

Information and Uncertainty

New forms of conflict are possible

by Eric X. Schaner

The subject of information has drawn interest and debate for millennia. Information is as old and ingrained in the human experience as is the written word. Information is well defined in science, mathematics, and engineering to serve as the basis of applied communication theory. Given the change in the nature of the modern global security environment—due in large part to the way information and modern global digital communications have changed this environment—it is necessary to discuss information from three related military perspectives: the signal-substance of all forms of communication, an instrument of national power, and the seventh Marine Corps warfighting function. This article discusses information from these perspectives using *uncertainty* as a connecting theme.

What Is Information?

The world in which we live is most often described in terms of mass, velocity, and other physical attributes. However, a quantity as important as these and vital to understanding the nature of our surroundings is *information*. Whether we consider computers, biological systems, physics, artificial intelligence, the human brain, or opposing nation states and military organizations, we are driven to conclude their behaviors largely depend on the way they process information.¹

Information is precisely defined in mathematical terms as a binary digit, or “bit.” This simple term provides the basis of applied communication theory, and in turn the basis of all man-made and biological forms of communication. However, within the Marine Corps we

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commonly use the term *information* generically to refer to all manner of descriptions and representations from raw signals to knowledge and understanding.²

To make the most effective use of information, an expanded understanding of it is required. Whether applying information theory in communications and engineering endeavors, or more broadly in military competition and war, the unifying theme of information is that in all cases it refers to a *reduction of uncertainty as a result of*

the ability to discriminate useful signals from noise.

These useful signals convey meaning with a value proportionate to the degree uncertainty is reduced. If the signal does not reduce uncertainty, the signal is noise. If the signal misleads or deceives the recipient, the signal is *misinformation or disinformation*. Simply, information reduces uncertainty, whereas misinformation or disinformation increases uncertainty—or increases certainty of a falsehood.

Referring to information as a signal discriminated from noise that reduces uncertainty is useful in the military context. Focusing on the concept of *uncertainty* as the common theme of information helps to explain both information as an instrument of national power and information as the newest Marine Corps warfighting function.



How we share and process information is important. (Photo by LCpl Joshua Sechser.)

Information as an Instrument of National Power

Information is one of the four instruments of national power, with the other three being diplomatic, military, and economic. These instruments refer to the resources available to a nation to achieve national strategic aims. These resources are available during times of cooperation, competition, and war.

Information is an instrument of national power because *information is power*. This adage derives from the Industrial Age where information provided competitive advantage to a nation with superior *know-how* in leveraging value-producing resources—typically land, labor, capital, and material resources such as minerals.

While information was important in the Industrial Age, it is *existential* in the Information Age. This change stems from the dependency advanced societies now have on information and the never-ending revolution in information technologies and global digital communications that define the post-industrial era. With dependency comes potential vulnerability, and with vulnerability comes potential advantage to the side seeking to exploit the vulnerability.

To understand potential vulnerabilities associated with information dependency, we look no further than societal institutions such as banking, health care, manufacturing, transportation, energy, trade and commerce, and all governmental functions. These institutions depend on databases and advanced computing systems and algorithms simply to function. This marks a significant change from the Industrial Age when these institutions functioned manually with physical-manual means of data storage, processing, and communication.

Additionally, the connection people have with these institutions is increasingly dependent on digital communications, to include the Internet, mobile communications, and data applications. Our world has become digital and networked, providing adversaries with virtually unlimited ways to interfere with an institution's data or the means of communicating with these institutions.



How do we use social media? (Photo by LCpl Jared Sabins.)

Another feature of information dependency is the degree to which people use the Internet, social media, and digital communications to socially interact, plan, and coordinate activities, and receive news and information. The unending trend of accelerated technology development will increase the dependency people have on digital communications and social media technologies to exchange information, socially interact, and interpret their environment. This introduces another critical vulnerability where aggressors may seek to manipulate information flowing through social networks and other media to alter a person's social reality and perception of truth.³

Because of the information dependencies noted above, the informational instrument of national power becomes increasingly important in the Information Age. The consequence of information dependency is the opportunity it affords aggressors to manipulate vital information to increase the *uncertain-*

ty people have with their institutions, thereby altering their perception of truth. The United States should employ a comprehensive strategy through the informational instrument of national power to build resiliency against potential aggressors in the information environment. This leads to a discussion of information as a warfighting function.

