



# White Paper on Bio-Psycho-Social Applications to Cognitive Engagement

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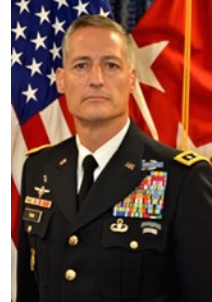
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## Preface

The hyper connected nature of the global environment brings with it new challenges to U.S. interests around the world. The future will see an increase in global connectivity and associated challenges as populations of developing nations gain access to modern communications technology. Greater connectivity will enable hostile entities to influence a wider audience and to co-opt members of disaffected populations for malign purposes. These and other aspects of the future operating environment will accelerate the speed with which threats can develop. As a result, we need to understand how to effectively influence adversaries in an effort to counter their actions before a substantial commitment of U.S. resources is required.



The following volume contains the work of military and academic practitioners committed to understanding and influencing our nation's adversaries. The ideas put forth by these authors represent efforts to develop scientifically informed approaches that address the operational challenges we face now and into the future. Contributing authors examine tactics that shape conditions and influence behavior through cognitive engagement; a concept that acknowledges the importance of psychological factors in modern conflict. The approaches to cognitive engagement discussed in this volume are ideally suited for Military Information Support Operations. They are also applicable to a wide range of military and interagency activities.

The work contained in the following pages focuses on how to operationalize scientifically informed approaches to understanding and influencing our adversaries. It applies science to the challenge of shaping human behavior and represents an important step forward in the study of biological, psychological, and social approaches as they relate to cognitive engagement. By leveraging science, we may act more effectively to counter the intentions of adversaries and facilitate security and stability in regions worldwide.

A handwritten signature in black ink, appearing to read "Ken A. Tovo".

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## Section 1: Introduction

The recently released White Paper entitled “*Assessing and Anticipating Threats to US Security Interests: A Bio-Psycho-Social Science Approach for Understanding the Emergence of and Mitigating Violence and Terrorism*” that Giordano discusses in the succeeding section provided a scientific perspective on current operations. The current White Paper provides operational perspectives on that and other relevant sciences. Previous versions outlined WHAT scientific approaches might be relevant; this iteration focuses on HOW to operationalize it.

The underlying concept of this paper is how bio-psycho-social approaches to cognitive engagement, described in greater depth by DeGennaro, may be put to use to collect, analyze, and/or apply information to meet a tactical, operational, or strategic end. This White Paper will focus on the proverbial “rubber meets the road” approaches of behavioral operations in the human domain where the former is “the study of attributes of human behavior and cognition that impact the design, management, and improvement of operating systems, and the study of the interaction between such attributes and operating systems and processes” and the latter is “the presence, activities (including transactions both physical and virtual), culture, social structure/organization, networks and relationships, motivation, intent, vulnerabilities, and capabilities of humans (single or groups) across all domains of the operational environment (Space, Air, Maritime, Ground, and Cyber).” Information Operations (IO) doctrine defines the cognitive domain as the component of the information environment (IE) that encompasses the gray matter of those who transmit, receive, and act upon information. Cognitive operations such as information processing, perception, judgment, and decision-making are the most vital aspect of the IE. Cognition is influenced by individual and cultural beliefs, norms, vulnerabilities, motivations, emotions, experiences, morals, education, mental health, identities, and ideologies and thus requires research and analysis methods from the bio-psycho-social sciences to understand and manipulate. When, how, and most importantly why to apply that understanding to US advantage at the tactical, operational, and strategic level is the focus of this effort.

The volume is focused primary on Military Information Support Operations (MISO), formerly Psychological Operations (PSYOP) as it is the activity that can most benefit from (and reciprocally impact) cognitive engagement. However, IO core capabilities such as Military Deception (MILDEC) and Computer Network Operations (CNO) information related capabilities such as counterintelligence (CI) could also benefit from bio-psycho-social applications to cognitive engagement.

To paraphrase Sir Basil Henry Liddell Hart, targeting the mind of the enemy commander is more important than the bodies of his troops (Hart, 1967), that recommendation can be extended to all those, belligerents and combatants alike, who comprise the human domain. The contemporary operating environment is growing increasingly contentious, however, the vast majority of those contentions do not necessarily require the use of lethal force. Instead, nuanced understanding of the nature of conflict and the peoples engaged are required to remain competitive. Cognitive engagement entails understanding the individual nodes with the human domain as such and developing appropriate methods for interacting with them. This White Paper is meant not only to continue the dialogue between the academic and operational communities but also to explore more deeply how to apply knowledge gained through bio-psycho-social research to cognitive engagement.

## References

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## **A Biopsychosocial Approach to Understanding and Mitigating Aggression and Violence: Groundwork for Operationalization of New Tools and Methods**

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Ongoing work of the Strategic Multilayer Assessment (SMA) group has been detailed toward identifying and studying particular methods and tools of the neuro-cognitive sciences that may be operationalized within national security, intelligence and defense initiatives. Such approaches may have utility to fortify extant assessments, analyses, and deterrence of factors contributory to aggression and violence. Through such studies, it became that neuro-cognitive techniques and technologies are best – and in some cases only – usable when they are incorporated within a framework that engages the interactive biological, psychological and social dynamics of humans-in-environments.

In light of this, the most recent SMA whitepaper, *Assessing and Anticipating Threats to US Security Interests: A Bio-PsychoSocial Science Approach for Understanding the Emergence of and Mitigating Violence and Terrorism*, presented the views and insights of multi-disciplinary intra- and extramural subject matter experts (SMEs) toward further defining and developing a bio-psychosocial approach to understanding, assessing, and influencing the aggressive and violent cognitions and behaviors of individuals and groups.

Targeting biological and/or psychological factors can be important and useful to altering social behaviors; just as engaging social and behavioral components can influence psychological and biological correlates. In appreciating these reciprocal interactions as relevant to defense operations, it is crucial to: 1) evaluate the potential roles effected by these factors in human thought and actions in particular settings and circumstances, and 2) re-frame national security and intelligence initiatives of conflict negotiation and resolution to more effectively assess, access, and affect salient bio-psychosocial variables.

For example, such initiatives are currently focused upon the problem of terrorist recruitment, indoctrination and inculcation. Frequently, recruits are attracted from late adolescent/young adult populations. Neurological and psychological characteristics of the peri-pubertal period make adolescents particularly vulnerable to recruitment tactics employed by fringe and antisocial groups. Thus, attempts at undermining groups such as ISIL/Daesh's influence will require understanding adolescents' brain and capacities for, and patterns of cognitive function(s), and developing intuitively appealing counter-messages that 1) are emotionally impactful instead offering logical arguments; 2) avoid emphasizing risks associated with joining ISIL/Daesh; 3) undermine ISIL's claims of belongingness and peer affiliation; and 4) provide alternate means for social acceptance.

Such narratives are important in the development and articulation of ideologies, which often attempt to reduce uncertainty and ambiguity and reinforce in-group biases. Understanding emotional reactions of – and to - uncertainty and ambiguity may be instrumental to developing more sophisticated products and series to exploit these phenomena in select target audiences. As well, moral emotions of anger, disgust, and contempt can be risk factors for emotional vulnerability that affect individual decisions to radicalize. Studying these phenomena as relevant to negative radicalization is necessary in developing understanding and to develop better operational tools and technology for Military Information Support Operations (MISO) to enable persuasion, emotion, and trust in target audiences.

Terrorist groups frequently exploit biological responses to psychosocial influences in the conjoinment of violence and propaganda, so as to modify behavior through coercion and persuasion. Indeed, terrorists' target audiences may include general populations; protective services officers, high-level decision-makers (who may be directly affected or come under political pressure) or local populations (e.g. in counter-insurgency campaigns in Iraq or Afghanistan). In these audiences: (1) the extent of terrorism's psychological impacts is determined by the neural phenomenon of "prediction error", which explains audiences' ability for adaptation; (2) terrorism's psychological impacts are also determined by perceived distance from the stimulus and/or its effect(s); and (3) prediction error can affect the fear, as well as resilience and even thriving.

Fear and anger elicited by terrorist attack evoke neuro-cognitive and behavioral effects. It was noted that: 1) terrorists' targets are subject to emotions that affect their political choices; 2) terrorists' targets experience more anger than fear; 3) both fear and anger produce over-reactions that serve the terrorists' politics; and 4) definitions of terrorism that focus on fear blind against the power of anger in eliciting political actions. Therefore, political resilience to terrorist attack requires public understanding that there is more to fear than fear itself, and thus anger-mongering can be more dangerous than fear-mongering.

In addressing the social aspects of behavior, it was noted the current type(s) and extent of escalating problems of aggression and cannot be contained by force alone. Understanding the social context(s) of threat is as important as efforts to understand psychological dynamics. Change in this direction is now on-going, with militaries grappling with their roles in "stability operations", "wide area security", and "Gray Zones." Some of the work now being undertaken that centers on ideas such as sustainable security or "human security" provides some hope of new thinking.

Thus, the importance of elucidating – and better comprehending – the ways that social stimuli evoke psychological and biological responses was emphasized, with particular attention needing to be paid to why and how emotional reactions to narratives and stories are such an important factor to consider when designing information campaigns. Toward such ends, a conciliatory approach was advocated that integrates natural and social sciences and the humanities, to facilitate interest in, and understanding of empirical exploration of social/moral behavior. In such an approach, both theoretical and experimental methods could be employed to understand real-world, "dirty" biological computation and how it produces social and functional behavior. It was posited that such work could impact the way the United States and its allies approach radicalization and countering threats posed by groups such as ISIL/Daesh; and the bio-psychosocial model was advocated as being crucial to operational and tactical counter-terrorism and counter-radicalization initiatives.

Employing the bio-psychosocial model (and methods) to understand the social context of key regional actors in the Middle East was posed as crucial to establishing larger social contexts in which groups contend and message one another to threaten, appeal and recruit. Methods of thematic analysis (TA) were defined that may be applicable to gain insight to the actions and narratives of both organizations (i.e. - social institutions) and the (bio-psychological) people who lead them. For example, it was shown that indices of leader aggression can be accessed via objective signals a given leader sends across multiple settings and time periods.

Additionally, advanced methods and text analytic algorithms developed by the U.S. Air Force Research Laboratory (AFRL) can be useful to enable identification, extraction and interpretation of discourse markers (that are reflective of identified bio-psychosocial characteristics) to assist analysts in identifying particular threats. These methods and algorithms afford a significant increase in enabling



anticipatory analysis of violent events. Importantly, the verbal cues on which methods and algorithms are based typically occur in advance of the actual event. Thus, such methods can provide leading indicators of violence, enabling either 1) collection of other confirmatory information, or 2) action to accelerate, mitigate or prevent the event(s).

The predictive capacity of such information can be leveraged through insights from cognitive models and cognitive behavioral therapy (CBT). Strategic information operations may restructure dysfunctional cognition to mitigate hostility by reverse-engineering CBT to be more suitably adapted to non-western cultures, so as to account for interactive effects when dealing with differences between operators and “audiences.” By attending to cultural differences in self-construal and behavioral attribution, strategic information operations may harness bio-psychosocial information, understanding and effects to engage more successful counter-messaging initiatives.

Similarly, engaging a bio-psychosocial approach can be useful for and in methods of at-a-distance thematic content analysis (TCA). To wit, the scoring of integrative complexity (IC) and motive imagery (MI) can be used to forecast if and when political actors will execute political violence against the United States. In assessing potential threats, tracking IC and MI can also be used to help forecast if a cycle of confrontational moves will lead to war. In this way, TCA can be used together with other analytics to help forecast both the likelihood that an adversary will engage in violence, and the timing of that violence.

In sum, *Assessing and Anticipating Threats to US Security Interests: A Bio-PsychoSocial Science Approach for Understanding the Emergence of and Mitigating Violence and Terrorism* established the conceptual and practical basis upon which operational perspectives and methods can – and arguably should – be developed and articulated. A final set of key points of the whitepaper fortified this conclusion by emphasizing the need and value of an integrative approach to better prepare operators in the field. The bio-psychosocial framework can facilitate day-to-day needs and clarify those domains where additional subject matter expertise may be required. The integration of theories enables proactive clarification of meta-narratives, development of approved narrative threads, and/or adaption of media and narratives to maintain visibility and coherence for the cultivation of trust.

To conclude, it was asserted that there is an evident and urgent need to rethink and retool the war against ISIL/Daesh, and a bio-psychosocial approach may be useful to engagement in both the narrative (i.e. - MISO/PSYOP) and “boots on ground” operational spaces. An expanded use of this approach to assist military strategists may be of value to incur more immediate and decisive progress to win the battle in these spaces. It was posited that a variety of operators (and perhaps most notably those of Special Forces commands; e.g. - USASOC) can capitalize on recent advancements in media neuroscience and integrate the field’s most current equipment, training, and techniques available into both PSYOP and more kinetic force approaches.

The bio-psychosocial model and methods structured thereupon can be leveraged to augment and enhance the existing social/behavioral science methodology presently in use, to contribute increased effectiveness of Department of Defense (DoD) influence campaigns through the use of modernized practices and tools. But how such practices and tools can and should be “put to work” remains a work-in-progress. The present whitepaper takes the torch to provide illumination upon ways and means to operationalize the bio-psychosocial model and methods, and in so doing seeks to create a practical roadmap for deployable techniques, tools, and tactics that have meaningful strategic effect.



## A Primer on Cognitive Engagement

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“As cities grow, many governments fail to provide adequate security, employment, infrastructure, and services... For Army leaders to thrive in these uncertain and chaotic conditions they must be able to understand the cognitive, informational, social, cultural, political, and physical influences that affect human behavior” –LTG H.R. McMaster

### Abstract

The idea of cognitive engagement comes from the discussion of the Gray Zone or times when nations compete with each other in everything except direct state on state war. During this time, nations can use diplomatic, information, military and economic (DIME) ways to pursue statecraft. This spreads through the gambit of combined arms maneuver, clandestine intelligence operations, robust diplomatic tactics, political and operational warfare to building partnership capacity. The challenge with ambiguous engagement is in order to have a high success rate at countering or anticipating action it is essential to enforce cohesive inter-agency cooperation, align missions across U.S. international and foreign policy tools, and understand how and when to use resources, in the military, conducting operations other than traditional war to support American interests. The military is currently the most dominant tool in U.S. policy. However, if the military is not trained and prepared to conduct campaigns other than war, its power wanes. This paper will look at how the military can operate in this ambiguous engagement environment primarily to support U.S. interests focusing more in DIME with a more prominent “I” (information) or the information environment (IE).

### Cognitive Engagement and the Gray Zone

The United States Special Operations Command (SOCOM) defines cognitive maneuver as the tactics of a campaign to shape the conditions of the global environment and influence actors' decision-making behaviors.<sup>1</sup> We shape and influence to continually maintain positions of advantage, adapting to the changing nature and character of conflict in an ambiguous, murky “Gray Zone.” Gray Zone challenges are competitive interactions among and within state and non-state actors that fall between the traditional war and peace duality.<sup>2</sup> The U.S. Army War College combines this definition with “purposeful, high-stakes employment of aggressive statecraft-employing all available coercive instruments-in a deliberate campaign-like persistent pressure and intimidation that achieves war-like ends through ways and means short of open conflict.”

Grey zone competition is not war by a classical definition but via miscalculation and unintended escalation threatens to transition to open conflict.”<sup>3</sup> In this vain, experts often refer to China’s maneuvers to reinforce its claim to a larger part of the South China Sea or Russians blatant annexation

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<sup>1</sup> United States Army Special Operations Command, White Paper, “*Cognitive Maneuver For the Contemporary and Future Strategic Operating Environment*” May 31, 2016. Also see “Department of Defense Dictionary of Military and Associated Terms,” *Joint Publication 1-02*. Washington, D.C.: Joint Chiefs of Staff, March 15, 2015 and Joint Publication 3-0, Joint Operations for the 12 principles of Joint operations.

<sup>2</sup> United States Special Operations Command, White Paper, The Gray Zone, 9 September 2015.

<sup>3</sup> United States Army War College, The Defense and Grand Force Implication of Hybrid and Gray Zone Threats, Integrated Research Project Brief, February 2015.

of Crimea and its continued military intimidation in Ukraine as Grey Zone competitions. Each trying to justify, legally or ethically, why their actions do not constitute a declaration of traditional war.

There have been ongoing discussions about war and the types of war that one is fighting. From traditional, guerrilla, hybrid to asymmetric, the labels often change, but does war. In many instances, the way war is conducted is based on the capabilities of those involved. For example, the U.S. has bombers, aircraft carriers, and brigades of soldiers prepared for State on State conflict. It also has Special Forces, navy seals and other lethally trained forces that can conduct a broader range of intervention. Although State adversaries may have similar structures and war is fought within the context of a stated international norm there are non-state groups that fight each other and/or national forces must fight as well, most recently the Islamic State (IS) and Al Qaeda (AQ), which have limited traditional hardware and no rules or stated ethics so they use what they can. Keeping all these things in mind, it seems that the U.S. has been fighting in a Gray Zone of sorts since inception.

Military leaders and security specialists alike are now grappling with a change in world order that has resulted in an unprecedented level of ambiguity in the way state and non-state actors compete for power. There are different conceptions of peace and war between great powers, there is no longer a Cold War, and there are more countries and peoples competing for a place on the global stage for both survival and influence. The world is now multipolar with players not afraid to confront larger powers with new, improved and different types of narratives, thought processes and technologies. The U.S. military itself is the elephant amongst nations as far as technological overmatch, none is stronger. However, after two wars and no clear victory, it seems that this overmatch is not necessarily the way to win today's perceived 'gray' battles. Thus, one might ask, is today's paradigm for war shifting or does it require a new structure of preparedness for an increasingly interconnected, level and unstructured globe. The short answer is yes. More broadly, cognitive maneuver is just as much a necessity to Joint operations as "employment of forces in the operational area through movement in combination with fires to achieve a position of advantage in respect to the enemy."<sup>4</sup>

Thus, it is necessary for the military to employ a greater range of responses during a "Gray Zone" competition that are crafted in the context of the diplomacy, information, military, and economic (DIME) framework. Specifically, the forces must understand the importance of the "I" in DIME. 'M' is necessary, however, investing in and not overlooking the use of the Information Environment (IE) is essential. Using the IE seems to be increasing as nations, many of whom have substantial and threatening militaries, and other parties are competing to defend respective global interest. Nation states understand the costs of an all-out war and, in the case of non-state actors, these groups like Da'esh, Hamas and others possess minimum kinetic capabilities and must find another way to engage and be heard.

The Gray Zone, as it is understood thus far, is ambiguous, aggressive and perspective dependent.<sup>5</sup> The U.S. security establishment is struggling to operate in such an environment. Two long wars continue to stress foreign policy agencies. The effects of these wars have stymied cooperation and weakened some of the U.S.'s best strategic thinkers and planners. U.S. policy and its implementation has become burdened with an internal political dynamic that is challenging America's ability to deter adversarial threats, often only recognizing them after the fact. U.S. current perspective on threats focuses on a strong military. However, is military strength enough or even adequate to protect the

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<sup>4</sup> "Department of Defense Dictionary of Military and Associated Terms," *Joint Publication 1-02*. Washington, D.C.: Joint Chiefs of Staff, March 15, 2015. See also, Joint Publication 3-0, Joint Operations for the 12 principles of Joint operations.

<sup>5</sup> United States Special Operations Command, White Paper, The Gray Zone, 9 September 2015.

nation. Looking at our efforts against the Islamic State and other non-state and state actors, we see that the U.S. security apparatus needs systems updating and training to keep up with 21<sup>st</sup> century change. A portion must be focused on cognitive maneuver.

Technological changes are occurring by innumerable leaps and bounds. Its lightning fast changes can have a deep impact on how we recognize, categorize and prioritize threats. Further these threats are flowing in the information arena at an exorbitant rate profoundly impacting diplomacy, military and economic making the “I” in DIME quite powerful. Despite this, the perception continues to be that there is little need to improve IE capabilities nor is it essential to use the IE to protect our nation regardless of the fact that the IE is often used as a primary means of dissemination by an adversary. This is clearly the issue with non-state actors like Da’esh who have mastered the IE space and gained strength by convincing foreign fighters to come and join their cause.

The IE space is the human space and requires a greater focus on knowledge, beliefs, and behaviors. In essence, if war is ultimately a clash of human wills,<sup>6</sup> why not focus on the battle against an adversary where the “I” is the primary means of influencing target audiences to take intended actions in order to strategically, erode the will of the opposition.<sup>7</sup>

In today’s ongoing State centric competition, the use of coercive instruments like these is not necessarily new. During the Cold War between the U.S. and, the then, Soviet Union, both parties played a dangerous Gray Zone game between two countries with nuclear weapons trying to out influence the other to ensure political and national interests. These two parties engaged in economic, political, informational, and unconventional force on force warfare against each other through combined arms maneuver, proxies, disassembling governments and by intervening, often forcefully, in another countries interests to defend their own.

