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Advances in the civilian fields of computation, genetics, robotics, and nanotechnology will optimize human performance to the extent that a future person's physical and mental abilities will not only be superior but also manifestly different than the current human form. With increasingly ubiquitous civilian access to emergent technology of all kinds, human enhancement will be available to anyone--including an adversary. The battle field will be different when both belligerents field a warrior with a physiologically optimized body that houses a cognitively optimized mind. At that time, when the character of war changes, a new type of war will emerge. This paper investigates what must also be developed to retain the asymmetrical tactical advantage necessary to win when US and enemy soldiers achieve physical and mental parity. In short, the US military must develop the spirituality of its enhanced warriors as well as create an operating concept which leverages the tactical asymmetry afforded by a "spiritually dominant" soldier.

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FUTURE WAR PAPER

Human Performance Commoditization and Future War:

The Requirement for a Dominant Spirituality

SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF OPERATIONAL STUDIES

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THE OPINIONS AND CONCLUSIONS EXPRESSED HEREIN ARE THOSE OF THE INDIVIDUAL STUDENT AUTHOR AND DO NOT NECESSARILY REPRESENT THE VIEWS OF EITHER THE SCHOOL OF ADVANCED WARFIGHTING OR ANY OTHER GOVERNMENTAL AGENCY. REFERENCES TO THIS STUDY SHOULD INCLUDE THE FOREGOING STATEMENT.

> One might say that the physical seem little more than the wooden hilt, while the moral factors are the precious metal, the real weapon, the finely-honed blade.
>
> - Clausewitz

Advances in the civilian fields of computation, genetics, robotics, and nanotechnology will optimize human performance to the extent that a future person's physical and mental abilities will not only be superior but also manifestly different than the current human form.[1] With increasingly ubiquitous civilian access to emergent technology of all kinds, human enhancement will be available to anyone--including an adversary. The battle field will be different when both belligerents field a warrior with a physiologically optimized body that houses a cognitively optimized mind. At that time, when the character of war changes, a new type of war will emerge.

This paper investigates what must also be developed to retain the asymmetrical tactical advantage necessary to win when US and enemy soldiers achieve physical and mental parity. In short, the US military must develop the spirituality of its enhanced warriors as well as create an operating concept which leverages the tactical asymmetry afforded by a "spiritually dominant" soldier.

To develop the above thesis, this essay will first describe the present and future of human performance enhancement. Next, the paper will examine the well-established dictum that, among the three elements of the character of war (spiritual, mental, and physical), the spiritual element is dominant. With that in mind, optimizing two of the three elements (physical and mental), leaves by default the spiritual element as the only undeveloped factor and therefore the domain in which tactical asymmetry can still be developed. Finally, this essay will offer questions which should be investigated as optimized human performance becomes the norm on the battlefields of the future.

Definition of Terms

For the purposes of this paper, a human artificially enhanced in physical and mental capacities through the use of genetics, robotics, nanotechnology (GRN) technologies, computational enhancement, pharmaceutical supplements, and other medical means is a *cyborg*. This paper uses the terms *physical* and *mental* in a customary sense. Thus, a cyborg's enhanced physical attributes are: optimized dexterity, inexhaustible energy, and maximum power to weight ratio. A cyborg's mental attributes are: awareness of the means to learn about everything knowable, the creativity to develop unique ways of thinking, unlimited memory, and unlimited computational processing speed. In short, a cyborg is a synthetically enhanced human.

With regard to the concept of spirituality, the term morality relates to *moral* behaviors or beliefs (*moral* being a belief of what is right or wrong). *Values* are the worth a person assigns to particular behaviors and beliefs. *Ethics* are the operating system of a person's morality and values in action. *Character* is the combination of attributes which make one person distinct from another. The innate source of that within a person which animates the body, gives a distinct personhood, and generates will power is the *spirit*. With this in mind, the term *spiritual* refers to the sense that the spirit is real. In other words, a spiritual person believes all people have a spirit.[2] *Spirituality* is, therefore, "the state or quality of being spiritual."[3] As a spiritual person believes in an inherent human attribute which animates the body, gives distinct personhood, and generates will power, spirituality is a term which describes the character of the spirit.

