, tasked with winning battles rather than wars, and its budget will always be only a portion of other Services. However, the underdog problem can be solved despite those realities. Conceptually, it already is: *MCDP 1* is designed to provide that theoretical mitigating factor. Technology now offers even more ways to address the underdog problem. We must exploit that technology in ways that simultaneously mesh with our ethos and offset our inherent weakness of numerical inferiority; through the acquisition of numerous simple and cheap platforms. This mass is amplified by appropriate maneuver in and around key maritime terrain. Numerically superior military forces can further their commitment when a conflict has not yet become a full-scale war, knowing that they have plenty of reserves should things go wrong. The Marine Corps cannot do that. However, if we exploit technology to provide cover for numerical inferiority, we gain some measure of that aspect of manpower and resource rich organizations that we may use.

Technological, organizational, and doctrinal change stems from innovation. Williamson Murray and Allan R. Millett, reflecting upon the military innovation that transpired between the conclusion of the First World War and the beginning of the Second World War, assert, "These innovations were thus of great moment; they represented fundamental, basic changes in the *context* within which war takes place."[7] Today will be considered another inter-war period. The question is for how long. The better we maintain our competitive edge, placing our elite forces paired with technological systems in and around key maritime terrain, provides an answer that is persistent, effective, and fiscally possible. Murray and Millett continue, "innovation is natural and the result of a dynamic environment in which organization must accept change if they are to survive."[8] The Marine Corps, as an underdog, thrives on this. This is the beginning of the next revolution.

Notes

1. Aleksandr A. Svechin, *Strategy*, ed. Kent D. Lee, (Minneapolis, MN: East View Information Services, Inc., 2004).

2. It is appropriate that we are turning to Soviet thinkers for ideas about attrition. The difference is that our mass is robotic; theirs was human.

3. Michael C. Horowitz, "Artificial Intelligence, International Competition, and the Balance of Power," *Texas National Security Review*, (Online: May 2018), available at http://hdl.handle.net/2152/65638.

4. Sean J. Edwards, *Swarming and the Future of Warfare*, (Santa Monica: RAND Corporation, 2005).

5. *Strategy*.

6. Olivia Garard, "Geopolitical Gerrymandering and the Importance of Key Maritime Time," *War on the Rocks*, (Online: October 2018), available at https://warontherocks.com.

7. Williamson Murray and Allan R. Millet, ed., *Military Innovation in the Interwar Period*, (Cambridge: Cambridge University Press, 1996).

8. Ibid.