One can point to the Cuban Missile Crisis or the Afghan standoff between the then Soviet Union and the United States, which the U.S. saw it through a state-centric paradigm missing the cognitive signs that the events in Afghanistan were helping to spawn one of the major sub-state challenges that we face in the 21st century. Experts counseled the U.S. government to stay engaged to ensure a stable population would emerge. Unprepared for cognitive maneuver in the human domain, the Taliban later took control of the helm.

The level of complexity today, post-Cold War and September 11, has risen exponentially. States and groups used as proxies in the Cold War game are now vying for their own identity, power and authority and with them wealthy shadow governments and violent extremist have risen in many forms across the globe. The nation state “playing field,” if you will, has leveled becoming multipolar and inclusive of very influential non-state actors that include lethal and philanthropic participants all of whom can affect the world’s trajectory toward war or peace. To make matters more complicated, non-state actors have abandoned the hierarchical organizations of the past for networks that are often more difficult to clearly identify and may lack clear leadership and mission.<sup>8</sup> All of these factors challenge today’s international system of order set by the West and erode the US global advantage primarily because leaders have stopped strategizing on a grand scale and succumbed to focusing on a specific

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<sup>6</sup> Generals Odierno, Amos, and McRaven, United States Army, United States Marine Corps and the United States Special Operations Command, “*Strategic landpower: Winning the Clash of Wills*,” January 28, 2013.

<sup>7</sup> The most prudent example of this type of adversary is Da’esh.

<sup>8</sup> Sageman, Marc. *Understanding terror networks*. University of Pennsylvania Press, 2004.

region or issue forcing the nation to react instead of working steadily to study, plan, anticipate and act, often in a non-lethal manner, to another party's move.

In effect, the US seems to have forgotten how to use all elements of statecraft, including its military as a non-lethal deterrent or coercive mechanism when engaging allies and adversaries alike. This dual use of statecraft is a skill. One that is necessary when conducting governmental affairs and foreign policy worldwide. No nation is exempt from participating in this global game of chess. Even as isolated as North Korea may be perceived to be, they use military - testing missiles and other lethal capabilities - combined with a robust information campaign. North Korean leaders may test missiles to keep us guessing about their lethal threat capabilities, but more often we hear harsh rhetoric or threats through information channels. Americans are arrested, their own population repressed through force, starvation and other means to stir national, regional and global fears, but they do not wage war. They are practicing cognitive maneuver in the Gray Zone, they are using a grand narrative to inform the world that they are dangerous and irrational so that they will be left to their own devices.

In the IE, potential threats can show up without warning often cloaked, one example is that of the infamous "dark web."<sup>9</sup> Although jihadists engage in few propaganda operations on the dark web, they are increasingly using it as a space to interact with avid users and hackers, to learn techniques from them, and use the knowledge to support their cloaked capabilities in the IE.

Producing and disseminating information is a relatively low cost means of achieving global influence and can quickly set the stage for the nation or groups next moves. That combined with time sensitive professional use of media to propagate narratives means that the use of information gives an adversary the ability to "influence" globally without direct lethal engagement.

The challenge then becomes two fold. First what actions should be determined as war-like and second, with so many players in theater, how does the human mind not only identify but prioritized threats hopefully avoiding traditional war and/or endless open conflict like that transpiring regionally around Iraq and Syria by both State and non-state actors.

The necessity of combined civilian and military approaches to monitor, assess, and respond to Gray Zone competition goes without saying. Making that happen is another story. Nevertheless, in the interest of military mission success in the operational environment our forces must be equipped with the skills necessary to analyze and interpret human behaviors, maneuvers and idiosyncrasies that occur outside of the battle zone and in a gray one.

Engaging all parties, especially nuclear ones that prefer to test how aggressive they can be without direct military repercussions, Gray Zone activity will be a more trying challenge on security than it has been in the past. Vigorous engagement, however, can make interaction less ambiguous.

### *The Human Factor*

Despite the increase in information flow and technology, humans themselves provide the most information on activities. Understanding the breath of the human dimension-including narratives,

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<sup>9</sup> Dark web is a term usually used for sites that are notorious and difficult to access on the Internet. People usually refer to a 'deep web' or 'dark web.' They are distinct in that the dark web is the encrypted network that exists between TOR servers, a system enabling its users to communicate anonymously on the Internet, and their clients, whereas, the 'deep web' is simple the content of databases and other web services that cannot be indexed by conventional search engines.

ideologies, culture and even body language-Gray Zone analysts can prepare both physically and cognitively in order to improve their intelligence preparation of the battle field (IPB).

In the between state of peace and war forces have the opportunity to understand the most important actors in the OE – humans. As Dr. Ian McCulloh stated, "Military leaders today must evolve their thinking from traditional military objectives of geographic terrain to higher level objectives of social problems and influence."<sup>10</sup> In the past, our military found it difficult to develop in-depth understanding of the human domain prior to deployment. In order to prevent, shape, and win future conflicts, our forces must embrace the challenge of understanding and influencing the human domain.<sup>11</sup> To achieve victory in future conflicts, US forces will require the ability to maneuver more effectively than our opponents in the cognitive, informational and physical dimension of the IE. Part of that is learning to maneuver in that all important but illusive narrative space. To compete in this space within the IE, forces will require in-depth understanding of what we will call the cognitive terrain including the human domain and the human networks that propagate opposing narratives. It will also require a coherent strategy to guide engagements and operations, both non-lethal and lethal, from the strategic to the tactical levels. But these are not concepts to be implemented in the distant future; they could be implemented now to counter Russia, China, and non-state actors like Al Qaeda, Da'esh, and Boko Haram, and their information operations.<sup>12</sup>

The information environment is the central part of the holistic OE. As shown in Figure 1, the Cognitive Dimension of the Information Environment (IE) holds the narrative space and has tentacles that can reach throughout the holistic OE. The key terrain is the cognitive dimension because that's where ideas are received, processed, and a response is nurtured. But cultivating ideas, through narratives or otherwise, these thoughts must be conveyed through the physical, informational and cognitive dimensions of the IE, including cyber space, in order to influence. Finally, PMESII systems can also serve as part of the IE influence. PMESII systems impact human behaviors and actions in many ways. For example, PMESII systems can affect quality of life, attitudes, and receptivity to those they encounter in the OE.<sup>13</sup>

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<sup>10</sup> Moore, BG Charles L. Jr., et al, SMA White Paper: Maneuver and Engagement in the Narrative Space, January 2016.

<sup>11</sup> Moore, BG Charles L. Jr., et al, SMA White Paper: Maneuver and Engagement in the Narrative Space, January 2016.

<sup>12</sup> Moore, BG Charles L. Jr., et al, SMA White Paper: Maneuver and Engagement in the Narrative Space, January 2016.

<sup>13</sup> Joint Publication 2-01.3, Joint Intelligence Preparation of the Operational Environment, 21 May 2014

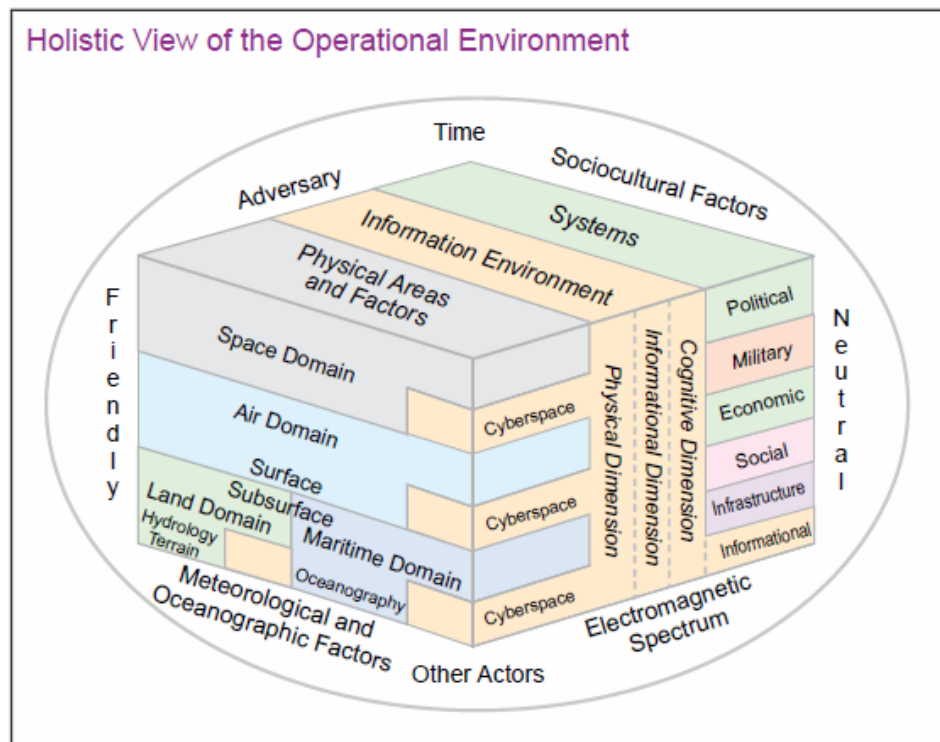


Figure I-1. Holistic View of the Operational Environment

Figure 1. Holistic View of the Operational Environment.

## IE and Engagement

*"By failing to understand that the space between war and peace is not an empty one – but a landscape churning with political, economic, and security competitions that require constant attention – American foreign policy risks being reduced to a reactive and tactical emphasis on the military instrument by default." – Nadia Schadlow*

The Gray Zone idea is an attempt to support the 7<sup>th</sup> Warfighting Function labeled engagement<sup>14</sup> and within that context revives the need for cognitive "engagement" if you will or simply understood as establishing a collective group - military, civilian subject matter experts, development, diplomatic and intelligence teams – to jointly pay relentless attention to governments, people and populations in order to anticipate and respond to actions through well informed decision making. All reinforced by historical, cultural, physiological knowledge of the forces that motivate people to do things.

Many experts are skeptics when it comes to the idea of an *engagement* stating the true gap is in the U.S. military's ability to keep up with modern day technologies and planning for the current and future OE.<sup>15</sup> Others argue the military has become too bureaucratic to operate in the abstract.<sup>16</sup> Either

<sup>14</sup> "The 7<sup>th</sup> WFF is all of the tasks and systems that military units need to do or have to do to influence people, taking into account the "socio-economic, cognitive and physical aspects of human activity." U.S. Army, TRADOC Pamphlet 525-3-0, *The U.S. Army Capstone Concept*, 19 DEC 2012, 15-16.

<sup>15</sup> Echevarria II, Antulio J., In the Gray Zone: An Alternate Paradigm for U.S. Military Strategy, Advantage Strategic Thought Series, U.S. Army War College, Strategic Studies Institute, April 2016; Paul, Christopher, Small Wars

way, it is a gap the military has spoken about but now must analyze, strategize and prepare for because the complexity of IE is growing. Unless U.S. foreign policy structure changes, immediately, the military will continue to be relied on within U.S. foreign policy if America is to maintain influence now and in the near future.

### *Why “Cognitive”?*

*"If you talk about going to war often enough and for long enough, people get used to the idea and some will even begin to think it is bound to happen sooner or later" -Stephen M. Walt*

A big part of military frustration in the fight against IS is its own operating concept in the IE. Then Commanding General Special Operations Command Central, MG Mike Nagata, worried that U.S. forces must understand the IS IE more in-depth to understand its social constructs. “We do not understand the movement, and until we do, we are not going to defeat it,” were his words. “We have not defeated the idea. We do not even understand the idea.”<sup>17</sup> MG Nagata understood that the battle needed increased emphasis on the information aspect of DIME along with the maneuvering of arms.

The actions of nations are created in the mind and formulated through ideas. Persons physically implement ideas, however, it is the mind or cognitive center of an ally or an advisory that nations wish to influence to either encourage or discourage activity with regard to U.S. interests. In that cognitive space, governments and peoples develop calculated thoughts can be channeled through actions, speech, different communications media, friends and networks and nations can respond in kind. This is all based on engagement hoping to convince others to conform to your will. When and if you’re not engaging, monitoring and assessing these behaviors in the so called cognitive space, nations all too often misunderstand other nation’s behaviors. For example, experts continue to discuss Russia’s real reasons for annexing Crimea and invading Ukraine. Russia says ‘it was to protect Russians’ bringing out historical ethos. In Ukraine some of the population has welcomed the intervention while others abhor it bringing out emotions - sadness, happiness, fear, resignation and the like. The question remains what is the truth and how does the U.S. maneuver in the narrative space to find that out without firing a shot.

International speculation centers on power and territory. The annexation of Crimea and Russia’s extended presence in the Ukraine causes other nations to rethink their perceptions about Russia. Are they becoming more aggressive, larger regional threat or is there another explanation. Discussions also broaden to a higher geopolitical level. Should America or Europe fear further Russian aggression? If the U.S. or Europe reacts will that diminish economic strength via world dependence on Russian oil? Must NATO be strengthened in order to deter Russian from strategically acquiring land mass from what is considered a sovereign country around its borders? Further, Russian military actions in Syria, their cooperation in the Iran nuclear deal, and influence in the Syrian and Nagorno-Karabakh cease fires immediately led outsiders to think about a new Cold War or Russia’s strengthened precedence on the geopolitical stage. Russia has in fact influenced the thinking or cognitive core of the West.

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Journal, March 3, 2016; Elkus, Adam, “50 Shades of Gray: Why the Gray Wars Concept Lacks Strategic Sense,” *War on the Rocks*, December 15, 2015.

<sup>16</sup> Martin, Grant M., The Sublime: The Paradox of the 7<sup>th</sup> Warfighting Function, *Small Wars Journal*, November 25, 2013; Brands, Hal, Paradoxes of the Gray Zone, Foreign Policy Research Institute February 2016 <http://www.fpri.org/article/2016/02/paradoxes-gray-zone/>

<sup>17</sup> Schmitt, Eric, “In Battle to Defang ISIS, U.S. targets Its Psychology.” *The New York Times*, December 28, 2014. [http://www.nytimes.com/2014/12/29/us/politics/in-battle-to-defang-isis-us-targets-its-psychology-.html?\\_r=0](http://www.nytimes.com/2014/12/29/us/politics/in-battle-to-defang-isis-us-targets-its-psychology-.html?_r=0)



Despite evidence that the U.S. can overmatch Russia on every level diplomatically, militarily, and economically, the West is really reacting to the information it is receiving through networks in relation to actions. Understanding history, pathways, networks and relationships can allow nations to, instead of reacting in a kinetic manner, clearly explore “why is Russia doing this?” or “what is the real meaning behind these actions?” Ironically, the West seems to be paralyzed about how to respond not because it is incapable of implementing a direct and powerful response, but because the information or the narrative coming from Russia is not well understood. Thus, confusing US action or reaction.

Some of this hesitation certainly goes with a Cold War thinking. That is, should a major conflict ensue with Russia nuclear weapons might be used. Here it is imperative to remember that most nations act to further or protect their interest, the rational intent is to maintain power not destroy itself. By convincing allies and adversaries there may be severe lethal consequences if they interfere, furthers the protection of interests and self.

Russian experts attribute Russian actions to U.S. NATO expansion policy and Russia’s primary interest of protecting its borders. They support this by extended historical, cultural, and regional studies. They spend their careers getting to know the people, their relations and networks. With this information, interpretation and prediction is built on the foundation of knowledge. Someone who has spent a lifetime learning about a region need not wonder about Russia. At the larger federal agency level these things are often missed not because people are not smart and knowledgeable, but because decision makers are not well equipped with the human resource knowledge they need to improve decisions making. This must change if the U.S. is to compete in the engagement realm. Nations act or react based on how their minds perceive what’s happening in the world. In order to keep up with this larger global vortex of movement, the U.S. must be better prepared to engage more comprehensively, cooperatively and at a more sophisticated, cognitive and instinctual level.

U.S. military forces have, as seen in the holistic view of the OE (Figure 1), part of that is the IE or the cognitive, information and physical dimensions. In 1965, the U.S. deployed army civil affairs units (CA) to Vietnam where they helped displaced people resettle and were “ordered to improve the lives of indigenous peoples through the building of Schools and the teaching of modern agricultural techniques in hopes that the local tribes would take up arms against the Viet Cong (VC) out of loyalty to the U.S. military.”<sup>18</sup> All non-kinetic actions. In effect, they were tasked much like Special Forces today when working with Iraqi populations to defeat IS. The CA in Vietnam were tasked to turn the tide against the insurgency through helping inhabitants to think, value and do, essentially, eliminate a threat by convincing the people to implement their own power against it. Later these CA teams were transitioned into robust Civil Operations and Revolutionary Development Support (CORDS) teams where civilians and military worked closely together to restore stability and oust the VC. By the early 1970’s, the VC insurgency in the South had been weakened as a result of CORDS, Phoenix and “Open Arms” programs.<sup>19</sup>

However, the effort cost the US over 58,220 lives.<sup>20</sup> Many of which could have been avoided through the operations conducted after commanders realized brute force was not enough. The effort was unsuccessfully duplicated in both Afghanistan and Iraq, however, the resources and support structure from civilian agencies were limited while the military focused on direct warfare and, thus,

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<sup>18</sup> [http://csis.org/files/media/csis/pubs/090130\\_vietnam\\_study.pdf](http://csis.org/files/media/csis/pubs/090130_vietnam_study.pdf)

<sup>19</sup> [http://csis.org/files/media/csis/pubs/090130\\_vietnam\\_study.pdf](http://csis.org/files/media/csis/pubs/090130_vietnam_study.pdf)

<sup>20</sup> <http://www.archives.gov/research/military/vietnam-war/casualty-statistics.html>

were unsuccessful initiatives in the field.<sup>21</sup> The basic point is that throughout US history civilian and military teams have not been constructed for cognitive engagement, our national security structure and system is not organized to encourage a more holistic process needed to address cognitive engagement. US effort needs teams of people, civilian and military, to cooperate on planning, implementing and assessing outcomes. Instead, the USG creates silos of efforts that do not benefit long-term strategic interests. The USG must find a way to change this system as the future becomes more ambiguous and complex or it will continue to be at a disadvantage when engaging global players that have learned to adapt.

Understanding the mind behind the person not only assists in understand stratagem of adversaries, it gives an advantage to forces when planning on how to engage— kinetically or not. Through tactics like social network analysis (SNA) combined with geopolitical assessments to further understand the importance of the IE, the military will benefit from an all-inclusive policy enabling forces and their civilian counterparts to improve threat identification, classification and prioritization and analyze how groups and nations compete for global influence, specifically in cognitive engagement allowing decisive action to knowns not reactions to things that are vague or misunderstood.

The military is focused primarily on dominance. Dominance in itself can be executed in different ways. Non-kinetic operations complement the ability to influence without physically or emotionally destructive results. During cognitive engagement, however, the idea is to walk a fine line between peace and war and, more appropriately, anticipate and/or counter adversarial moves.

These actions may not be kinetic, but they are no less valuable and often more complicated to address. Compiling, critically analyzing and interpreting people's relationships, actions, and concurrent events allowing decision makers to form a more sensible strategic response instead of one that is uniformed and reactive may just deter all of us from a deadly demise, the exact outcome that clearly nations are strategically looking to avoid.

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<sup>21</sup> In Iraq and Afghanistan Provincial Reconstruction Teams filled this role. Literature is plentiful on the successes and failures of the PRTs making the topic too broad to be discussed in detail here.

## Section 2: Human Factors Analysis

The term “human factors” has a rather broad set of interpretation depending on the context in which the phrase is used. The Human Factors and Ergonomics Society (HFES) defines the field as “the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance.”<sup>22</sup> This definition, while comprehensive, is not necessarily congruent with how “human factors” has historically been used in Information Operations (IO) doctrine, policy, and practice. Instead, the Intelligence Community definition seems more appropriate to both IO as well as cognitive engagement. Director of Central Intelligence Directive 7/3 defines human factors analysis (HFA) as, “*the psychological, cultural, behavioral, and other human attributes that influence decision-making, the flow of information, and the interpretation of information by individuals and groups at any level in any state or organization.*”

HFA can be subdivided into three principal fulcrums of assessment; group and population analysis, social network analysis, and individual and leadership analysis. Group & Population Analysis (GPA) can include social structures, stratification, and demographics, as well as the key institutions, governance, roles, culture, atmospherics, economic factors, and information networks. GPA should include not only formal (or official) structures and influences but also the unofficial, clandestine, and/or illicit. Social network analysis (SNA) examines groups of humans within and beyond the social context of institutions. SNA enables human factors analysts to understand the strengths and vulnerabilities of different types of networks, how networks structures affect social processes, and the various roles individuals play with networks. Individual & Leadership Analysis (ILA) examines the underlying human factors that affect how individuals manage their environment, process information, and make decisions. These factors include motivation, beliefs, thinking style, personality, and even (as many OSD-SMA White Papers have suggested) neuropsychological attributes.