Because it is difficult to describe the character of the spirit, the term "spirituality" makes many uneasy. One source of this uneasiness may be cognitive dissonance; plainly stated, intellectual discomfort caused by a conflict between two closely held ideas.[4] For example, spirituality is intensely personal and it is deemed impolitic (politically incorrect) to discuss such

an intimate subject with others. However, people (as social animals) want to reconcile their personal understanding with others. For the purposes of this paper, "spirituality" creates the intellectual discomfort required for a deeper level of understanding.

The Argument

The argument of this paper relies upon several premises. First, access to the cyborg's medical, manufactured, informational, and computational components will be commoditized and available to anyone, so future war will be characterized by physical and mental parity. Second, military history and theory identify three elements in the character of war that can be leveraged to achieve victory: physical, mental, and spiritual. Since the first two will be fully optimized, only the third remains to be further developed. Therefore, since physical and mental abilities will be balanced between adversaries, spirituality must be developed to produce the dominance needed in future war. Having framed the paper by explaining the problem, proposing a thesis, clarifying the definitions and outlining the logic, the following evidence is presented to support the argument.

Enhancing Human Physical and Cognitive Attributes: Creating Cyborgs

The confluence of technologies available today and in the future will make possible the commoditization of enhanced human physical and mental abilities. Rapid enhancement of human physical attributes will be enabled by improvements in three key fields: genetics, robotics, and nanotechnology (GRN). Genetic manipulation has the ability to create custom genetic material which can be used for preventative, sustaining, and/or restorative purposes.[5] Robotics makes possible the introduction of mechanical components into the human body that harnesses the

speed, precision, and endurance of computational advances. Nanotechnology is a composite field that enables the miniaturization of sensors, machines, and therapies for integration with the human body.[6] There is no recognized limit, save cultural and ethical factors, that stands in the way of the GRN enabled medical treatments to surge, sustain, protect and repair a person's body at the atomic level.[7] The door is open to radically enhance physical attributes.

The above modifications are already being applied to the physical organ of the human brain. Functioning in an enhanced brain is an enhanced mind where cognition occurs at above-human capabilities. An enhanced mind consists of a human mind complemented by artificial intelligence (AI). The human mind-AI "team" benefits from the strengths of each, resulting in enhanced cognition.[8] The enhanced mind will also benefit from digital connections to other minds and bodies, in the same way that a computer can interface with other computers or peripheral devices. It has even come to pass that human minds can directly communicate with other minds and control other human bodies over the internet.[9] These are modifications that already exist but have yet to be optimized for general use.

Without belaboring the point, the confluence of advancements in medicine, GRN, computation, artificial intelligence, etc., will enable human performance enhancements to become smaller, more personalized, more efficient, less expensive, longer lasting, and more ubiquitous. Due to the fact that information sharing is a key contributor to these developments, and that these developments are civilian in origin, it is reasonable to assume continued sharing of these developments. As evidenced by the well-established economic principle of commoditization, acceleration in the rate of development in all of the above fields, will accelerate the distribution and depreciation of physical and mental enhancements.[10] As these enhancements become ubiquitous, predicted by some to occur as early as 2035, the physical and

cognitive boundaries of mankind will be vastly altered.[11] The military significance is that it is reasonable to expect that the US and its future adversaries will send cyborg warriors into battle. If the US is to retain any asymmetric advantage in the future battlespace, it must come in the form of enhanced spirituality.

Spirituality as a Component of War

Professional military literature identifies three fundamental components of war: spiritual, mental, and physical. Either directly or indirectly, all of the notable philosphers and theorists of war – from Sun Tzu to John Boyd – have addressed the role of these factors in war.[12] Furthermore, all agree that the spiritual (or moral) component dominates the other two. Recognizing the dominance of spirituality amongst the three components is crucial to understanding and operating in future war.

Spirituality as the Dominant Factor in Future War

When, in the future, physical and mental abilities are equivalent between adversaries, the only advantage will be a dominant spirituality. Consider: ***If*** American warrior ability is the combination of spiritual, mental, and physical components; ***and*** the adversary warrior ability is likewise the combination of spiritual, mental, and physical components; ***and*** the American mental and physical components are equal to the adversary's mental and physical components; ***then*** the greater spirituality component determines the greater warrior ability.