Information as a Warfighting Function

Societal information dependency is a vulnerability shared by Information Age militaries. During the Industrial Age, U.S. technological superiority contributed to global reach and relative information superiority. This superiority was characterized by the numerous ways in which information about a threat could be gathered, processed, and exploited to some effect, such as bringing combat power to bear at a specific time and place anywhere on the globe.

The inherent assumption during the Industrial Age was that information



How we conduct OIE can affect the utilization of our combat forces. (Photo by SSgt Patricia Morris.)

contained within intelligence, command and control, communications, and weapons systems was largely secure, accurate, and trusted. *The Information Age has fundamentally undermined this assumption and thus altered the technological and combat power advantages the United States experienced during the Industrial Age.*

Because the Marine Corps is an Information Age military organization, it is as susceptible to information manipulation or denial as are other advanced societies. Competitors and adversaries alike understand our information dependency, and we should expect them to exploit it to foil our ability to function—regardless of how much combat power we attempt to muster.

To increase our capacity for competing and fighting in the Information Age, the Marine Corps in January 2019 established information as the seventh warfighting function. This action followed the establishment of information as the seventh joint function in July 2017.

The new warfighting function provides a framework for the commander and staff to integrate information into all operations. More specifically, the information warfighting function provides a framework that solidifies a Service perspective recognizing the necessity of information by making

information *generation, preservation, denial, and projection* the commander's business.

From this overarching framework, the Marine Corps is developing derivative concepts and terminology such as *Military Information Power and Operations in the Information Environment* (OIE) to describe how information generation, preservation, denial, and projection achieves advantage in competition and war. Military Information Power was established as a term in a joint memo signed by the DC I and the Deputy Commandant for Combat Development and Integration in January 2020. This term is described further in a currently proposed Marine Corps Doctrinal Publication on Information Operations in the Information Environment was also established as a term in the January memo. This term will be expanded upon in detail in an intended Marine Corps Warfighting Publication on OIE.

Underpinning these emerging concepts and terminology is leveraging information for competitive and combat power advantage. The theory is simple and goes like this: through the information warfighting function framework the Marine Corps plans and conducts OIE to create and leverage military information power for competitive and combat power advantage. Military

information power creates advantage over an opponent by increasing their uncertainty, increasing their certainty of a falsehood, or by denying them the information needed to function. This is accomplished through information generation, preservation, denial, or projection. Military information power is discussed in more detail in the article entitled "What is Military Information Power?" within this issue (on page 17).

Conclusion

Significant changes in the global security environment are driven in many ways by changes in the nature of information and the never-ending revolution in information technologies and global digital communications. Because of these changes, new forms of conflict are possible such as the targeted deceptive messaging of individuals or groups within a society, and the denial of vital institutional information to cause societal disruption. Information Age militaries suffer the same vulnerabilities of information dependency as do advanced societies as a whole. While information has always been important, it is now existential for the effective functioning of military organizations. The joint force and Marine Corps are adapting to this new environment by developing new functions to serve as a framework for commanders to integrate information in all operations and focus the use of information to create competitive and combat power advantage.

Notes

1. James V. Stone, *Information Theory: a Tutorial Introduction*, (Sheffield, UK: Sebtel Press, 2016).
2. Headquarters Marine Corps, *MCDP 6, Command and Control*, (Washington, DC: October 1996).
3. Michael J. Mazarr, Ryan Michael Bauer, Abigail Casey, Sarah Anita Heintz, and Luke J. Matthews, *The Emerging Risk of Virtual Societal Warfare: Social Manipulation in a Changing Information Environment*, (Santa Monica, CA: RAND, 2019).