Cognitive engagement is a data-driven approach to operations that requires HFA, not an academic exercise but as an operational requirement. HFA evaluates the psychological attributes (motivation, thinking style, beliefs, and personality), cultural attributes (values, beliefs and norms that influence behavior), behavioral attributes (responses to context or stimuli independent of personality), as well as the *neural correlates of those attributes* In order to influence decision-making (how individuals and groups select a course of action), information-flow (how individuals and groups acquire information required to make a decision), objective reasoning (how individual and groups process information they receive), *neurobiological changes to (or away from) specific states*, and ultimately, behavior of individuals and groups in any state or organization.

The papers included in section illustrate how HFA can be applied to develop empirically based approaches to cognitive engagement. Some, like those of Jonas et al and Spitaletta, represent existing capabilities while others, like McCulloh, highlight current basic research that may one day (preferably sooner rather than later) be applied to our influence processes to develop even more refined approaches. These ideas are the logical extension of previous OSD-SMA efforts reported in Reynolds & Lyle (2013), DiEullis et al (2014), and Giordano (2016).

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<sup>22</sup> <http://www.hfes.org/Web/EducationalResources/HFEdefinitionsmain.html>

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## Social Network Analysis for Influence & Intervention to Advance Military Information Support Operations (MISO): Combining the Social and Bio-Cognitive

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TRADOC G-27

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General Stanley McChrystal, a former commanding general of a U.S. Joint Special Operations Task Force operating around the globe initially attempted to understand and visualize an enemy network by applying a traditional bureaucratic military structure with tiers and rows. He reports that his team learned that these groups did not operate in a centralized manner. They operated, instead, in decentralized, non-linear lateral manner. They were complex, adaptable, and closely linked to the people and the environment they operated in. These opponents moved resources and information through social networks with unfamiliar structures and had the ability to change tactics quickly and operate independently. These networks organized themselves by “relationships and acquaintances, reputation and fame.”<sup>23</sup> By mapping these networks, understanding who communicates with who, and applying social network analysis (SNA) techniques already tested on the battlefield and validated in academia, Military Information Support Operations (MISO) can better perform their mission. SNA not only gives Psychological Operations (PSYOP) personnel a toolkit to better understand information and influence, it provides assessment tools that quantify their successes.

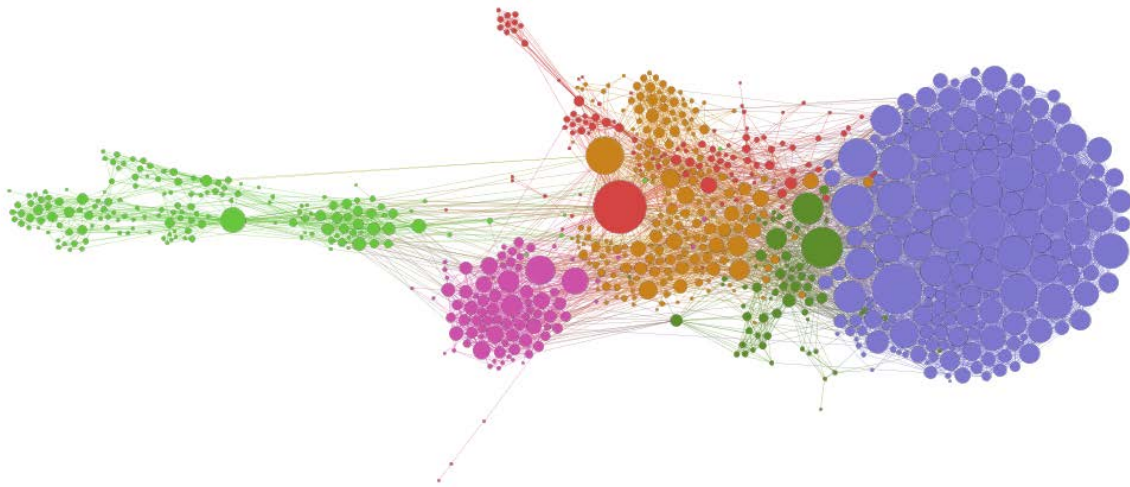
It has been well-documented that collective behaviors spread through social contact. From the emergence of unspoken social rules such as cultural norms, to the adoption of technical innovations, or the growth of social movements and political parties; social networks are the pathways along which these “social contagions”<sup>24</sup> propagate. Despite the well-established importance of social contact with regard to influence, PSYOP training and doctrine is often focused on the bio-cognitive and other psychological approaches that focus primarily on the individual. Not taking into account the well-researched social structures that affect individual behavior potentially puts PSYOP operators at risk of missing social contagions that shape the narrative space and potential future conflict. Important methodological and theoretical advancements that are being actively implemented by various agencies within the international community are seeking to bridge this gap. SNA is an especially relevant methodological and theoretical toolkit that can aid in the seven phase PSYOP process as outlined in ST 33-01 by supporting planning, target audience analysis, series development, and evaluation. SNA has already proven to be a valuable tool in identifying key players within terrorist and other criminal organizations. Since its explicit mention in Army Field Manual 3-24, *Counterinsurgency*, application of SNA has been focused primarily on identifying individual actors or subgroups that are critical to an organization’s functioning. Despite a rich academic history dating back to the 1950s (Katz and Lazarsfeld, 1955) of how social networks influence opinion formation, few if any of these lessons have been put into practice. SNA can benefit PSYOP practitioner efforts to craft better narratives or series that will resonate with their intended target audience. The following offers a broad introduction of how to

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<sup>23</sup> <http://foreignpolicy.com/2011/02/21/it-takes-a-network/>

<sup>24</sup> Social contagion theory asserts that behaviors and information travel along social connections much like biological contagions do.

operationalize SNA techniques already being taught within the Department of Defense to improve how PSYOP personnel can maneuver and engage in the narrative space<sup>25</sup>.



**Figure 2. Network visual of an individual's online social media friendship network, N=784. Larger nodes have the most friendships (degree centrality), colors are different subgroups within the network (Girvan-Newman Community Detection).**

Data to construct social networks can be derived from a variety of sources. Data can be gathered from unobtrusive and publicly available sources or by directly asking people to complete surveys or list personal contacts<sup>26</sup>. Human networks are tied together by certain quantifiable links: working together, kinship, friendship, financial transactions, and countless others. Of particular importance to PSYOP personnel may be the publically and commercially available data from social media platforms. SNA allows the mapping of these social relations that can provide important insights on data that may not have been previously realized. A number of software tools such as ORA, UCInet, NodeXL, Pajek, and Gephi can easily import and visualize social network data. Figure one shows an example from publically available data from an online social networking site. In this network, the 7,936 friendship connections (represented as links) between a focal individual's 784 online friends (represented as circles) are visualized. From this visual, several sub-groups relevant to the individuals' life can be identified along with several potentially influential individuals. Certain highly connected 'central' people can be identified and highlighted who may prove beneficial to push information out to others in the network. Different groups are uncovered by an algorithm discussed later that finds unique groups that may represent different social groups and cleavages between them. In this network, the algorithm does a remarkably precise job of identifying 6 groups relevant to the person's online network: the individual's different friends from high school (purple), college undergraduate (orange), college graduate school friends (fuchsia), professional colleagues (light green), and close friends (dark green) and family (red) of the individual who 'bridge' between the various groups. Visuals like these can be used to add understanding to noisy data environments and quickly identify influential individuals. An analyst looking at this data can make valuable insights such as how information may travel rapidly through the individual's high school associations, but the information may be slower to travel the social distance to the person's professional colleagues. Social media data can be conceptualized many other ways also, such as looking at hashtags connected by users employing them or mapping who retweets or

<sup>25</sup> JS J39 SMA White Paper: Maneuver in the Narrative Space 2016

(<http://www.soc.mil/swcs/ProjectGray/Maneuver%20in%20the%20Narrative%20Space.pdf>)

<sup>26</sup> For a primer on the development of social network analysis see Borgatti et al. 2009. or McCulloh 2013.

shares content from others as a network, or online participation in forums. Despite the power of social network data visualizations, they can still be somewhat subjective and are best utilized when combined with other SNA metrics can be leveraged to better understand, quantify, and assess the narrative space.

Centrality measures are some of the most basic yet powerful innovations of SNA. Certain individuals, based on their “central” position within social structures, may have differing access to pertinent information and potential influence over others. Academic literature from the diverse fields of sociology, management, and psychology discuss the effects of occupying certain social network positions. These lessons can be easily adapted to maneuver in the narrative space. A person who is central may receive information more quickly than others in the network and someone who has links to otherwise unconnected groups can act as a gatekeeper for the flow of information or other resources from one part of the network to the other.

The simplest centrality measure is **degree** (Freeman, 1979), which is merely the number of ties one has. In a social media network this would just be how many other people one is connected to. This can be used to quantify immediate influence. If a person has 200 social media connections we know they may be able to project a message more widely than someone with 20. A more nuanced measure is **eigenvector centrality** (Bonacich, 1972). Eigenvector centrality identifies actors who are the most connected to other actors with multiple connections. This index locates actors who are the top of hierarchies or are popular within the network. Google uses a similar algorithm to rank pages by counting the number and quality of links to a page to determine how important a website is on the Internet. In the narrative space, where individuals shape ideas and behaviors, those with more connections often have significant ability to influence others. While someone with high degree may influence many people of the first order, those high in eigenvector will be able to spread messaging to other key nodes, thereby creating the opportunity for more rapid and substantial change.

**Betweenness centrality** (Freeman, 1979) identifies nodes that lie on unique paths in the network, connecting otherwise unconnected actors. Individuals who are high in betweenness serve as brokers who act as gatekeepers for the flow of resources, such as information and even behaviors in a network (Burt 1992, 2005). People with connections that bridge different parts of the network are often less embedded in one group and may be innovators, taking ideas from different groups and synthesizing them (Burt, 2004). Actors who are high in betweenness often have a sense of the norms and differences of the groups they connect. If removed, these individuals will often fragment the network the most and increase the social distances between actors in the network.

**Key Player centrality** (Borgatti, 2006), can also be explored to identify which *sets* of individuals in a network may be the most effective at receiving or spreading information<sup>27</sup>. Here MISO teams can identify a set of well-connected actors to maximize the potential impact of a message and spread it through a given network influencing a given number of nodes with minimal overlap. This algorithm can also be applied to determine which set of nodes, if removed, would fragment a network the most and damage its ability to spread information or other resources. Figure two shows a graph of information that might spread through a network using Key Player metrics. You can see that only 4 nodes need to be selected to pass along a piece of information to over 50% of the network. It can also be seen that choosing too many actors to diffuse information has diminishing utility since there will be redundancy in who spreads the information to whom. Other measures, called community detection algorithms (CDAs),

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<sup>27</sup> Free software that implements Key Player centrality can be downloaded at [www.analytictech.com](http://www.analytictech.com), it is also implemented in ORA, UCInet, and the R language for statistical computing.



can help identify the topography of the narrative space and cleavages that exist among the target audience (TA).

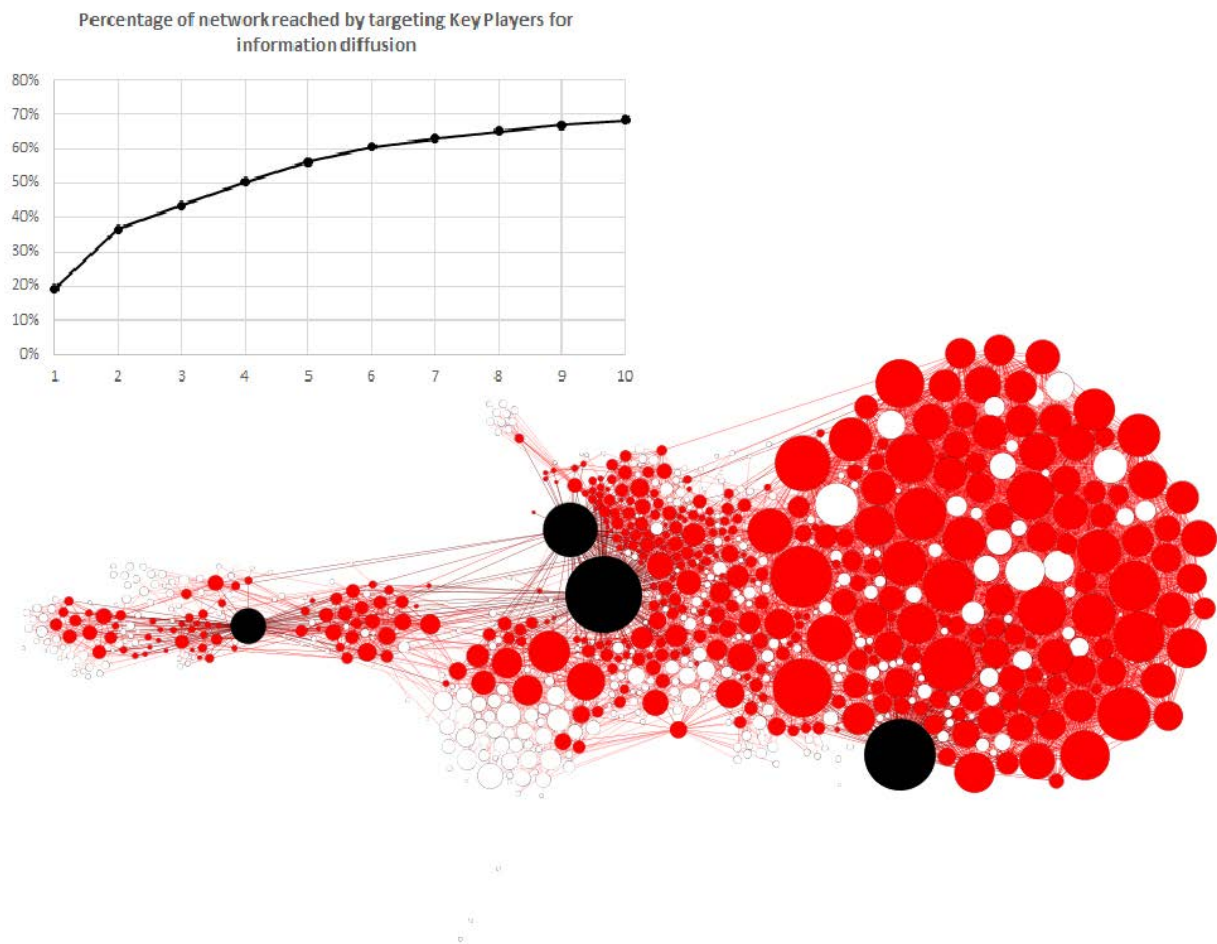


Figure 3. 4 Key Players (Black circles) that could disseminate information to over 50% of the network (Red Circles).

One of the most widely used CDAs is **Girvan-Newman (GN) community detection** (Girvan and Newman, 2002). GN allows for the rapid detection of subgroups within a given network. GN also returns a score, called modularity, of how well the network can be divided into distinctive groups. GN has been used to great effect to identify cleavages within groups, which are not easily recognized, even by those within the group themselves. PSYOP teams could use this method to increase identification of cleavages to better tailor messages and understand the topography of their intended audience. In addition to allowing PSYOP members to identify groups of people within a given network, GN may help identify factions that will eventually split into other organizations. This type of analysis provides commanders much needed human network information, which can be incorporated into the military decision-making process. Effective application of SNA techniques can reduce complexity from often-ambiguous operational environments.

SNA metrics are instrumental in recreating and planning activities in the narrative space. Since PSYOP practitioners deal specifically with the flow of information and influence, it is important to apply theory that is directly relevant to these points. As written by the prominent author and leading SNA expert Stephen Borgatti (2005) and reiterated by Aral and Walker (2012), different resources diffuse

through social networks in different ways. Information flow and influence are often nonlinear and are difficult to understand, much less predict, without first mapping the underlying relationships between those you are hoping to influence. These network pathways should be considered by MISO planners and analyzed when preparing for influence operations.

Another measure that is applicable to MISO is actor density or, simply how connected an individual's network is to each other. To cite a seminal study on density (Coleman, 1988), groups such as diamond dealers in New York City are highly connected to one another in a dense network of linkages. Since nearly all of these group members have access to similar information, if someone mistreats someone else, the news travels quickly to everyone in the group. This allows them to conduct financial transactions based on trust rather than legal documentation, since to wrong any individual member of the group could result in expulsion by all. This measure of how well one's connections are connected accurately shows how embedded one is in a certain social structure. Actors with dense networks tend to have strong ties to one another, share a similar identity and norms with those they are connected to, and are often more resistant to outside influence. In a narrative space, one would expect actors who are high in density to be 'flying the flag' of their group, thereby espousing their identity offering insights to future behavior. Densely connected actors are likely to be interchangeable with their network colleagues because they likely have access to similar information and resources due to the redundancy of their social connections. Nevertheless, actors in dense networks may prove more difficult to influence, especially from outsiders to their network. Dense networks tend to be good for the transfer of complex, tacit knowledge (Centola and Macy, 2007) yet often lack novelty compared to networks that bridge together different groups with innovative information. Density is in many ways an inverse measure to the before mentioned betweenness centrality, which detects people who bridge otherwise unconnected actors. Density can be easily measured by the metric that bears its name or also by the slightly more refined **effective size** measure. Effective size (Burt, 1992) calculates an actor's degree centrality and then weighs those connections by the interconnectedness of their 'neighbors', giving a higher score for individuals who connect otherwise unconnected people and a lower score for people in dense networks where many actors are interconnected. Taking into account if individuals are embedded in dense networks during the planning phase could help identify difficult to influence regions of the network that may require uniquely tailored series and products to intervene with.

Key opinion leaders in social networks often vary by topic, but can be identified through social network metrics and engagement with the target audience. For instance, understanding who the TA looks to for religious inspiration may be very different than who people go to for political advice. This slightly glib example highlights the very well-studied phenomenon: that we often rely on certain people within our social network for certain types of information. We use our social contacts to effectively filter media, be it politics, religion, or other important matters. This phenomenon is referred to as the two-step flow model of communication (Lazarsfeld, Berelson, and Gaudet, 1944; Menzel, 1957). The conclusion directly invalidates the 'Magic Bullet' theory of communication, which essentially states that well-crafted media messaging can change the mind and even the behavior of an actor. Research in the fields of communication, sociology, political science, to management, concludes that media messaging in isolation tends to only influence behavior if the problem is low-risk and highly ambiguous, such as choosing one of many breakfast cereal brands available at a local supermarket. MISO teams are faced with high-risk problems and confronted with groups that harbor deeply held, often unfamiliar, cultural beliefs and traditions. Shaping or influencing in these cases requires diligence in identifying key opinion leaders, engaging with them, seeking clarification through subject matter expertise and intervening in a way that uses existing social networks to accelerate the flow of information.

**Table 1. How effective influencers may vary with changes in decision-making ambiguity and risk**

	<b>High Risk</b>	<b>Low Risk</b>
<b>High Ambiguity</b>	<p><i>Example:</i> Joining a VEO you know little about</p> <p><i>Effective Influencers:</i> Key Opinion Leaders within one's personal social network supported by media to create perceptions low ambiguity.</p>	<p><i>Example:</i> Small household purchasing decisions in which there are multiple brands</p> <p><i>Effective Influencers:</i> Media messaging</p>
<b>Low Ambiguity</b>	<p><i>Example:</i> Joining a local militia which your family has close ties</p> <p><i>Effective Influencers:</i> Key Opinion Leaders within one's personal social network. Media may be leveraged to create perceptions of ambiguity, but will likely be rejected as less credible than direct social connections.</p>	<p><i>Example:</i> Which religious service to attend or readings to study. As a devout member of a religion finding texts to read or ideologues to follow is relatively easy to do and may only bear the consequence of wasted time</p> <p><i>Effective Influencers:</i> Existing social norms and trusted social network members</p>

It is naïve and counterproductive to simply rely on cultural stereotypes in order to identify who is influential in a given TA, such as the 'village elder'. Organizational science teaches us that humans rarely seek information from the best-suited person to solve our technical problems, nor do we always seek out traditional leaders such as a supervisor. Rather, people routinely ask friends and those who are easy to access and those that they trust (Lazega and Pattison, 1999; Agneessens and Wittek, 2011). Eigenvector centrality can help to identify opinion leadership. By combining eigenvector centrality with 'on-the-ground' ethnographic knowledge from a subject matter expert or someone within the network can offer MISO personnel valuable insights when performing target audience analysis, aiding in crafting effective series and be used to assist in measuring the effectiveness of a given series after it is delivered. Publically available open data can be exploited by running a relatively simple analysis using commercially available off the shelf programs like Scraawl, Maltego, or by using open-source code in programming languages such as R or Python. This data could then be imported into a social network analysis package to use eigenvector centrality<sup>28</sup> to identify which actors are most likely opinion leaders. Then either through careful examination of what they speak out about or by asking people connected to them why they look to that person for advice given certain topics MISO members can better target messaging to influence a larger portion of the TA with an increased likelihood of producing real behavioral change.