With the above in mind, there are significant military considerations which should guide our approach to the development of spiritually dominant cyborg warriors. Military professionals, manufacturers and scientists are already thinking through human performance enhancement.[13]

Though ideas about physical and mental enhancements dominate the literature, there is little regarding the spirituality of the enhanced warrior and little consideration of what comes next. Below are questions that must be addressed during cyborg development to ensure spiritual dominance in the future war.

First, can the human spirit be assessed? Does the possession of a particular spiritual attribute improve battlefield performance? Does a unit perform better when it has a strong spirit? Are there things that can be done which affect the spirit? The answer to all of these questions is yes. Indeed, leadership, courage, and bravery are among the attributes that can be developed and enhance a person's or units effectiveness in battle.

But while these are useful starting points, they do not attend to the nature of humankind once radical physical and mental enhancements are realized. There are harder questions that must be answered: Is there a way to achieve uniform assessment of human spirituality? Can steps be taken to improve the quality of someone's spirituality? Are all spiritual characteristics general in value or are there specializations? Is there a type of spirituality that most benefits battlefield performance? Is one form of spirituality dominant in relation to other forms?[14] Another hard question to answer for a military in a country that values individualism and liberty is: does religion play a role in the development of spirituality? And, if so how and to what end? This may be the most important and the most difficult question to answer.

In the operational sense, there are questions regarding how spirituality can be leveraged to produce tactical advantages. Is there a way to bring spirituality to bear in a decisive manner? Can there be an asymmetrical advantage for which one form of spirituality dominates another? Is spirituality a nested concept, like commander's intent, or does it vary between civilian leadership

(strategic level), Combatant Commander (operational level), and the individual soldier (tactical level)?

The above questions point to other questions regarding the relationship of the military to the population in the age of cyborg warriors. If a civilian and a military member have similar cognitive abilities and physical abilities, how would this effect recruiting, retention, promotion, etc? What is the relationship between the spirit of the nation and the spirit of the cyborg warrior? What if the spirit of the nation changes while the cyborg warrior's spirituality reflects an earlier national spirit? If by the nature of physical and cognitive enhancements a cyborg warrior can wage war on a scale previously associated with major weapon systems (perhaps strategic level effects), how will the population come to trust the cyborg to do the right thing? These questions are just the tip of the iceberg and they must be answered if the United States is to retain its military superiority.

There are ways to answer these questions. One potential way would be to establish an organization within the military to assess, shape, and develop spirituality. This entity should be a peer organization to existing education and training commands. In this way human development would be addressed in all three domains. Such an organization would enhance martial spirit, national spirit, and ultimately human spirit. It would inform policy with a keen eye to these forms of spirituality. It would continue to assess the role of spirituality in the military and advance the study of this vital topic. Finally, this organization would experiment with the role spirituality plays in operational art and would serve to identify places where spirituality could be brought to bear against an adversary.

Conclusion

The confluence of existing technologies makes possible the commoditization of human physical and mental abilities. Military literature identifies the fundamental components of the warrior as spiritual, mental, and physical. When physical and mental abilities are equivalent, the only advantage to be gained is in a human with greater spirituality. Focusing on development of physical and mental abilities is ongoing and can be reliably predicted to result in human performance enhancements which far exceed today's human abilities. Thus, the spirituality of our cyborg warriors must be developed and operationalized to win future wars. That said, there are many questions that must be answered to fully leverage the spiritual potential in our future warriors. Cyborg warrior spirituality must balance dominance against the adversary with acceptability to the American people.

Ultimately what this essay brings to light is the necessity to look at spirituality as a feature of warfighting that must be enhanced in concert with mental and physical enhancements so as to ensure continued American military dominance. Specifically, the United States military must investigate the means to produce a cyborg with optimized and appropriate spirituality. In addition, operational concepts should be developed to fully exploit spiritual dominance in future warfare.

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[1] Ray Kurzweil, *The Singularity is Near: When Humans Transcend Biology* (New York: Viking, 2005). Also see Steven Pinker, *The Blank Slate: The Modern Denial of Human Nature* (New York: The Penguin Group, 2002).

[2] Meriam-Webster Dictionary, http://www.merriam-webster.com/dictionary/spirit, retrieved 5 Nov 2015.

[3] Meriam-Webster, http://www.merriam-webster.com/dictionary/spirit, retrieved 5 Nov 2015.