The idea that sources must be credible is nothing new, but it is important to reiterate that credibility is heterogeneous given different subjects, and knowledge of social divisions within the TA is necessary to create meaningful influence. For example, when looking at one's own personal network,

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<sup>28</sup> Technically in-eigenvector centrality, since the network would be 'directed' consisting of social network followers

the people you seek in order to gather information about technology will be different than those you go to for advice about politics or religion. Finding credible and relevant opinion leaders can be done by using SNA mapping and analysis of the narrative space along with wider populations fused with existing knowledge of the human domain. Identifying these opinion leaders requires a shift in thought as well. Analysis of these social networks coupled with understanding and quantification of who influences whom in a given operational environment, could yield more effective engagement recommendations<sup>29</sup>. To focus myopically on threat networks yields a disjointed view of the population and risks oversight of important individuals who may be deterred from radicalization or informants who can provide valuable information about how an attempt to radicalize works within the network as a whole. Furthermore, by broadening our scope we can identify friendly actors who may have connections that enable them to better influence threat networks.

Given the complexities of the narrative space, it is imperative that PSYOP members be trained to use SNA methods as a valuable asset in the cognitive battlefield where complex narratives, ideas and behaviors reign. SNA is a theory accompanied by a set of methodological tools that can help teams navigate social contagions to effectively intervene in a network. TRADOC G27, offers training on social network analysis that would enable PSYOP members to apply these tools in order to enhance their ability to conduct the PSYOP process. The training to enhance PSYOP process skills with SNA can be conducted at any level from platoon to combatant command, allowing soldiers to better understand their operational environment, to more effectively analyze and communicate with target audiences, and to more accurately evaluate the effects of PSYOP operations. By adding social network analysis to the existing MISO toolkit and leveraging the extensive social science research in behavioral change, we can empower PSYOP operators to dominate the ambiguity of the narrative space.

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<sup>29</sup> In the near future these recommendations could also be based on predictive models of information through social networks. The ability to accurately model and simulate the diffusion of information and behavior is the cutting edge of network analysis. This has already been done through the use of stochastic actor-based models for network dynamics (SIENA) modeling (Snijders 1996; 2001). However, these models require substantial training in statistics to run and interpret. Additionally, models or simulations have many underlying assumptions that may be inappropriate when applied to the narrative space. Many current models are not robust enough to inform a commander's decision making, especially in complex, ambiguous operational environments. However, social scientists supporting the forces should be aware of these models and know their shortcomings and strengths to evaluate if they could correctly inform course of action development and war gaming.

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## Engaging Decision-Making

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### *Abstract*

The most precise component of Human Factors Analysis is Individual & Leadership Analysis (ILA) whose fulcrum of assessment is typically an individual. (ILA) examines the underlying human factors that affect how individuals manage their environment, process information, and make decisions. Decision-making is a form of problem solving (Fletcher, 2004) requiring an ongoing multi-pronged implicit cross-referencing process of projection, empathy, correlation, and rejection (Boyd, 2010). Boyd's OODA Loop can be employed as a model of decision-making to facilitate engagement. The following article describes Boyd's model in bio-psycho-social terminology and provides suggestions as to how this information may be employed in cognitive engagement.

### *Introduction*

Behavioral operations (the study of attributes of human behavior and cognition that impact the design, management, and improvement of operating systems, and of the interaction between such attributes and operating systems and processes) approach to social network analysis (SNA) provides a sound approach to the initial targeting phase of an adversary macrocognitive system (Gino & Pisano, 2006). The core idea of behavioral operations is exploration of the intersection of behavioral decision research (BDR) (oriented toward individual behavior) and operations management (OM) (oriented toward systemic behavior) (Gino & Pisano, 2006). OM contexts are complex organizational settings where individual biases interact with each other and heuristics are used at different stages of the decision making process by different decision makers while operating problems are perpetually dynamic processes which engage groups of people possessing heterogeneous skills and organizational responsibilities within a macrocognitive system (Gino & Pisano, 2006). Decision-making has been studied intensively in disciplines from cognitive psychology to behavioral economics and correspondingly a number of models and/or frameworks have been postulated to represent the decision-making process.

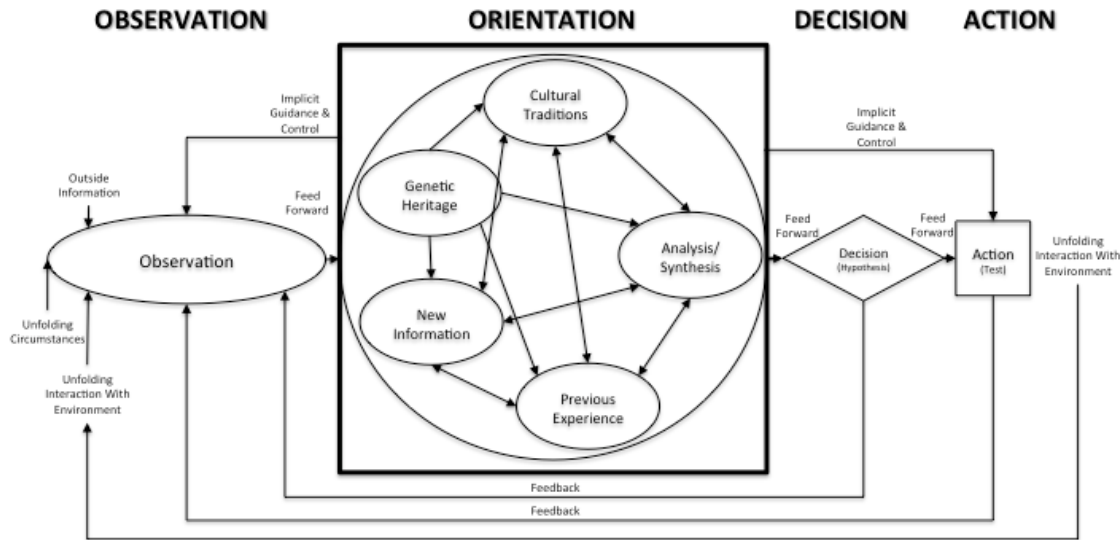


Figure 4. Boyd's OODA Loop (Adapted from Boyd, 2010).

Decision-making, as it pertains to military psychology, is a form of problem solving (Fletcher, 2004) or the selection of an "Action" in highly complex environments (Grier, 2012). Boyd's OODA is not a serial procedure but an ongoing multi-pronged implicit cross-referencing process of projection, empathy, correlation, and rejection (Boyd, 2010). The model represents "an evolving, open-ended, far-from-equilibrium process of self-organization, emergence, and natural selection" (Boyd, 2010 p 4). Boyd's model can be synthesized with the neural process model of automatic multi-structure controlled social cognition (Lieberman et al., 2003) as well as Baddeley's (2003) working memory model to provide neuroanatomical and cognitive reference points to the original. Lieberman's construct is a two-component system (X and C) that describes a systematic interaction between "Observation" and "Orientation" that produces a refined output, "Action" (Lieberman et al., 2003). Working memory is the capacity to store and manipulate information in short-term memory (Baddeley, 1992) and is an enabling capability of the OODA Loop (Matthews, 2013). Baddeley's (2003) model has four main components: the central executive, the phonological or articulatory loop, the visuospatial sketchpad, and the episodic buffer (Baddeley, 2003).

Tactical decision-making is fundamentally uncertain (Murray, 2013) as any "Decision" is based on incomplete, inaccurate, or even contradictory "New Information" (HQMC, 1997) and the consequences of any particular "Action" are not associated with known probabilities (Gonzalez & Liberzon, 2010). Therefore, using OODA as a model of decision-making under uncertainty while lacking in scientific support from the cognitive psychology literature nonetheless has face validity.

### Orientation

Boyd's model is centered on "Orientation", the hub upon which the other elements rotate (Richards, 2012). "Orientation" shapes "Observation", "Decision", and "Action" (Boyd, 2010) and includes the complex filtered arrangement that analyzes and synthesizes new information, along with genetic heritage, cultural predisposition, and complex system of memory that comprise an individual's cognitive apparatus (Osinga, 2006). "Genetic Heritage", "Cultural Traditions" and "Previous Experience" provide the psychological foundation to function at a basic level while "Analysis/Synthesis" provides the ability to comprehend novel phenomena (Boyd, 2010). The interplay amongst these elements is underlined by working memory capacity (Matthews, 2013), and as such working memory is the limiting reagent of the model.



The first opportunity for uncertainty to manifest in decision-making is “Orientation” as “Observations” may be ambiguous, “New Information” is susceptible to misinterpretation, and the effect of implemented “Decisions” may be unclear. Lieberman and colleagues (2003) have suggested that these interactions are mediated by two neuroanatomical systems in the brain, the X-system and the C-system. Working memory plays a critical role in both Boyd’s (2010) and Lieberman’s (2003) models. Working memory, described in greater detail at the end of this chapter, has four main components: the central executive, the phonological or articulatory loop, the visuospatial sketchpad, and the episodic buffer (Baddeley, 2003). The key component of Baddeley’s (2003) model, the central executive, integrates and deconflicts cognitive resources during parallel tasks, temporarily stores and manipulates long-term memory, alters those storage and manipulation strategies, and provides selective attention to novel stimuli. While merging the concepts is not seamless, the functional descriptions of Baddeley’s (2003) components map reasonably well to those of Boyd (2010). The doubled-sided arrows amongst “New Information”, “Previous Experience” and “Analysis/Synthesis” in Figure 2 roughly correspond with the functions of working memory as “New Information” and “Previous Experience” provide input in the form of discreet pieces of information and “Analysis/Synthesis” holds and manipulates that information to make sense of the unfamiliar and dynamic (Boyd, 2010).

The X-system (lateral temporal cortex, amygdala, and basal ganglia) holistically and unconsciously integrates current goals, context, and perceptions to direct consciousness and current behavior while the C-system (prefrontal cortex (PFC), anterior cingulate cortex (ACC), and medial temporal lobes), reallocates cognitive resources to the immediate priority (Lieberman et al., 2003). The X and C systems respectively are roughly analogous to the System 1 and System 2 metaphor employed by Kahneman (2011). Regions of the C-System have been implicated in the storage, manipulation, and resolution of ambiguity and uncertainty during decision-making (Huettel, Song, & McCarthy, 2005; Goel et al., 2007). Meanwhile, working memory supports “Orientation” subcomponents. During “Analysis/Synthesis”, arguably the most demanding process within “Orientation”, the C-system can integrate and synchronize numerous bits of information (Lieberman et al., 2003) likely placing demands on the central executive (Baddeley, 2003). The X-system depends primarily on the associative links formed through “Past Experience”, whereas the C-system constructs novel associations through “Analysis/Synthesis” (Lieberman et al., 2003).

“Orientation” is the center of gravity of decision-making (Osinga, 2006; Richards, 2012) and requires both conscious and unconscious processing (MacCuish, 2012). As a careful examination of the model suggests, the OODA process is neither serial nor linear; an individual could rapidly progress (or react) from “Observation” to “Action” via “Feed Forward” if the circumstances required it. However, the capacity for intuitive “Action” is not the result of the absence of, but rather reliance upon, “Orientation”; particularly given that intuition is essentially applied memory (Kahneman & Klein, 2009). “Orientation” enables the comprehension of and adaptation to the environment as well as the recognition of the need for others to “Orient” (Boyd, 2010).

## **Observation**

Despite the OODA acronym and the linear tendency to interpret the model from left to right, action flows from “Orientation” not “Observation” (Richards, 2014). However, both operate perpetually and are mutually dependant and reinforcing (Richards, 2014). “Observation” is self- and environmental actualization through information assimilation via sensory stimuli (Osinga, 2006). For military personnel, assimilation can be augmented by technology both expanding the type and quantity of “Outside Information” that can be collected. More “Outside Information”, however, does not necessarily benefit the individual decision-maker unless they can “Orient” better as a result. In fact, the addition of

technology may actually contribute to the inability to “Orient” (Hsia, 2009) as the amount of “New Information” overwhelms working memory. This is particularly so as “Observations” in combat are often ambiguous as “Outside Information”, “Unfolding Circumstances”, and “Unfolding Interaction With Environment” can be incomplete, inaccurate, or even contradictory (HQMC, 1997). The “Observation” process, like the other components of the model, is neuropsychologically dynamic as all input from “Unfolding Circumstance” to “Outside Information” change the brain. The transition from “Observation” to the “New Information”, within “Orientation”, activates the X-System where it employs parallel input networks to integrate “Outside Information” from multiple sources (Lieberman et al., 2003).

### *Decision*

“Decision” is the review of alternate courses of action and the selection of the preferred course as a testable hypothesis (“Feed Forward” and “Feedback”). “Decision” involves the C-System, which is activated when the X-System fail to generate coherent “Decisions” during “Orientation” (Lieberman et al., 2003). “Decisions” are monitored by the ACC, which if required, signals the PFC that a conflict has been detected, requiring conscious attention and cognitive resource allocation to working memory (Goel et al., 2007). Complex tasks place high demands on attention (Osman, 2010) and given that attention and working memory utilize the same neural substrate (Jha, Krompinger, & Baime, 2007; Kiyonaga & Egner, 2014), activating the C-System places increased demands on working memory (Osman, 2010).

A “Hypothesis”, however, does not always result in an “Action”. The “Feedback” mechanism from “Decisions” to “Orientation” via “Observation” is activated if the projected effect of an “Action” does not align with one’s goal. It is difficult to predict the effect of one’s actions within complex environments, and thus “Actions” are not always prudent. When “Unfolding Interaction With Environment” fails to reduce the uncertainty, the “Feedback” via “Observation” tends to require greater C-System resources to “Orient”. This C-System activation can coincide with a more deliberate “Decision” which may not be effective under temporal demands. With individual highly intolerant of ambiguity and/or uncertainty this type of C-System activation can be relatively distressing, thus increasing the potential for decision paralysis (Bredemeier & Berenbaum, 2008) or remaining stuck in “Orientation”. An individual may not necessarily be stuck in “Orientation” if an “Action” doesn’t come quickly as inhibiting “Action” or exhibiting tactical patience may be a conscious outcome of C-System processing.

### *Action*

“Action” validates the selected “Decision” through implementation, or “Test”, but can also result from “Implicit Guidance & Control” directly from “Orientation”. Selecting an “Action” in the face of unanticipated “Outside Information” or “New Information” relies upon regions within the C-System (Lieberman et al., 2003), the rapid “Feed Forward” from “Observation” through “Orientation” to “Action”. “Action (Test)” involves the dorsolateral prefrontal cortex, ACC, the head of the caudate nucleus, and medial temporal lobe structures (Lieberman et al., 2003) and is also heavily reliant on working memory and executive attentional processes (Rocklage, Maddox, Tujillo, & Schnyer, 2010). Any “Action” Changes the “Unfolding Interaction With Environment” and thus results in new “Observations”. The more predictable the “Unfolding Interaction With Environment” resulting from “Action” is, the fewer cognitive resources are required (Osman, 2010) and the more quickly one can cycle through the process (Klein, 1997).

## Summary

Boyd (1987) advocated isolating adversaries by manipulating their ability to “Orient” by introduction ambiguity, deception, and novelty, or, in psychological terms the tactical applications of interventions that trigger the human stress response (Lupien, 2009). While Boyd’s theories have been put to practice at the organizational level in recent conflicts, they are also relevant at the individual level. Boyd’s insight should not only continue to be integrated into campaign plans focused on the imposition of will but also on training strategies designed to develop individual ability to make intuitive complex decisions (HQMC, 2011).

Engaging decision-making requires not only knowledge of the information realm (what the enemy thinks and/or perceives) but the cognitive realm (how the enemy thinks and/or perceives) therefore; understanding both structure (organizational anatomy) and function (organizational physiology) is necessary (King, 2004). Decision-making is a form of problem solving (Fletcher, 2004) within an ongoing multi-pronged implicit cross-referencing process of projection, empathy, correlation, and rejection (Boyd, 2010). The OODA loop represents “an evolving, open-ended, far-from-equilibrium process of self-organization, emergence, and natural selection” (Boyd, 2010 p 4). The term is widely used in contemporary military parlance and most service members will likely have been exposed to it at some point. That exposure may afford the opportunity to use the model to reinforce the necessity for detailed information about an individual be it an adversary decision-maker, potential human source, or a key-leader of any sort. That detailed information can be used to help one “Orient” to another, to better empathize with another in order to engage. This is a data-driven and data-intensive process, but most contemporary military operations are (or, at least should be). Understanding what information is required to better engage will enable more precise priority intelligence requirements as well as a more detailed method of planning an engagement.

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## Integrative complexity approaches to prevention in education: the key is to identify the 'cognitive casualty' in each extremism context

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### *Abstract*

Working across cultures in prevention of extremism in schools through raising integrative complexity, a key operational principle has become clear: it is vital to identify how, in each cultural context, the extremist ideology knocks out a specific kind of thinking as its first victim. This **first cognitive casualty** then has a disabling effect on empathy and higher processes such as moral reasoning and critical thinking. In designing an intervention, step one is to identify the first cognitive casualty within a given cultural context. This then shapes a newly contextualized theory of change, which is operationalized for cultural appropriateness. For example, Al Qaeda-related ideology in UK is a context in which the first cognitive casualty is the ability to see some validity in differing perspectives; ISIL internet propaganda promotes an emergency 'moral shock' that collapses a sense of time; and inter-group hostility and Salafist separatism in Bosnia-Herzegovina presented the challenge of enabling youth to emerge from a group level of mind.

### *Executive summary*

- A key operational principle for prevention in education is to identify the first cognitive casualty of the extremism in each cultural context (which then points to the resources that are needed in the intervention).
- In UK, Al Qaeda ideology's first cognitive casualty is the ability for British Muslim youth to perceive some validity in opposing perspectives.
- In contrast, ISIL's first cognitive casualty is an 'emergency' compressed sense of time, without transitional states, in which it seems that the Ideal Past (Caliphate) is now here, and the Ideal Future can be realised if you act now.
- Amongst vulnerable Serb, Croat and Muslim Bosniak youth in Bosnia-Herzegovina, the cognitive resource that it was possible to operationalize was the ability for individuals' perspectives to change over time, and to emerge from a group level of mind.
- All three approaches operationalize and measure the construct of integrative complexity, but in ways that directly engage the extremism's particular method of manipulation.

### *Introduction*

Extremist ideology of any kind shows a low complexity structure that disqualifies, as if by design, negotiated solutions for resolving intergroup conflicts (Suedfeld 2010, Suedfeld, Cross & Logan 2013). Prevention policy in the UK and elsewhere recognizes that critical thinking should be taught in schools in view of extremist over-simplifications. However, thinking can be compartmentalized, and individuals'

complexity can be high in one domain and low in another (Hunsberger, Pancer & Pratt 1994). Thus, a generic approach may not succeed. Our prevention work in schools leverages higher levels of integrative complexity in tailor-made, strategic ways in each context (Savage 2015). This requires diagnostics. Working across cultures, a key operational principle has become clear: it is vital to identify how, in each context, the extremist ideology knocks out a specific kind of thinking as its first victim. This **first cognitive casualty** then has a disabling effect on empathy and higher processes such as moral reasoning and critical thinking. In designing an intervention, step one is to identify the first cognitive casualty within a given cultural context. This then shapes a newly contextualized theory of change which is operationalized for cultural appropriateness. Below, this process is described, using IC Thinking work in three different contexts: Al Qaeda-related ideology in UK; ISIL internet propaganda; and inter-group hostility and Salafist separatism in Bosnia-Herzegovina.

### *Addressing Al Qaeda-related ideology in UK*

Al Qaeda-related ideology is based on the scholarly but value monist writings of Qutb, Maududi, Wahaabi and Deobandi theologians and others that declare a complete separation of 'True Muslims' from all others (Roy 2004). Bifurcating Muslim culture from Western culture in this way increases alienation and vulnerability to recruitment among youth. The **first cognitive casualty** here is the ability for Muslim (and non-Muslim) British youth **to perceive some validity in differing perspectives** (Baker-Brown et al 1992). Identifying the first cognitive casualty also indicates which resources to bring into the room, in order to support young people's normal developmental pathway towards complexity. Thus, the method we use here (Liht & Savage 2013; Savage, Liht & Khan 2014) is to leverage multiple viewpoints within a safe terrain: not focusing on Western viewpoints which are de-legitimated by definition by AQ, but rather by engaging with the breadth of (Sunni) Islamic discourse which spans a number of competing positions such as pietist Salafist, moderate traditionalist, Caliphate activist, Sufi integrationist, and jihadist. We exploit this ingroup multiplicity to increase complexity of thinking. Pre-post test results from 25 group interventions show that over 16 contact hours, higher IC reliably spreads firstly towards the ingroup, and then, as if by osmosis, towards the outgroup (westerners), through participants' discovery of shared values between Muslim and Western cultures (Savage, forthcoming). Using multi-media course materials, and transformational learning group activities, trained facilitators enable participants to work through the steps of raising integrative complexity by 'laddering down' to underpinning values, in order to explore value trade-offs in line with participants' own value hierarchies and religious traditions. This strategy works in the UK Muslim youth context because the different Islamic viewpoints are well known and really matter to the target audience. In short, it is vital not only to identify the cognitive casualty, but also to connect with the personal concerns, interests and socially shared worldview of that target audience.

### *Addressing the impact of ISIL Internet propaganda*

When people read word-based material such as Al Qaeda (AQ) ideology, the 'propositional cognitive system' is utilized, according to dual systems models of the human mind (Teasdale & Barnard 1987), a way of processing that overlaps with the sophisticated language and logical problem solving specialisms of our brain's left hemisphere (Schwartz & Begley 2002)). A surface reading of ISIL ideology shows it to be quite similar to the ideology of AQ, using passages from similar *suras* and *hadiths* to justify violent jihad as the pinnacle of Muslim duty (Winter 2015). However, ISIL propaganda carries much greater visual, emotional and embodied impact, processed through the 'implicational cognitive system' (Teasdale & Barnard 1987), and using the brain's more broadly neuronally networked processing of the right hemisphere, with its closer links to the senses, embodiment the limbic system (Schwartz & Begley 2002).

Unlike AQ, ISIL propaganda largely *assumes* that a complete bifurcation between itself (the 'True Muslim' ingroup) and any who oppose ISIL (the outgroup) to be already in place. Argumentation is mainly to assert post hoc religious legitimization of ISIL's actions. It seems that the influence of ISIL depends less on content-based arguments than on mechanisms such as the familiar 'bad cop/good cop' strategy often used by manipulators. ISIL's 'bad cop' mode is replete with visually rich brutality such as ritual beheadings or crucifixions, whose impact is to create a 'moral shock' (Snow & Soule 2010), a frozen cognitive state that collapses a sense of time, but motivates action. Thus, we consider that ISIL's **first cognitive casualty is a sense of time**.

In this compressed time state, ISIL propaganda feels congruent when it claims that

The Ideal Past (Caliphate) is now here

The Ideal Future can be realised if you act now.

Past, present and future seem to exist together without transitional states. Cause and effect thinking, which relies on perception of events over time, is absent. This is a sign of 'fast' thinking (System 1) rather than 'slow' deliberative (System 2) thinking (Kahneman 2014). In real life emergencies, fast System 1 thinking saves your life. Time seems to stand still as you rush to immediate action, thanks to speeded up brain processes. These more powerful, faster, older-evolved (mid-brain) limbic system processes include the fight/flight/freeze response. Real emergencies unfailingly activate this response. Situations *construed* as existential or moral emergencies will also activate it, and this is what ISIL propaganda seeks to achieve through brutality. In an emergency state, the blood flows preferentially away from the neo-cortex (and its capacity for logical reasoning), flooding the limbic mid-brain, and particularly the amygdala (Schwartz & Begley 2002). The knock-on effect of ISIL's **first casualty, time**, is stymied cause and effect reasoning. Moral reasoning depends perceiving consequences arising from cause and effect, and is also deterred. A temporal sense of how things can change over time is similarly absent, thus preventing the contemplation of any alternatives.

However, this, as any shift to limbic dominance is normally short lived. The brain readily returns to equilibrium once the emergency has been dealt with, and the hormone cascade has subsided. Thus, ISIL propaganda has the challenge of maintaining limbic dominance, to keep System 2, deliberative thinking off-line. To do so, it seems necessary to continually refresh the shock sparked by brutality. Drawing on the thematic analysis of the entire ISIL propaganda output over one month (Winter 2015), alternating brutality with a desire for utopia seems to achieve that refreshed moral shock. The frequency of utopia events dominate by far. Second in frequency are mainly glorious war and military events. Third in frequency are victimhood events, with brutality events fourth, and belonging and mercy the least frequent. The frequency patterns among the six themes shows that spikes in brutality correspond to **dips** in utopia. In this way, brutality and utopia themes are kept separate in the online propaganda presentation, perhaps to avoid cognitive dissonance that could otherwise trigger critical thinking amongst viewers.



The six propaganda themes identified by Winter (brutality, victimhood, war, mercy, belonging, utopia) can be collapsed into two meta-themes, **Violence** and **Desire**, in view of their differing impact on the limbic system and ingroup/outgroup biases:

**Violence:** brutality (shock and awe at new levels of brutality); victimhood (Syrians/ Muslims as victims); war (represented by military success)

**Desire** for mercy (clemency, redemption, a new start for those who adhere to ISIL); belonging (to like-minded jihadi brotherhood, sisterhood), utopia (a just social order based on black and white rules and punishments, romance, marriage, family, children playing, planting crops, protecting ecosystem, jobs and career advancement). (Winter 2015).

In short, it seems that alternating between ‘bad cop’ brutal violence and ‘good cop’ desire for utopia is used to refresh the moral shock. The vastly more frequent use of utopia themes (Winter, 2015) across the year 2014 suggests that limbic dominance is largely maintained over time by desire, even if it is triggered sporadically by brutality. Both themes speak directly to the limbic system through positive stimuli regarding the ISIL ingroup (utopia, military success, mercy, belonging), and negative stimuli regarding the outgroup (brutality against ISIL opponents and victimisers of Muslims).<sup>30</sup> Motivation to act is strong, risk is attractive, confidence is high, and a compressed sense of time prevents cause and effect and moral reasoning. To avoid cognitive dissonance with one’s online commitments, for some young people can mean travelling to Syria or Iraq, or carrying out a lone wolf attack in the West.

To restore a sense of time, the IC intervention enables participants to identify ‘fast’ (limbic) thinking from ‘slow’ thinking (deliberative, complex reasoning), and to employ normal temporal sequencing about issues close to, but *other* than ISIL. These have to be issues that matter to them personally. The goal is to enable perception firstly of mono causality, then of multiple causality, and finally, mutual influence, reinstating higher neo-cortex processing, and releasing from limbic dominance. The key in this process is to engage participants’ empathy towards self and other through right hemisphere engagement via creative activities. Without empathy, dialectical complexity (Conway 2014) does not develop, and ingroup outgroup categories remaining fixed as all good/ all bad. But if empathy is engaged, there are increases in both dialectical and elaborative complexity (Savage, forthcoming). Through iterations of IC-scaffolded activities, the propaganda loses its ability to shock and excite, and critical reasoning is restored step by step.

### ***Bosnia-Herzegovina***

Prior to the 1990s war, Bosnia-Herzegovina was a predominantly a moderate Muslim culture with a habit of good neighborly relations between Muslim Bosniak, Serb and Croat citizens, despite historic grievances in the past. The post war peace settlement bizarrely has increased ethnic differences, for example through the current post-Soviet education system that maintains separate history books and separate curriculums for the three ethnic groups, each with their different accounts of the recent traumatic past (including genocide denial) (Ahmed...). This fragile ‘peace’ includes 68% youth unemployment and youth disengagement and passivity in the face of rampant political corruption. New Salafist enclaves within with Bosnia-Herzegovina are now seeding Muslim separatism, yielding recruitment to ISIL, at levels proportional to Belgium and Britain (Jusic 2016).

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Through background research and fieldwork, it became clear that, similar to young British Muslims, the **ability to perceive some validity in opposing viewpoints** of Bosniaks, Serbs and Croats was a key cognitive casualty. However, the existence of multiple viewpoints in society is an officially avoided resource, and was therefore impossible to leverage as an opening strategy. So, we focused on the potential for change within the individual, as his or her perspective changes over time. This temporal change does not invalidate the earlier view, but in a cumulative, developmental progression, new integrated ways of looking at the social world can be achieved. Thus to pursue our identified core resource ('differing temporal perspectives', according to the Baker-Brown et al 1992 coding manual), we used a narrative structure for each session (the protagonist, the context, the obstacle, the crisis, the help, the resolution) to achieve awareness of how a person's perspective can change over time through experience. This included awareness of how the participants shifted to a group-based mindset under conditions of threat or ingroup bias.

To provide a lingua franca for groups of our 15-25 year old media savvy Bosniaks, Serbs and Croats, we framed the session topics using film clips from blockbuster films (The Matrix, Lord of the Rings, Avatar, Star Wars and Wizard of Oz), so that contentious themes were introduced in a way that was implicit, open ended, ambiguous and searching for more information (at IC score 2). The narrative structure to the session was used to precipitate a 'crisis' in the room that evoked a regression to a group level of mind, which orchestrated a drop in complexity of thinking to IC score 1. This drop in complexity achieves a vital learning point. Cognitive constriction riding on the back of intergroup processes such as outgroup derogation, stereotyping, polarization, majority influence, became visible to participants. The experience of the drop in IC enabled people to 'see' their thinking and to link that to social events and pressures within their lives and milieu.

We observed that physical movement in the room was required (through role play, or other group activities) in order to trigger awareness of how groups very quickly develop a shared identity and group mindset with concomitant simplified perceptions of the social world. Since the 1900's, the existence of a group level of mind has been contested. Le Bon's early observations of a crowd, collective mindset (1898), and research on 'ideological brainwashing' during the Korean War (1950s) were unsuccessful in demonstrating a group level of mind. The existence of a socially shared mind is the focus of a Sergei Moscovici's (1984) theory of social representations (how socially shared information is transmitted and internalized). However, this can be understood through the properties of many *individuals'* separate minds. More recently, Jonathan Haidt (2006) posits the limbic system categories of ingroup outgroup as one glimpse into a group level of mind, which is hypothesized to reside at a sub-cortical level in the brain.

It may not be necessary to posit a group level of mind residing in a particular part of the brain. My explanation follows Gibson's theory of direct perception (1979), well demonstrated among animals, as well as humans, for example, with birds in flight scanning for landing sites, shoals of fish evading a predator, or human crowds acting as 'one'. In each case, the group seeks to ensure its survival through direct perception of others' movements in the 3-D space. Applied to human groups, this direct perception can also be thought of as an emergent group mind, sustained through near-instantaneous mutual perceptions of the group's collective body postures, movements and facial expressions.

The movement basis for an emergent group mind can be seen in sectarian marches, gang turf warfare, political rallies, military boot camp, and football violence. Under certain conditions, such as inflamed political rhetoric producing a social scapegoat, a group level of mind can trigger violence of surprising ferocity against outgroups, even to the point of genocide. In short, the theory of change here is to reveal how an individual's thinking can change over time, dropping in complexity to conform to the

group level of mind, and then through IC resources, to be enabled to emerge from it, through meta-cognition, to be able to differentiate and integrate multiple features of the 'crisis'.

To conclude, operating in the arena of education, integrative complexity (IC thinking) prevention interventions seek to identify the first cognitive casualty, and then either directly or indirectly, turning that into a resource that promotes empathy for self and other, awareness of a broad range of values, and with the help of IC based transferable skills, youth become resilient to extremism and able to engage in civic participation.

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## Neuroscience of Influence

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### *Abstract*

The science of influence is often counter-intuitive. This can lead to situations where likely successful information operations are not approved, in favor of those that create unintended negative consequences. Neuroscience offers additional insight into the neural correlates of influence. It provides a means to empirically test hypotheses at the biological level. This paper introduces a neurocognitive model of behavioral influence, intended to guide Department of Defense (DoD) policy makers and planners in designing more effective influence campaigns to support vital US foreign policy interests. It calls on the DoD to invest in a deeper understanding of cognitive influence as well as increased funding to basic fundamental research in neuroinfluence.

### *Introduction*

The U.S. Military dominates the Air, Land, and Sea domains. Today, however, the bigger military challenge lies in the human and cognitive domains: influencing populations to overcome cultural bias and misinformation to align themselves with US vital interests. GEN Votel, commander of U.S. Central Command and former commander of U.S. Special Operations Command, has characterized these activities as operations in the “Gray Zone.” These activities, whether unconventional warfare (UW), civil military operations (CMO), or military information support operations (MISO), all involve targeted influence at the cognitive level.

Influence is essential for maneuver in the human domain and to address critical national security challenges. Russia achieved success in the Ukraine, not through kinetic military power, but rather through “hybrid warfare,” where they applied effective influence to persuade the population to reject their existing government in favor of Russian annexation. The Islamic State is using successful persuasion and influence to raise funds, recruit soldiers, and radicalize citizens in western countries. The US is also vulnerable to the spread of infectious disease emanating from populations that must be persuaded to take proper medical precautions. Influence is thus a critical component of national security.

Despite the growing importance of influence as an element of foreign policy and military power, the DoD still struggles to dominate in the human domain. Much of the problem is blamed on a lack of authorities or permissions. The author posits that perhaps the real issue is confidence and understanding. Senior policy and decision makers within the DoD rely on intuitive reasoning to make decisions regarding policy and authority. Influence is anything but intuitive. Decision makers need a simple model that they can use to evaluate proposed influence operations. Likewise, junior officers preparing military plans must also have a simple model they can use to develop viable influence operations or integrate influence effects within other military operations. These two communities must be able to communicate concepts efficiently with each other and have an objective means of assessing the success or failure of specific messaging goals.

Advances in neuroscience may provide solutions to some of these problems. Neuroscience allows hypothesis testing at the biological level. Certain brain regions are associated with various different cognitive responses to stimuli. These findings allow operators to test whether a desired cognitive response is present when presented with new stimuli in an influence operation. Neuroscience also provides insight into the anatomy of the brain and how certain brain regions are related, which helps form an improved understanding of how influence and decision making works. For example, decision-making is more strongly associated with emotion areas of the brain than logic areas (Damasio, 1994; Bechara et al, 2000). This counter-intuitive finding is supported by biological data and has profound implications for strategic information operations planning. Neuroscience provides objective data that can be used to inform an empirically supported understanding of influence that in turn may inform policy and planning.

This paper is organized in three remaining sections. The next section provides an overview of cognitive influence within the context of MISO, leveraging current science in persuasion. This overview provides a basic understanding of influence and while cast within the context of MISO, it finds similar application to other military operations such as UW, CMO, military deception (MILDEC), and a range of deterrence operations. The subsequent section integrates neuroscience into the discussion on persuasion. The final section outlines current ongoing research efforts in the area of neuroinfluence.

### *Cognitive Influence*

“Military Information Support Operations (MISO), formally known as Psychological Operations (PSYOP), are planned operations to convey selected information and indicators to foreign audiences to influence their emotions, motives, objective reasoning, and ultimately the behavior of foreign governments, organizations, groups, and individuals. The purpose of MISO is to induce and reinforce foreign attitudes and behavior favorable to the originator’s objectives.” (Department of the Army, 2013)

Attitudes influence behavior when they are specific, personal, and relevant (Myers, 2011). In order for MISO officers to design effective specific, personal, and relevant messages that have the ability to change attitudes and behavior, they must understand how humans cognitively process information that they receive.

People do not form their understanding, beliefs, and world view from a rational and scientific study of their environment. Aristotle’s approaches to persuasion, ethos (credibility), logos (logic), and pathos (emotion) are over 2 millennia old and uninformed by advances in cognitive psychology. Current US influence activities are either based in Aristotle’s rhetoric or worse, rational choice. For example, individuals’ behaviors such as suicide bombing cannot be reconciled with rational actor models of human behavior (Atran et al., 2007; Tetlock, 2003). We may want to believe that messaging an indigenous population with facts and evidence of adversary malign actions and intent will create an influence effect. This strategy is grossly naïve, unsupported in data, and is a major reason why the US is failing in the narrative space.

People have to make sense of the world and will have difficulty in trusting any message or evidence that contradicts their current world-view. Modern persuasion research has demonstrated that persuasive messages inside one’s latitude of acceptance lead to movement towards that position (i.e. assimilation) and persuasive messages outside one’s latitude of acceptance lead to no persuasion or even movement away from that position (i.e. contrast) (Hovland, Harvey, & Sherif, 1957). For example, people who hold political views that are slightly more liberal or conservative than one’s own are seen as reasonable and possible to engage, while views that are highly divergent are seen as unreasonable and

are rejected. In other words, a person assesses whether a new message can be integrated with one's current beliefs and self-concept.

When people encounter persuasive messaging that falls outside of their latitude of acceptance, the likely cognitive response is resistance and mistrust. Much of the research and understanding of influence is not conducted under conditions of resistance and is therefore not generalizable to many MISO or strategic influence applications. For example, advertising campaigns do not attempt to change behavior outside of a target's latitude of acceptance. If I am selling a new brand of toothpaste, I do not need to convince you that it is a good idea to brush your teeth. I need to offer an appeal, well within the target's latitude of acceptance, that my toothpaste brand may offer advantages over their current brand of choice. In this setting, Aristotle's *ethos*, *pathos*, *logos*, are likely to be effective. If, however, the goal is to create influence effects outside the latitude of acceptance, focused on polarizing issues, then cognitive resistance mechanisms must be considered.

The most common form of resistance thought to occur during persuasion attempts is *counterarguing*. This refers to the thoughts we generate that either identify weaknesses in the persuasive message itself or that bolster our existing beliefs to render them less vulnerable to such arguments (Festinger & Maccoby, 1964; Hovland, Lumsdaine, & Sheffield, 1949). Counterarguing is likely a central component that thwarts persuasive messaging relevant to the defense and intelligence communities.

Influence can be thought of like a military maneuver operation. If the goal was to conduct a deliberate attack, we would expect the adversary to establish defenses to turn, delay, or disrupt our attack. When developing a maneuver plan, much thought is devoted to understanding the terrain (target audience analysis), avenues of approach (lines of persuasion) and the decisive point is usually successful breach of the adversary's obstacle belt (breach cognitive resistance). Current MISO efforts devote varying levels of effort toward target audience analysis and lines of persuasion. They almost universally, however, demonstrate a complete lack of awareness of cognitive resistance.

There are several approaches to disarming cognitive resistance:

- 1) *Distraction* (Festinger & Maccoby, 1964). The rationale is that counterarguing takes effort. Distracting an audience with some stimuli appears to be an effective antidote to counterarguing and promotes acceptance of persuasive messages (Baron, Baron & Miller, 1973).
- 2) *Self-affirmation*. This involves thinking or writing about a highly valued aspect of the self, like one's social connections or moral beliefs. This process has led to reduced defensiveness in a variety of experimental domains from cognitive dissonance reduction (Steele & Liu, 1983) to negotiation (Cohen et al., 2007). It has also been shown to render people more open to identity-threatening information in a persuasion context.
- 3) *Narrative persuasion* uses stories, anecdotes, examples, or testimonials. Narratives tend to be more engrossing, which has several benefits. First, transportation into the narrative itself (i.e. *narrative immersion*; Green & Brock, 2000) allows deep processing of messages in a way that is not experienced as effortful. Additionally, narratives are often presented as entertainment rather than as attempts to persuade and thus they are less likely to trigger defensive measures like counterarguing (Slater & Rouner, 2002). Second, narrative immersion is often associated with identification with protagonists, which in turn may be associated with persuasion (Dal Cin et al, 2004). Degree of immersion has been associated with belief change and may function, in

part, like a form of distraction leaving a person less inclined or less able to devote the mental energy to generating counterarguments.

In contrast, *rhetorical persuasion* is presenting messages that are logical, statistical, or fact-based. These tend to promote counterarguing because they are overt in their intention to persuade (Brock, 1967). Effective messaging under conditions of resistance must carefully plan how they will disrupt counterarguing. Recent advances in neuroscience may offer new opportunities to support this objective.

### Neuroscience and Persuasion

Through the use of functional magnetic resonance imaging (fMRI) and over a decade of empirical research, we understand that activity in different areas of the brain can signal certain cognitive processes. One of the benefits of fMRI is that multiple processes can be interrogated simultaneously and the interactions between these processes can be assessed as well. Here, a neurocognitive model for persuasion-induced changes in belief and behavior is presented. As seen in the figure below, each aspect of the persuasion process that we have discussed is represented along with the hypothesized relationships between regions. Arrows connecting boxes illustrate the direction of putative causal effects, with unbroken lines representing facilitation and dashed lines representing inhibition.