[4] Leon Festinger, *A Theory of Cognitive Dissonance* (Stanford, California: Stanford University Press, 1957).

[5] Michael MacRae, "Pharma Dips into Organs on Chips," American Society of Mechanical Engineers, 1-3. Also see Puping Liang, et al. "CRISPR/Cas9-Mediated Gene Editing in Human Tripronuclear Zygotes," *Protein & Cell,* 363.

[6] Robert Freitas Jr., *Nanomedicine, Basic Capabilities,* Vol. I (Georgetown, TX: Landes Bioscience, 1999), 93-121.

[7] Freitas, *Nanomedicine,* pg XX. Also see Kurzweil, *The Singularity is Near*; and National Research Council (U.S.), Committee on Assessing Foreign Technology Development in Human Performance Modification, *Human Performance Modification: Review of Worldwide Research with a View to the Future* (Washington, DC: National Academies Press, 2012), 1-6; and Paul O'Connor, and Joseph V. Cohn, eds, *Human Performance Enhancement in High-Risk Environments: Insights, Developments, and Future Directions from Military Research* (Santa Barbara, California: Praeger, 2010), 268.

[8] Kurzweil, *The Singularity is Near.* Also see Murray Shanahan, *The Technological Singularity* (Cambridge, MA: MIT Press, 2015).

[9] Vikash Gilja, et al, "Clinical Translation of a High-Performance Neural Prosthesis," *Nature Medicine*,1142. Also see Carles Grau, et al, "Conscious Brain-to-Brain Communication in Humans using Non-Invasive Technologies," *Plos One*, 1; and Kurzweil, *The Singularity is Near*; and Shanahan, *The Technological Singularity.*

[10] Kurzweil, *The Singularity is Near.* Also see Shanahan, *The Technological Singularity.*

[11] Freitas Jr., *Nanomedicine.* Also see Kurzweil, *The Singularity is Near*; and National Research Council (U.S.), *Human Performance Modification*, 1-6; and Shanahan, *The Technological Singularity.*

[12] Sun Tzu used the idea of Dao (the way) to represent the moral or spiritual attribute of war. Napoleon said, "In war, moral factors account for three quarters of the whole; relative material strength counts for only one quarter." Clausewitz uses the terms "will, genius, and physical" to describe spiritual, mental, and physical elements of war. Mahan makes reference to "martial spirit" and "military spirit" as well as the physical attributes of war. J.F.C. Fuller offers perhaps the most extensive study of the moral, mental, and physical elements of war. John Boyd expands upon the work of Fuller in describing the moral, mental, physical elements of war. Sun Tzu, *The Art of War* Translated by Samuel B. Griffith, (New York, NY: Oxford University Press). J. C. Herold ed., *The Mind of Napoleon: A Selection from His Written and Spoken Words* Translated by J. C. Herold, (New York, NY: Columbia University Press, 1955), 219. Carl von Clausewitz, *On War* trans. Michael Howard and Peter Paret, (Princeton, N.J.: Princeton University Press, 1984), 75-123 (Book 1), and 133-147 (Book 2 Chapter 2). Alfred Thayer Mahan, *The Interest of America in Sea Power, Present and Future* (Boston, MA: Little Brown and Company, 1917), 191. J. F. C. Fuller, *The Foundations of the Science of War* (Carlisle Barracks, Pa.: US Army Command and General Staff College Press, 1993), chapters VI-VIII. John R. Boyd, *Patterns of Conflict* eds. Chuck Spinney and Chet Richards, (Atlanta, GA: Defense and the National Interest, 2007).

[13] The US Army started investing in Human performance enhancement research in the 2000's and has authored several publications to guide development. National Research Council (U.S.), *Human Performance Modification.* Also see Department of the Army, United States Army Combined Arms Center, *The Human Dimension White Paper: A Framework for Optimizing Human Performance* (2014); and ———, *Talent Management Concept of Operations for Force 2025 and Beyond* (2015); and Department of the Army, United States Army Training and

Doctrine Command, *TRADOC Pamphlet 525-3-7: The U.S. Army Concept for the Human Dimension in Full Spectrum Operations - 2015-2024* (2008).

[14] It will be noted that religion has not been mentioned in this paper up until this point. This is deliberate in that the key issue here is spirituality, not religion.

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