The model focuses on four psychological processes that are color coded both in the model (right) and in the brain images highlighting the neuroanatomical systems (left). Successful persuasion, at least as observed in prior studies, has been associated with activity in medial prefrontal cortex (MPFC) and posterior cingulate cortex (PCC), through a process we tentatively characterize as *self-integration* (i.e. increased activity for messages and cues that are successfully integrated with one's self-concept). This network is shown in green in the model. *Counterarguing* in our pilot data was associated with right lateral prefrontal cortex (LPFC) and is shown in orange in the model. *Self-affirmation* in our pilot data was associated with ventral striatum (VS). With more statistical power we also expect to see orbitofrontal cortex (OFC). This system is shown in red in the model. Finally, *Narrative immersion* is hypothesized to rely on mentalizing regions including dorsomedial prefrontal cortex (DMPFC) and tempoparietal junction (TPJ) and is shown in blue in the model.

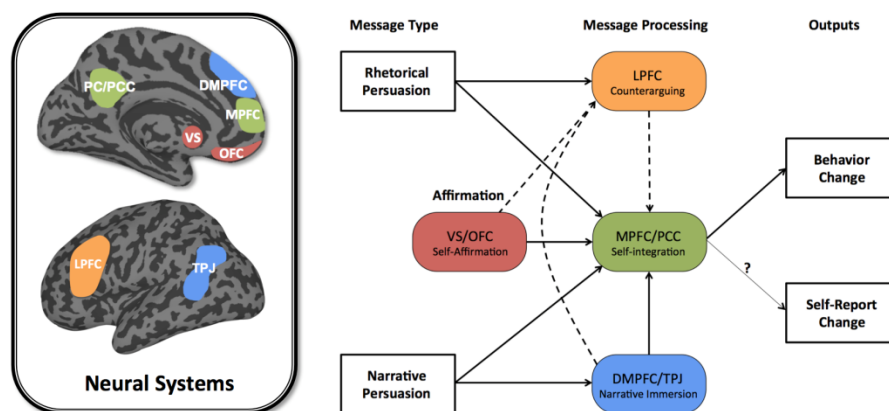


Figure 5. Neurocognitive Persuasion Model (MPFC=medial prefrontal cortex; PC/PCC=posterior cingulate cortex & precuneus; DMPFC=dorsomedial prefrontal cortex; TPJ=tempoparietal junction; LPFC=lateral prefrontal cortex; VS=ventral striatum; OFC=orbital frontal cortex).



Inputs to persuasion are shown on the left side of the model. I hypothesize that Rhetorical persuasion (i.e. persuasion based on logic, facts, and statistics) will induce both attempts at self-integration and counterarguing. Messages that are relatively innocuous and inside one's latitude of acceptance should promote more self-integration and less counterarguing. Messages that are outside of one's latitude of acceptance should promote less self-integration and more counterarguing. In contrast, narrative persuasion should induce both narrative immersion and self-integration. Self-affirmation is also viewed as an input process that moderates the neurocognitive response to the messages themselves. Specifically, to the extent that self-affirmation increases VS/OFC activity, we expect to see decreased counterarguing (both self-reported and as indicated by LPFC activity) and increased self-integration via MPFC/PCC (see preliminary research below).

During message processing, I hypothesize that three processes interact to increase or decrease the resulting changes in belief and behavior. To the extent that counterarguments are generated, self-integration will be diminished. In contrast, to the extent that narrative immersion occurs, self-integration will be facilitated. I also hypothesize that narrative immersion will lead to reduced counterarguing. Counterarguing and narrative immersion will both have their impact on outputs via self-integration, rather than having direct effects. Thus, correlations between counterarguing or narrative immersion and belief and behavior change are mediated by MPFC/PCC activity associated with self-integration (i.e. the successful integration of an idea into one's self-concept). There is evidence that MPFC/PCC activity is related to subsequent behavior change (Falk et al, 2015). The link to self-reported intentions is less clear and will hopefully be examined in future research.

The recent US-based research on neural correlates of influence demonstrates that neuroscience may be significantly more effective than traditional focus groups for understanding behavior change (Lieberman and Falk, 2014; Falk, 2015). In these studies, neural response was better correlated with behavior change than self-reported findings. Figure 2 shows the results of a study where three smoking cessation ads were shown to subjects and their brain activity was measured by a functional magnetic resonance imaging (fMRI) device. The subjects were asked to self-report on the effectiveness of the ads. The ads were aired at different times and the effectiveness of the ads were measured based on the call volume to a hotline to help people quit smoking. The neural response was better correlated with behavior change as measured by call volume to the toll free number at the end of the video after it was aired in Los Angeles.

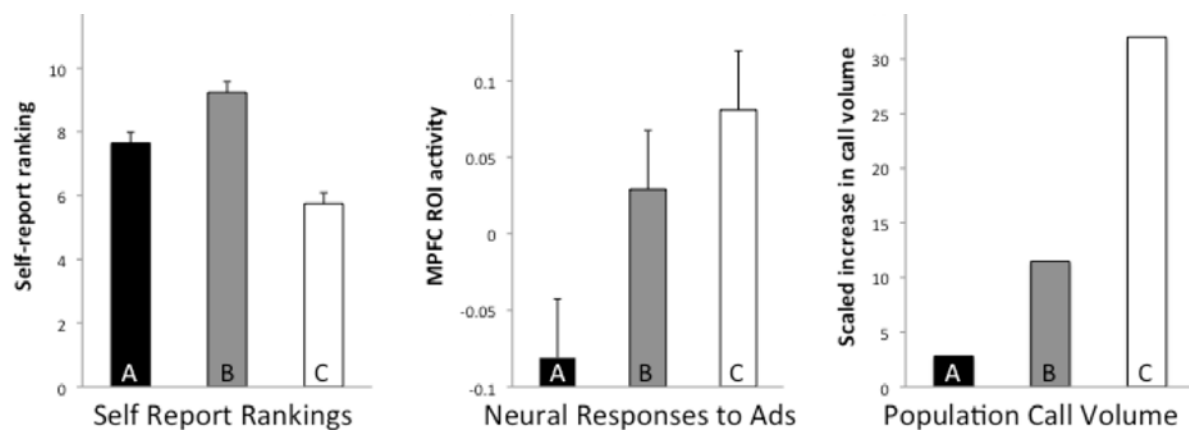


Figure 6. fMRI Results Evaluating Neural Response to Three Smoking Cessation Ads.

The important insight from this research is that current methods for product testing influence campaigns involve focus groups and surveys, which are known to be suboptimal approaches (Lieberman and Falk, 2014; Falk, 2015). Improved methods of product testing influence are required.

## *Conclusion*

This paper provides a brief introduction to cognitive influence and presents a neurocognitive persuasion model. This model has important design considerations for influence messaging. Results from neurocognitive models are more predictive of behavioral outcomes than focus groups or other traditional approaches.

In order to capitalize on this research for military planning efforts, senior leaders and planners must develop basic understanding of influence as outlined in this paper. CMO, MILDEC, MISO, UW, and other military operations must be evaluated in the context of this model. The DoD must invest in useful mixed methods research to collect relevant data to inform influence planning and then use that data to inform data driven operations and not “CONOP by good idea.” Military planners must understand influence; understand strategic goals; and develop their polls like any other reconnaissance and surveillance plan. Where is my adversary (ethnographic/in-depth interviews to identify polarizing issues and context)? Where is the location of obstacles (polling to understand latitude of acceptance)? Identify influence avenues of approach and mobility options (cultural domain analysis to understand self-affirming values and narrative analysis to understand culturally known stories that will resonate with and immerse the target audience). Breach the obstacle (design products based on neurocognitive model). Identify the establishment of successful breach lanes (product test concepts, story boards, products using brain imaging). Exploit the breach (deliver products and use polling and social media analysis to assess effect). Consolidate and perform actions on the objective (be prepared with a set of alternatives to the adversary that will allow indigenous populations to have dignity and feel success). Prepare for follow-on operations.

The DoD should fund additional research in neuroscience as applied to influence and radicalization. While neural imaging has been demonstrated to provide an effective means to measure engagement and target audience resonance with messages in recent OSD Minerva effort, this research has not been extended to social media engagement. The DoD needs to understand what aspects of social media capture the attention of target audience members at the cognitive/neurological level. They also need a method to test the effectiveness of media interventions/engagements prior to full development and employment of influence activities. Their solutions must be field portable and demonstrate effectiveness. The miniaturization and availability of functional near infrared spectroscopy (fNIRS) offers an attractive option.

fNIRS is an optical approach that approximates functional Magnetic Resonance Imaging (fMRI) at much lower cost and greater portability. Oxygenated and de-oxygenated tissue absorbs light of different wavelengths. By modulating light at different wavelengths, emitting the light on the skin-exposed areas of the cranium and detecting that light, fNIRS measures the blood oxygenation level dependent (BOLD) signal as does fMRI. fNIRS has recently been used to successfully measure characteristic neural responses to anti-smoking and anti-obesity public health video advertisements in the U.S. under Air Force Office of Scientific Research (AFOSR) funding. This research promises to equip military operators with a cost effective means to design, test, and develop much more effective influence operations to meet current challenges in the Gray Zone.

General Votel stated, “Our ability to operate in the Gray Zone is dependent on our ability to understand the human domain.” The “Gray Zone” refers to conflicts, which fall in between peaceful

interstate competition and war. He continued to emphasize the importance of understanding influence in order to meet current and future national security challenges. Russia has already demonstrated the danger of overlooking influence in Eastern Europe. "The role of [cognitive influence] for achieving political and strategic goals has grown, and in many cases, they have exceeded the power of force of weapons in their effectiveness..." (General Valery Gerasimov, Chief of Staff of the Armed Forces of Russia). Recently, the Joint Staff J39 Strategic Multilayer Assessment (SMA) has taken particular interest in neuroscience approaches for understanding influence and the "Gray Zone." This is an important step forward. DoD must now advance fundamental basic research that directly supports this critical national security challenge.

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## Section 3: The Role of Narratives in Cognitive Engagement

Narratives have taken on an increasingly prominent role in contemporary conflict and, as such, have taken a prominent role in recent OSD-SMA White Papers (Reynolds & Lyle, 2013; DiEullis et al., 2014); Giordano; 2016). Revolutionary objectives frequently define an identity group, either explicitly or by the nature of its socio-economic or cultural framing (Crossett, 2012). This partitioning is a critical component to validating claims of grievance, support, and legitimacy that are so prevalent in today's operating environment. The more salient these categorical distinctions, especially when based on cultural, ethnic, nationality, or class divisions allows the revolutionary group to recruit, frame propaganda, and sanctify their operations against the specified out-group (Bos et al., 2013). Successful movements often rely on a narrative for recruitment, legitimacy, and support that resonates with a deep cultural, ethnic, or historical myth/memory within the population (Bos et al, 2013) and thus understanding narratives (including not only what resonates by how and why) is an essential component of cognitive engagement.

Humans tend to think in stories; often linking discrete facts together in a logical sequence (sometimes to their detriment) and thus narrative analysis is a necessary component of contemporary intelligence support to MISO and/or MISO target audience analysis. Narrative analysis facilitates understanding of 1) recruitment occurring before the consolidation of formal movement organizations; 2) the conditions under which movement organizations are able to rebound from strategic setbacks; and 3) the impact of movements on institutional policymaking (Polletta, 1998). The following group of papers addresses narratives from a variety of perspectives ranging from comprehension to analysis to visualization. As the following papers highlight, understanding, visualizing, and ultimately engaging narratives are necessary components when considering cognitive engagement as a strategy. As Sun Tzu advised, it is better to attack an enemies' strategy than their fortified defenses and thus the US must understand the narrative construction process and how it manifests in various target audiences to do that effectively.

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## Narratives as the Target: A Human Dimension Paradigm Shift

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In this changing world, the Army must actively seek innovative approaches to leverage its unique strength – its people. Through investment in its human capital, the Army can maintain the decisive edge in the **human dimension – the cognitive, physical, and social components of the Army’s trusted professionals and teams**. With this investment, the Army is capable of developing **cohesive teams of trusted professionals that improve and thrive in the ambiguity and chaos of 2025**.<sup>31</sup>

### *Abstract*

Narratives should be regarded as living, breathing, adapting entities. Although developed by individuals and groups, its ability to morph and evolve makes it challenging to seize. In today’s “Internet of Everything<sup>32</sup>” world, a narrative’s reach and adaptation can grow exponentially. This fact becomes a challenge when developing strategic narratives in support of operational and tactical themes and messaging. This paper proposes to treat narratives as the main target.

### *Understanding the Power of Narratives*

A narrative is a system of stories that share themes, forms, and archetypes.<sup>33</sup> Every story in a narrative need not have exactly the same characteristics; the point is that they relate to one another in a way that creates a unified whole that is greater than the sum of its parts. Some narratives, whose stories are widely known in a culture and consistently retold over time, rise to the level of master narratives.<sup>34</sup> They are so deeply ingrained that they can be invoked by words and phrases without telling the actual stories that make them up.<sup>35</sup>

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<sup>31</sup>[http://usacac.army.mil/sites/default/files/publications/20150524\\_Human\\_Dimension\\_Strategy\\_vr\\_Signature\\_WM\\_1.pdf](http://usacac.army.mil/sites/default/files/publications/20150524_Human_Dimension_Strategy_vr_Signature_WM_1.pdf)

<sup>32</sup> “The Internet of Everything (IoE) is a broad term that refers to devices and consumer products connected to the Internet and outfitted with expanded digital features. It is a philosophy in which technology’s future is comprised of many different types of appliances, devices and items connected to the global Internet.” Ref.: <https://www.techopedia.com/definition/30121/internet-of-everything-ioe>

<sup>33</sup> One can identify two types of narratives here: Those one can exert control and those you cannot control at all. A properly developed narrative is closely controlled by its creator. In its purest form, a narrative is simply a story, or an intentional collection of connected events. An intentional narrative is almost a causation-correlation (often fallacy), where the creator(s) purposely connect events and thoughts to guide the members of the Target Audience [TA] to a line of thinking and, hopefully, a change in behavior.

<sup>34</sup> Halverson, J. R., Goodall, H.L. and Corman, S. R. (2011). Master Narratives of Islamist Extremism. New York: Palgrave Macmillan.

<sup>35</sup> Corman, S., (2011). Understanding Extremists’ Use of Narrative to Influence Contest Populations. Position paper submitted to Workshop on Mapping Ideas: Discovering and Information Landscapes San Diego State University, San Diego, CA.

### *Narratives, Themes, and Messaging—Bridging Academia and Military Doctrine*

The book, “Master Narratives of Islamist Extremism”<sup>36</sup> opens with a discussion defining a narrative as a “coherent system of interrelated and sequentially organized stories that share a common rhetorical desire to resolve a conflict by establishing audience expectations.”

Joint military doctrine<sup>37</sup> defines **narrative** as an “[o]verarching expression of the context and desired results;” **themes** as “[u]nifying idea(s) or intention(s) that supports the narrative and is/are designed to provide guidance and continuity for messaging and related products;” and a **message** as a “... tailored communication directed at a specific public, aligned with a specific theme, in support of a specific objective.” Messages should support the themes at their specific level. The themes should support (or be nested under) the next higher-level themes and support the enduring national narrative. The Joint Staff J7 guidance for CommSync expands on these by adding, “Narratives focus on context, reason, and desired results [and]...enables understanding for external stakeholders... [and] messages are “narrowly focused communications that support a specific theme...to create a specific effect.”

### *Symbiotic Relationship between Influence and Engagement*

To influence attitudes and behavior you must gain the attention of a Target Audience (TA). In order to garner and hold a TA’s **attention**, you must **engage** them. Engagement,<sup>38</sup> which is the essential gateway to influence, has a mandatory emotional component required to effectively hold the TA’s attention. Engagement then becomes the essential gateway to influence.<sup>39</sup> The paper on “The Neuroscience of Influential Strategic Narratives and Storylines”<sup>40</sup> lays out a structural model that represents the elements and techniques used to establish and to manipulate reader/viewer engagement.

Narratives also exert a powerful influence on attitudes and behavior. They consolidate memory, shape emotions, cue heuristics and biases in judgment, influence in-group/out-group

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<sup>36</sup> Halverson, J., Goodall, H. L. (Bud), Jr., Corman, S. (2011): *Master Narratives of Islamist Extremism*. New York: Palgrave Macmillan.

<sup>37</sup> Department of Defense (2013). Commander’s Communication Synchronization. Joint Doctrine Note 2-13. Washington, D.C.

<sup>38</sup> “The engagement warfighting function will institutionalize into Army doctrine, training, education, and leader development, the capabilities and skills necessary to work with host nations, regional partners, and indigenous populations in a culturally attuned manner that allows bridging language barriers, opening lines of communication and connections with key political and military leaders in a way that is both immediate and lasting. It enhances interdependence between special operations forces, conventional forces, and unified action partners while incorporating the tenets of the emerging idea of the human domain. As a result, this warfighting function will contribute to mission accomplishment by providing better, more synchronized lethal and nonlethal capabilities to assess, shape, deter, and influence the decisions and behavior of a nation’s security forces, government, and people.” Ref: <http://www.tradoc.army.mil/tpubs/pams/tp525-8-5.pdf>

<sup>39</sup> Haven, K. (2014). *Story Smart: Using the Science of Story to Persuade, Influence, Inspire, and Teach*. Santa Barbara, CA: Libraries Unlimited.

<sup>40</sup> Seese G., & Haven K. (2015). *The Neuroscience of Influential Strategic Narratives and Storylines*. IO Sphere Journal, Fall 2015. Joint Information Operations Warfare Center (JIOWC), San Antonio, TX.



distinctions, and may affect the fundamental contents of personal identity.<sup>41</sup> A master narrative is trans-historical and is deeply embedded in a culture, expanding over time. Narratives almost never stand alone, and are instead part of a cultural landscape that contains a complex system of interrelated myths, folklores, and histories. In a paper presented to defense officials at a U.S. Defense Department forum sponsored by the Highlands Group, Dr. Amy Zalman stated,

...stories move not only through living narrators but through different formal structures—from, for example, a report to a newspaper article, to a website, to a reader, who may tell the story to someone else, who may take elements of the story and reframe them on a radio program, whose listeners may pick up elements of the new story, and so on. This is a simplified version of how stories flow through space and over time [see Figure 1]. These narrative flows constantly branch and intersect. What the stories mean to those who tell them and those who listen is a dynamic process related to their context and the other stories intersecting them.<sup>42</sup>

## Narrative Flows

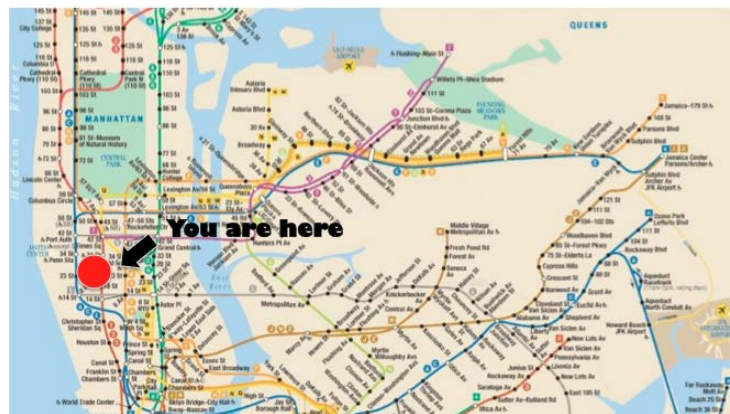


Figure 7. Narratives flow, intersect and branch, like subways, through time and space. From a holistic vantage, we can see that we are also on the narrative map.<sup>43</sup>

### Application of Narratives in the PSYOP Process

PSYOP behavior change efforts typically focus on messaging that leverages the key vulnerabilities and susceptibilities of groups and individuals.<sup>44</sup> While this has shown to be a proven combat multiplier, both at the tactical and operational level, it has fallen short in the

<sup>41</sup> DARPA's research solicitation - Defense Advanced Research Projects Agency, "Broad Agency Announcement Narrative Networks DSO DARPA-BAA-12-03."

<sup>42</sup> Zalman, A. (2005). A Narrative Theory Approach to U.S. Strategic Communication. Paper presented to defense officials at a U.S. Defense Department forum sponsored by the Highlands Group.

<sup>43</sup> (c) Amy Zalman/ Strategic Narrative, referenced with permission from: <http://strategic-narrative.net/blog/2012/03/the-definition-of-strategic-narrative-an-evolving-concept-in-international-affairs/>

<sup>44</sup> Vulnerabilities are TA weaknesses that can be leveraged. Susceptibilities are risks (i.e., risk vs. rewards) in regards to the targeted behavior. Department of the Army. (2007). *Psychological Operations Process Tactics, Techniques, and Procedures* (FM 3-05.301). Washington, DC: US Government Printing office (GPO).

effort to contest master strategic narratives.<sup>45</sup> Furthermore, often due to political considerations, too little effort is given to analyzing, understanding, and targeting the narrative itself. Consequently, US doctrine has been slow to adapt to the need for this.

Traditional PSYOP planning efforts focus on identifying the problem behaviors and problem conditions that impede the supported commander's (or ambassadors) goals and objectives; however, this retroactive approach, while good for simple tactical and operational messaging, typically leaves the master strategic narratives themselves untouched. These master narratives then continue to perpetuate unchallenged and begin to take on a life of their own, adapt, and spread like a virus. The practitioner must take into account the credibility of both the message and the sender;<sup>46</sup> therefore the message must have the irrefutable appearance of having been sent by a credible sender, and itself being credible.

### *Potential Solutions to Operationalize Narratives*

New methods are needed to not only contest existing master narratives, but to develop new ones that can dominate the narrative space.<sup>47</sup> Currently, a variety of new tools<sup>48</sup> are under development to not just analyze narratives and the component of messages but to also understand how they adapt and perpetuate over time. At the strategic level, narratives are bigger than the audience itself. Treating the narrative as a target—much like PSYOP practitioners treat a target audience for influence operations—can facilitate tracking and understanding a narrative's effectiveness in shaping a TA's behavior at the operational and tactical levels. There is no doctrine to apply methods of addressing and tracking strategic narratives, however. Thus approaching strategic narratives as if they were a TA can facilitate linking them to the operational and tactical levels in ways that can be traced and interconnected.

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<sup>45</sup> Department of Defense (June 2012). "Decade of War, Volume I: Enduring Lessons from the Past Decade of Operations." Suffolk, Virginia: Joint and Coalition Operational Analysis, p.2.

<sup>46</sup> <http://blog.apastyle.org/apastyle/2012/08/almost-published.html>

<sup>47</sup> <http://www.soc.mil/swcs/ProjectGray/Maneuver%20in%20the%20Narrative%20Space.pdf>

<sup>48</sup> These tools include (Seese & Linera): Cognitive mapping, Cognitive IPB PSYOP Modal Logic, and Perception Modeling to name a few.

## Narratives and the Warfighter

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As the world increasingly moves toward more complex asymmetric conflict, the United States must proactively learn to adapt to an increasingly fast, dynamic environment where local and regional narratives have even more prevalence on the battlefield than during the age of conventional warfare. Over the past few months, the Department of Defense (DoD) has intensified its interest in narratives and messaging campaigns. In order to inform, influence, engage, and interact with populations effectively, it is necessary to understand how they view the world and what resonates with their perceptions and values. The harder part is how to understand and maneuver within that space, what is essentially a competitive narrative landscape.

Many efforts have focused on how the DoD can “do” narratives, concentrating on how a commander drives the development of a compelling narrative, associated themes, and tailored messages to explain US presence and activities in a given area. Crafted ideally, the narrative explains and influences foreign audiences to accept US efforts and diminishes adversarial narratives intended to counter American actions. As narratives are, essentially, a story or series of stories with which a population has an emotional attachment and uses to explain the world and its place in it, they are powerful vehicles for interacting with other populations. The value of the narrative is that it provides a framework to shape and impact how people think and act in an operating environment.

### *Doing Narratives*

US narratives must nest within the hierarchy of the strategic, operational, and tactical levels. Alignment is critical for the US to synchronize activities vertically (in the nest) and horizontally (across the services). With alignment, the US narrative’s credibility can increase and lead to greater resonance, while it simultaneously reduces the possibility for DoD mission sets to appear contradictory to local populations (DTD 2016). The process is not complete, however; while it represents a “whole of government” strategy, it doesn’t quite explain “how” to do narratives, nor does it address how to understand what the competitive narrative landscape looks like in the area of interest, two key pieces required to maneuver in that contested battlespace.

The commander ultimately determines the mission narrative. In order to provide him/her with the local perspectives required to “do” narratives effectively, the analyst must map the contested narrative battlespace. The process involves researching the major narratives in a given area, paying close attention to the narrative arcs and major themes that resonate with relevant audiences. During the research and analysis process, the focus is on narratives from both the emic and etic perspectives. According to linguist Kenneth Pike (as cited in Fenstermacher 2016), emic is the view from the inside, opposed to etic, the view from the outside.

For purposes of understanding narratives, we suggest inverting the typical applications of emic and etic. Competing in the contested narrative landscape requires a solid understanding of US culture, politics, and strategy, which makes us the “people under study” who need to understand how other people and cultures view us, which makes us the people being viewed and judged externally. It is very difficult to look at the world entirely from another person’s or people’s perspectives. Flipping the two perspectives induces a less ethnocentric approach and aims to reduce personal and cultural biases. The US narrative at the operational and tactical levels includes commander-driven narratives that must

resonate with and compel the emic beliefs and worldview held by local populations. For our narratives to be accepted or tolerated, they must also consider how other people view us in a particular environment. Together, the emic and etic narratives must be analyzed and assessed; the commander cannot formulate his/her narrative without having an understanding of local emic and etic perspectives. With this information, the commander's narrative frames US actions in a more compelling manner and builds upon or alters the local populace's pre-existing perceptions about the US.

The challenge for the services, particularly at the tactical level, is how to conduct research quickly and effectively so that it can be operationalized into planning and operations. The analyst, or a small team of analysts, is responsible for conducting the research and analysis, often under time and resource constraints. Most operators do not have access to advanced analytics, algorithms, or programs, and when they do there may not be lead time to design and conduct a rigorous study. They are also often subject to low bandwidth and limited computing infrastructure, which further limits their ability to do complex calculations on a data set without quick turnaround reach-back capabilities that may not exist. Long-standing research on the complexity of the narrative environment may also not be immediately available.

The planning process, and in particular rapid response planning processes (R2P2), often limits the time available to conduct research. Ideally, an analyst would have advance notice and develop a deep understanding of the narrative environment. However, it is not always realistic; in fact, for accelerated planning, the analyst may have to look broadly at US and foreign national strategic narratives, guidance from higher headquarters, and the most readily-available information on local perceptions and beliefs to provide the commander with immediate recommendations. While this strategy fits the time constraints, it often misses the cultural and bio-psychosocial inputs needed for the commander's narrative to operate effectively in the narrative battlefield. At minimum, an analyst should attempt to assess news headlines from popular media to ascertain what the current local issues are, understanding that the assessment comprises a quick look at the media environment that is not based on rigor.

During deliberate planning, the opportunities to derive the major narrative themes in an environment increase, allowing for more robust analysis. Analysts can start with higher headquarters' guidance and tailor their research to examine specific groups in the designated area of operations (AO). Because the tactical-level narrative must nest with higher, these upper limits can focus the workload on the critical, granular narrative themes stemming from relevant audiences in that AO. Major narrative themes are not a substitute for narratives, though they do illuminate how an individual or group prioritizes specific topics and uses specific language to discuss those topics. Thus, they provide some, albeit not comprehensive, insight into the cognitive processes that are shaped by narratives and worldview.

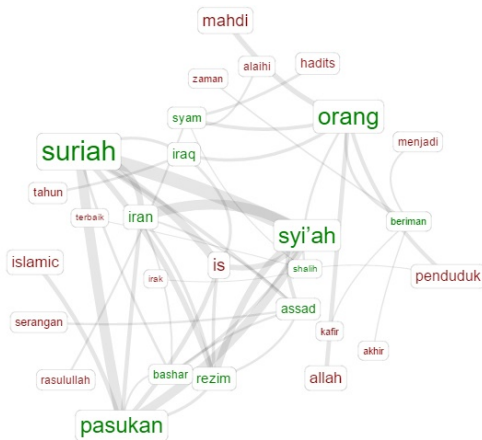
One approach that ties neuro-cognitive and bio-psychosocial techniques to narrative is to use rhetorical and discourse analysis. Through rhetoric, the precise words that people use to express themselves, and discourse analysis, the study of analyzing written and spoken expressions, an analyst can gain insight into an author's mindset, which includes emotional state, beliefs, preferences, biases, thinking, memory, decision-making processes, etc. These approaches add to an understanding of cognition and behavior, while also providing information about the variables involved in the analysis of aggression, violence, and radicalization; the research outputs contribute to our understanding of how the mind frames issues and problems, which can become building blocks for narrative thematics.

In order to derive narrative themes or major topics of conversation, an analyst can perform open source research and utilize software that is either already installed on the computer or tools accessible on the web. The analyst must first identify popular and reliable sources of information, such as a news website or blog, or look for specifics on an individual via their speeches, social media posts, or other forms of public communication. When other resources are available to enhance the speed and quality of the research, such as a reach back capability or access to social scientists and cultural advisors, they should be utilized to provide additional analysis and data. Once the data is obtained, it can be processed via standard computer apps, such as Microsoft Office programs, though they require manual processing that can be tedious. Some open source programs also have utility, such as a word cloud generator to visualize major topics in the environment; more advanced programs, when accessible, can perform basic content and discourse analysis. These programs do not alleviate every potential issue; for example, a language-enabled analyst is required to assess foreign language materials effectively. Analysts also require training on rhetorical and discourse analyses and the designated software for processing. Once processed, the data reveal some bio-psychosocial insights into a local information environment.

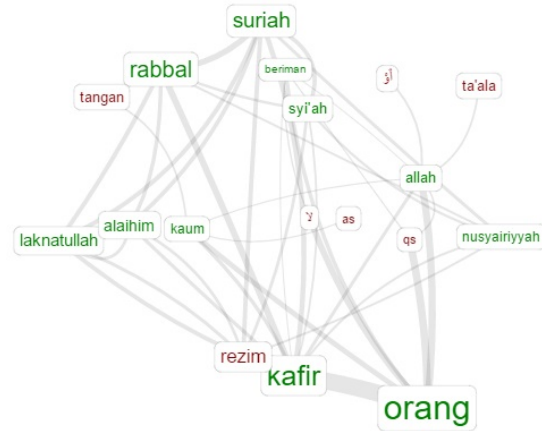
### *Conceptual Case*

This case example is based on a hypothetical mission from higher that requires operational and tactical MISO/PSYOP personnel to counter Islamic State influence and recruitment in insular Southeast Asia. After acquiring guidance from higher headquarters and then performing human factors and media analyses on the information environment, the analyst discovers two pro-ISIL news sites and one suspected pro-ISIL news site. To determine the “emic” perspective on how local nationals supporting ISIL view the group’s activities, the analyst performs rhetorical and discourse analyses, running the results through an open source program developed to understand significant topics and the links between them. In this hypothetical case, the focus is on ISIL’s activities in Syria and how the locals interpret them from abroad. The case example focuses on online articles published during May 2016 to keep the output manageable for this proof of concept. An open source tool suite, Voyant-Tools, produced graphics showing high-volume topics in the documents and how those topics connect to each other and the larger corpus, or body of text.

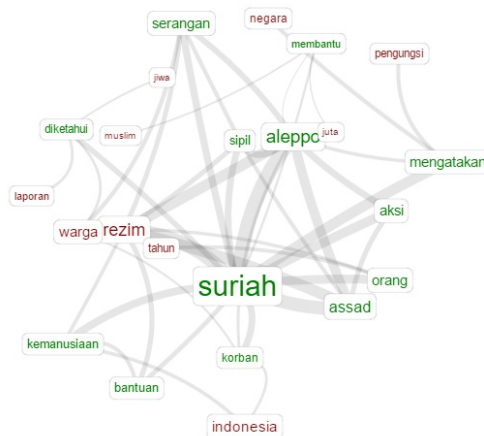
The results show three different perspectives that are either shared by or held by portions of the pro-ISIL supporters. Website 1 takes on a political-military perspective that supports ISIL as a caliphate and its anti-Asad agenda. It places the heaviest emphasis on the terms in green, which are Shia, militia, people, regime, Asad, Iraq, Iran, and becoming an imam. Terms in red were less connected to the main article themes; in the sample, they introduce the ideas of attack, population, and several religious terms. Website 2 heavily uses religious terminology. It also includes the addition of the term infidel and a derogatory term for Shia. Most of the terms have religious connotations or origins.



Website 1



Website 2



Website 3

In contrast, Website 3, the site suspected of having pro-ISIL leanings, utilizes language that is more balanced. While it includes political terms, such as Asad, state, and regime, it also employs terms related to assistance, civil society, refugees, and humanity. Shia are not mentioned. Website 3 requires further exploration to determine if it is taking the stance that ISIL promotes governance or if it is just reporting pro-Muslim news. Together, the first two sites demonstrate political, militaristic, and religious topics—and supporting terminology—that can form the basis of narrative themes, or the starting points for more complex narratives existing in the environment.

These same documents have additional utility in that they offer examples of how website followers likely view the US. The headline “With Bloody Pig Bullets, Terrorist Infidel Crusaders in the US Practice Shooting to Hunt the Muslim Ummah,” and statements such as “the Islamic State is also being attacked by air by the international crusader coalition headed by the United States and also the Russian communist regime under President Vladimir Putin” and a religious leader saying “Our goal is to provide support to the people of Aleppo, Syria, while combatting the brutality of satanic America, satanic Iran, satanic Russia and the satanic Shia [derogatory term],” represent how pro-ISIL supporters use precise terminology to frame the US and its allies as immoral, areligious, and violent. Deeply-rooted stances and perceptions, as in the quotes above, will prove difficult to sway. What these quotes do is summarize

beliefs—at least in this environment—toward the West; they create the “etic” dimension to the emerging narrative themes. They provide the foundations for understanding the components that play a role in narratives and sense-making.

From this hypothetical case, an analyst has a sense of the political and humanitarian issues that have the pro-ISIL supporters’ attention during this limited timespan. That knowledge informs the analyst of where to conduct a deeper assessment on these topics and why they resonated, as well as prompt the analyst to explore what major incidents and political events occurred over that period. Both events and politics are often linked to strong emotional experiences and tied to narrative; they can be indicators that lead to predictable, albeit not always rational responses (Wurzman & Casebeer 2016). The rhetoric also gives clues as to what words may be useful or problematic in a messaging campaign or other engagement, based on an “emic” lens that may follow different logic patterns.

Overall, this method does not replace advanced tools or allow for a comprehensive understanding of the narrative environment. However, it does produce a starting point to gain awareness of local narrative themes and responses to events of interest. Ideally, this method would combine with more rigorous techniques and methods to establish a baseline for narratives in a given environment. The ultimate goal is to craft more focused messaging and counter-propaganda campaigns folded under a US narrative umbrella to defeat adversaries such as ISIL in the Middle East and abroad.

## Conclusion

Narratives function on a cognitive plane that is invisible and yet critical to determining what people think, believe, and how they behave. The landscape is complex and is always in a state of competition. It is where a large portion of any battle is waged and fought, often regardless of how much physical power is exerted.

In order to address narratives, particularly at a high-tempo battle rhythm that is taxed for time and resources, analysts can utilize written or transcribed documents and open source materials to initiate a baseline understanding of the rhetoric and discourse surrounding a particular problem set. Combined with open source tools, it is possible to extract information related to narrative themes and events of interest. In this way, analysts contribute to deducing narrative themes that reflect local grievances, demands, ideologies, and pre-existing perceptions of the US in order to produce a deeper knowledge base about the operational environment. These outputs enhance multiple facets of the mission by informing the commander’s narratives and tying operations to a compelling US narrative campaign; they are a step towards “doing” narratives and learning to maneuver in a contested narrative landscape.

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## Reverse Engineering Extremist Narratives in a Big Data Environment—Targeting the Human Domain in Real-time

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### Abstract

This chapter outlines a theoretical framework intended to provide (a) a capability to rapidly identify and analyze Big Data Violent Extremist Organization (VEO) messages, and (b) to generate counter messages that will appear authentic to the individual, group, movement, or sect that the original messages are affiliated. This theoretical model will assist the generation of large amounts of counter-propaganda which will bear signatures of authenticity to be released back into the radical violent extremist narrative space (e.g., jihadist propaganda or any other VEO)—facilitating targeting such narratives in real-time.

### Problem and desired outcome

There is not one single narrative ‘blanket’—or even a somewhat general counter messaging—that can be particularly effective.<sup>49</sup> For instance, each group, each leader, even each mosque will have its own narrative. The complexity within the narrative—including the religious and psychological aspects of both the writer (originators) and the recipients (target audience)—is far from direct. It is clear that our JIIM<sup>50</sup> efforts to counter the enemy’s narrative—whether it is to recruit a foreign fighter or exhort an individual or small team to act in their homeland—are ineffective.<sup>51</sup> In order to execute these efforts very precise tools will be needed which meet the requirements of the JIIM mission. Through a CARVER-like thought process (see Chapter on CARVER), this paper proposes a solution approach to analyze and then reverse engineer radical narratives. This concept, called SINGSHOT (Specialized Linguistic Support Human Operations Tool), can facilitate targeting such counter narratives in real-time.

### Background

Violent Extremist organizations disseminate their messages through a variety of means. Though video is an important propaganda tool, text products actually comprise larger percentage of the daily

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<sup>49</sup> Linera-Rivera, R., Seese, G., Canna, S., & Rhem, S. (Eds) (2016). *Counter-Da'esh Influence Operations Cognitive Space Narrative Simulation Insights*. Washington, DC: Strategic Multilayer Assessment Office, Office of the Secretary of Defense.

<sup>50</sup> Joint, Interagency, Intergovernmental, and Multinational.

<sup>51</sup> “We do not understand the movement, and until we do, we are not going to defeat it,... We have not defeated the idea. We do not even understand the idea” Major General Michael K. Nagata Deputy Director for Special Operations/Counterterrorism, J-37, Joint Staff. Ref: [http://www.nytimes.com/2014/12/29/us/politics/in-battle-to-defang-isis-us-targets-its-psychology-.html?\\_r=0](http://www.nytimes.com/2014/12/29/us/politics/in-battle-to-defang-isis-us-targets-its-psychology-.html?_r=0)



media flow. For skilled analysts these text products are identifiable by style, lexicon and usage of religious terminology and references. This creates context and relevance to gain attention and engagement, and aids in recruitment, promoting the call to action, and with fundraising in addition to providing ideological and religious instruction. These texts can be found on the Internet, often in social media, in pamphlets disseminated in mosques and marketplaces, and in meeting places frequented by potential recruits to the movement.<sup>52</sup>

The scope of these and other sources is immense. Millions of pages in Arabic and other Islamic languages and terabytes of digital documents are captured per year by counter-terrorist (CT) operations in the West. This, of course, does not include the massive amount of material on the Internet and distributed on a daily basis in mosques and streets all over the world. The messaging is ubiquitous and directed at a broad variety of “consumers” including potential recruits from the west as well as the Middle East and Asia. The volume is so immense that it cannot be meaningfully analyzed without the assistance of machines.

With the increasing volume and scope of these messages there is a requirement for tools to develop effective counter messaging. An effective influence strategy must address (a) the source of indoctrination; (b) identify the vulnerabilities and susceptibilities of the intended target audiences, and (c) develop tools to counteract and go on the offensive in the struggle for the attention of the consumers of this material. Such coherent influence strategy must manifest itself at both the strategic and tactical level. Strategically, a capability is needed to target extremist material on the world-wide web and to not only counter existing messages but to offer alternative ones to include those designed as recruiting tools for foreign fighters as well as those exhorted to act at home (local, tactical level). Furthermore, such approach must be capable of recognizing the nuance of different countries, regions, languages, and sects.

### ***‘SLINGSHOT’ Methodology***

SLINGSHOT (Specialized Linguistic Support Human Operations Tool) is a concept that provides (a) a capability to rapidly identify Violent Extremist Organization (VEO) messages, and (b) to generate counter messages that will appear authentic to the individual, group, movement, or sect that the original messages are affiliated. SLINGSHOT is a theoretical model aimed to generate large amounts of counter-propaganda that will bear signatures of authenticity to be released back into the radical violent extremist narrative space (e.g., jihadist propaganda or any other VEO). Also, it can assist to inundate that space with confusing and contradictory messages or targeted messages to serve US military and political goals against specified targets—supporting US government objectives from the strategic to the tactical level.

SLINGSHOT is not a traditional Department of Defense (DOD) DOCEX<sup>53</sup> system but rather a system for analyzing source material for (a) pertinent content and intent, then (b) for rapid and real-time production of Irregular Warfare (IW) documents to counter the narrative/message with a high level

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<sup>52</sup> “Transmedia storytelling uses multiple media platforms tell a narrative across time. Each media piece—whether it’s a comic, novels, video games, mobile apps, or a film—functions as a standalone story experience—complete and satisfying. Like a giant puzzle, each piece also contributes to a larger narrative. The process is cumulative and each piece adds richness and detail to the story world, such as character backstories and secondary plotlines.” Ref: <http://athinklab.com/transmedia-storytelling/what-is-transmedia-storytelling/>

<sup>53</sup> “Document Exploitation (DOCEX) is the set of procedures used by the United States Armed Forces to discover, categorize, and use documents seized in combat operations.” Ref. [https://en.wikipedia.org/wiki/Document\\_Exploitation\\_\(DOCEX\)](https://en.wikipedia.org/wiki/Document_Exploitation_(DOCEX))

of authenticity.<sup>54</sup> In other words, (a) it identifies and dissects the “threat” messages and (b) assists the practitioner in producing effective counter rhetoric; thus, enhancing current capabilities by the following use of documents not only for operational intelligence but as raw material for operational IW use.<sup>55</sup>

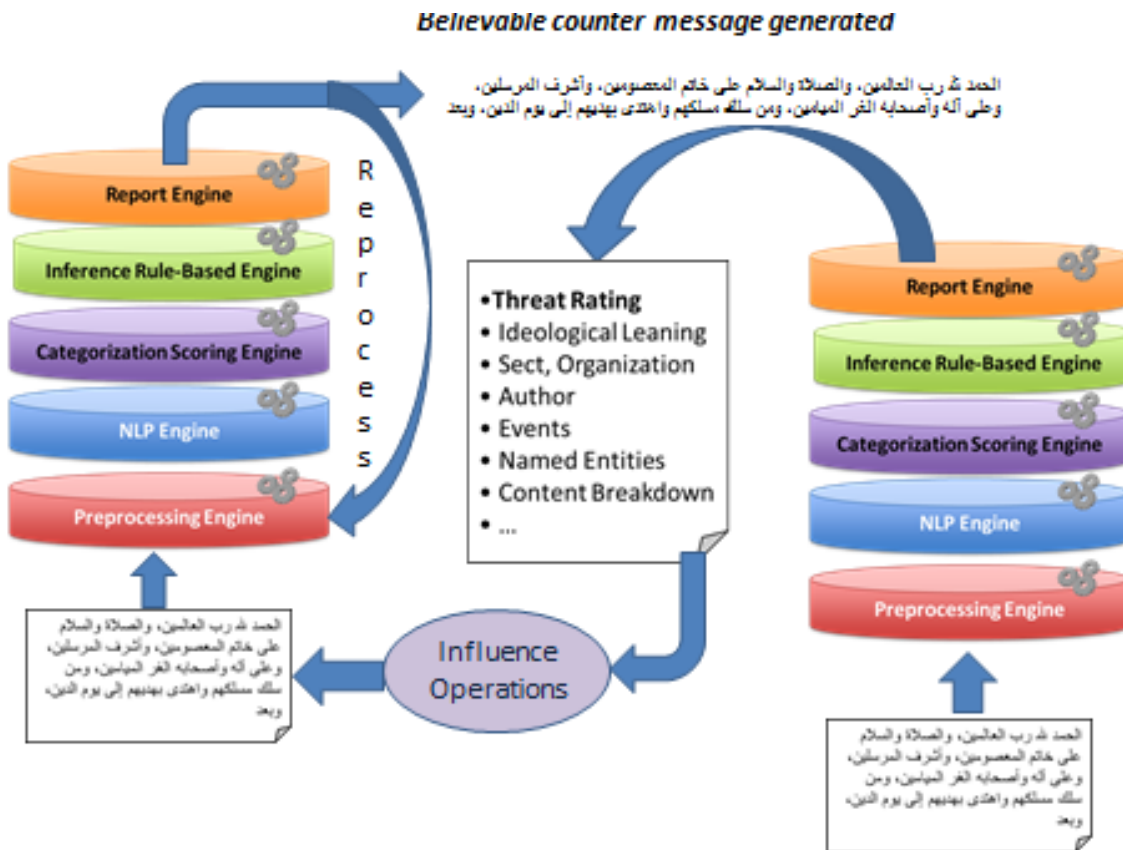


Figure 8. SLINGSHOT Methodology

Capabilities within the SLINGSHOT system must include (but not limited to):

- A capability for information saturation to enable the overwhelming of current VEO communications network with credible material;
- A capability at the operational and tactical levels to influence specific actions of Special

<sup>54</sup> “IW operations also employ subversion, coercion, attrition, and exhaustion to undermine and erode an adversary’s power, influence, and will to exercise political authority over a relevant population. **What makes IW “irregular” is the focus of its operations – a relevant population – and its strategic purpose – to gain or maintain control or influence over, and the support of, that relevant population through political, psychological, and economic methods.**” [http://www.dtic.mil/doctrine/concepts/joint\\_concepts/joc\\_iw\\_v1.pdf](http://www.dtic.mil/doctrine/concepts/joint_concepts/joc_iw_v1.pdf)

<sup>55</sup> “[The joint force] will exploit the internet and cyberspace for communications, propaganda, funding, recruiting, and training. They will function more like a tribal group, crime syndicate, or extended family than like a military or paramilitary organization. Consequently, the joint force will have to defeat the regional or global dimensions of the insurgency by methods such as strategic communications targeting diasporas, supporting operations against criminal enterprises supporting the insurgency, and denying sanctuary in cyberspace and in the ungoverned and under governed areas of non-belligerent states unwilling or unable to take effective action against non-state adversaries operating within their borders.” [http://www.dtic.mil/doctrine/concepts/joint\\_concepts/joc\\_iw\\_v1.pdf](http://www.dtic.mil/doctrine/concepts/joint_concepts/joc_iw_v1.pdf)

- Interest Groups or Individuals;
- A capability for misinformation on friendly or enemy capability, disposition, or intent;
- A capability for attacking the nexus between the VEO leadership and its wider constituency by creating uncertainty regarding the former's intentions and directives; and
- A capability for manipulating or disrupting the jihadist's own IO channels.

The methodology of SLINGSHOT is based on the following:

- Authentic VEO documents will be analyzed to acquire an in-depth understanding of the source's intent; distinguishing between messages directed towards different target audiences; and characterizing, defining and extracting the leitmotifs<sup>56</sup> of the messages—all according to their milieu, intent, and provenance. These are the elements that indicate a document's authenticity in the eyes of the target audience.
- Interim products include "Framework messages" that will serve as the basis for constructed messages. These messages will be sets of "concepts" and "topics" that will be arranged in a logical order that will be the basis for the structure of the final document. A set of documents from a given domain from which the IW influence strategy will be modeled. Identification of the type of document (fatwa, communiqué, etc.) that is the most relevant for infiltrating IW messages.
- Each concept will then be represented by a choice of frames that can express the chosen idea. The frames will then be culled to cancel redundancy. At this point a document will be formed that will consist of chosen Arabic language frames that express the ideas chosen at the beginning of the process. This document will be manually edited for ironing the seams in the final document.
- The resultant document will go through quality assurance by running a check for authenticity through an integrated multi-lingual semantics-driven platform, which integrates fully automated Natural Language Processing (NLP) algorithms with ontologies of human knowledge in order to extract both explicit and implicit information from the analyzed texts. The document will be manually ironed out a second time by experts who will continuously feed the document through such integrated multi-lingual semantics-driven platform in an iterative process to ensure that the content has a completely authentic appearance based on a full hermeneutic analysis and mirroring of the source document.

Once the process is perfected, it will be tested operationally, in a controlled environment and in an operational environment. The testing can include survey and interview data from IW subject matter experts as well as survey and interview data from US members with firsthand knowledge of the target audience. The findings from the surveys and interviews will be used in the continual feedback loop to ensure continued production of "authentic" product.

The resultant document will not be identical to any one document as it will be "genetically modified" and bear elements taken from different documents which presented certain ideas in different ways. The final outcome will be a document that appears authentic and does not give the impression of a spin-off document.

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<sup>56</sup> leit-mo-tif: a recurrent theme throughout a musical or literary composition, associated with a particular person, idea, or situation.

This system can offer a knowledge-based warfare tool for strategic IW operations. These operations are now handicapped by the sheer volume of Jihadist material in the Jihadist space, the lack of trained Arabic linguists who are also savvy with the Islamic Jihadist parlance and the absence of a comprehensive doctrine for such operations.

Disinformation has traditionally relied on efforts to influence enemy decision maker's perceptions through indirect attacks on the enemy's information (feints, actions in the field to be observed and interpreted by the enemy). Hence, the efficacy of the deception was contingent on the enemy's observing the acts, analyzing them as real and relevant and acting upon them according to the goals of the deceiver.

Modern technology has not only created capabilities but vulnerabilities as well. These include:

- (1) Concentrated storage of information (loss or corruption of which can severely damage the enemy's access to its own information),
- (2) Access speed (allowing less time for reflection on the validity of the information accessed),
- (3) Widespread information transmission (allowing "virus-like" spread of incorrect information),
- (4) And the increased capacity for information systems to direct actions autonomously (allowing attacks on separate critical nodes of the networks).

All these now permits an adversary to change or create information without relying on observation and interpretation. The proposed system will take advantage of these vulnerabilities – particularly 2, 3, and 4.

The operational scenarios for this type of operation would be headquarters based at first for:

- Strategic "drowning" of Jihadist messages on the web
- Spoofing of Jihadist websites and blogs
- Spoofing within a blog to drown out the authentic messages, creating targeted messages to draw in individuals who are particularly drawn to those messages

The system will have value for tactical operations as well. It could conceivably be used on the local level through:

- Distribution of hard copy documents in the field with the contents of the strategic documents mentioned above.
- Breaking enemy command and control by manufacture of bogus documents for Unconventional Warfare use in the field to distribute in targeted areas and to create confusion regarding the actual intent of the leadership.
- Spoofing of a captured enemy commander's order by quickly manufacturing documents which would bear a signature of authenticity as if they were written by him and thus send messages to his followers.
- Sending the enemy communications system false messages which would indicate military developments which did not take place and lead them to false conclusions.

In summary these tools will enable the operator to analyze individual messages in groups of messages to determine their origin, sentiment, and other factors important to the understanding of the message and the delivery of the sentiment. The information operations professional will be able to "get inside the mind" of the originator and understand how they intend to influence their target audience.

The same operator will understand the criticality of different parts of the message and be able to identify the vulnerability of those messages to be “reengineered” to defeat the originators goals. Technology will enable the operator to access the message stream and identify where and how to perform the reengineering. Additionally the cyber team will be able to use equivalent thought processes to develop insertion techniques, which will go on detected. By doing this we will be able to manipulate and disrupt the narrative.

## Mapping Dynamic Narratives in the Common Operating Picture

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### *Abstract*

This chapter outlines a tool for making visual narratives that have been used in operations and explored in simulations and exercises usable in an operational environment. Her main points are as follows:

- The tool is a narrative database that maps any operator-utilized or exercise “tested” media to the geographic location and Human Domain it was utilized or “tested” on
- The goal is twofold: 1) To bring narrative data up to OPTEMPO, not just incorporate it into training, and 2) To track the dynamic shifts in narrative forms as they are adopted in a locale, keeping a “living database” so operators know they are accessing the most recent and effective version of a narrative for a specific location or Human Domain
- Operators could select a geographic area from a map and pull up the media that worked there
- Operators could also search by demographics and/or ideology rather than just location
- Metadata on the media would indicate name and contact information of the creators of the media so the operator has resources if needed

### *Background*

Training and simulation is an essential part of threat reduction, and training operators in the biopsychosocial area is no different than physical and skill training in preparation for deployment. Great effort is being made to capture the results of both operations and simulations and integrate their lessons into training operators for the cognitive maneuver challenges they will face in the future. One such example is the SMA Counter-ISIL Messaging simulation that concluded in April, 2016. Valuable lessons on Influence Operations training were taken away from that exercise and integrated into the operator training cycle. In this chapter I propose a process for taking the valuable lessons learned in narrative operations and simulations past, present and future, and integrating them directly into the operations process as an easily-accessible resource. General Moore et. al. (2015) outlined a plan for the creation of a “cognitive database,” which, to my knowledge hasn’t been implemented yet. My idea differs from theirs in many ways because it focuses more on the narrative than the populations, however, I have those authors to credit for being the inspiration behind my proposal—and perhaps the ideas should be combined.

Considering General Votel’s (2016) remarks, one thing that is new about the threat we face today is that

“...increasingly, populations are becoming connected through modern communications technology and are demanding change from their respective governments on a range of issues. Common grievances can now quickly mobilize a connected population and create opportunities for exploitation by outside state or non-state actors.”



Joint Forces need to the ability to quickly mobilize, utilizing the strength of communication technology to approach this dynamic challenge effectively and efficiently. While work is being done to mobilize forces in many ways, mobilizing the narrative is the aspect I focus on today: Joint Forces need the ability to pull up data and interpret it, allowing them to ascertain which narratives have met with success in which situations, to which biopsychosocial group is receptive to it.

### *Interactive Narrative Map Design*

At a granular-level, the final product would look similar to the map in Figure 1. Operators could also zoom out and view a wider angle such as the example in Figure 2. However, different than both of these example maps, the color-coding would not tie to just the ethnic, religious, and language

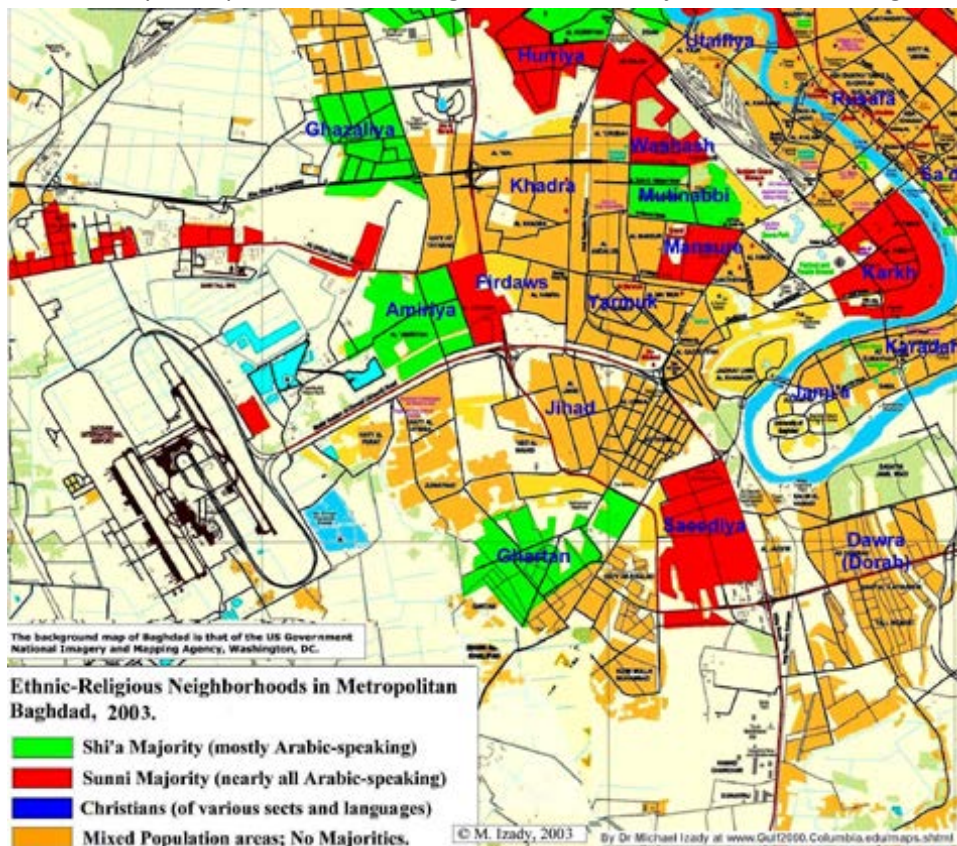


Figure 9. "Ethnic-Religious Neighborhoods in Metropolitan Baghdad, 2003." The Middle East Institute

have been conducted so far. Since geographic locations don't move, but populations within them can shift to new locations changing the make-up of the TA in the region, the next layer of the map would be identification of the ethnic, language, demographic, and ideological make-up of the population accurate to the date the narrative was tested. Operators could select which layers to see depending upon their objectives. The ability to search by location, demographic, ideology, or type of narrative expands the usefulness of the tool, making it a reference for operators who want to create their own visual narratives, or whose TA is of similar makeup but in a different location.

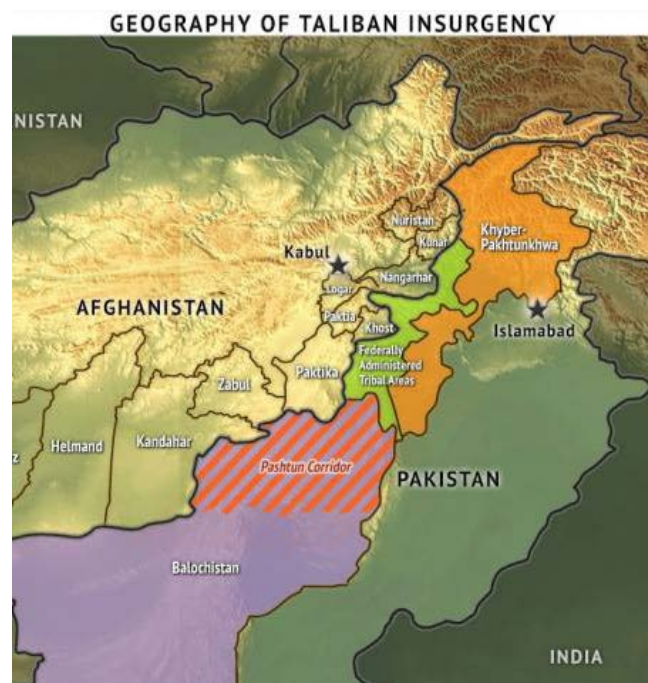
Once a location on the map is selected, operators could click on the region and get a list (visuals or text) of what narratives have been successfully tested in that region. Operators could further sort for

information of the TA, but to the category of narrative that tested useful in that geographic location. The primary divisions on the map would be geographical so that operators could identify their target area and then identify the types of narrative that have been used or "tested" in that area. The goal is for every area on the map to be populated with narrative that has been used or "tested," but we would start by inserting data from

narrative simulations and operations that

types of media (radio, print, social media, text, dark web, etc.), to aid in speed: if they know they only have access to radio, then selecting radio will give them only narrative that was used on the radio. Because we know that narratives once disseminated, do not necessarily stay within one media but are dynamic and change shape as people use and share them, operators could also view the movement of one narrative. For example, operators could isolate one narrative and see “message zero” (Linera Rivera, 2015), including its media type, geographic location, and demographic information, and also see the movement of the narrative as it evolves through media types and geographic locations, and what biopsychosocial group is driving the evolution. This movement and change of narratives would be shown in layers of color over a geographic map with selectable/unelectable details so that operators can get a detailed picture of narrative travel without leaving one page. Another layer of selection could give operators a list of what narratives did not work and the reasons why. This would help operators know what narratives to stay away from as they work with the TA and/or create more narratives. Remember, this data will be visual narratives, but if the operators don’t have the time/capacity to disseminate or duplicate, then they are at least armed with the types of visuals and messages that have worked in the past and can use language and metaphor that reflects them.

Another benefit of this concept is that narratives can be vetted and approved beforehand, enabling swifter access and deployment. Since the database would be populated with media that exists



already, operators wouldn’t be as dependent upon the availability of SME’s to create visuals. It is important to note that this database would need to be updated regularly, because, like the human domain it begins to map, it has to be “living.” This updating is essential for operators to get the best common operating picture (COP). In addition, this tool would work well in concert with a reach-back SME team that was proposed as a result of the SMA Counter-ISIL Messaging simulation (Linera, Seese, Canna & Rhem, Eds, 2016), because SMEs’ contact information could be in the metadata connected to the media their team created, allowing the operator to contact them for more information or other assistance. This database would also be helpful for those who participate in future narrative simulations, to more easily track the work that has been done in the past and allow each simulation to build upon the last one.

This type of database would be easy to create simply using ArcGIS, but could also be integrated into any existing databases so as not to recreate the proverbial wheel. The database should be widely unclassified so that continued multi-disciplinary contributions could continue.

### Way Ahead

Similar to other mediums/platforms, Deep/Dark Web and social media are good indicators of mindset of the target audiences in a location, but not enough to give us a total operational picture. One needs to consider other dynamics that factor in as well. Our narrative and its dissemination are not the



only factors; therefore, constant integration of other communities have to be accounted to attain the best COP.

In the same manner, words, images and deeds have to work hand-in-hand. As we saw in the SMA Counter-Da'esh Narrative simulation and as we see in the world today, neither narrative nor actions are as effective when used in isolation; each can be used as a force-multiplier of the other. (Linera et al., Eds, 2016). This can only be done if narrative-focused and action-focused communities are integrated. Narrative needs to be less about checking on the responses to Joint actions in the Human Domain and more about planning narratives that can shape the perception of the actions to come, stabilize during the actions, and reinforce the desired outcome afterwards.

The following are some logistical considerations for the way ahead:

1. Determine if an unclassified database already exists that this one could be mapped onto
2. Determine what organization hosts and maintains the database
3. Identify potential project funding sources
4. Identify all the instances of narrative use that need to be included
5. Identify SME's and literature to support sound design of interface and conceptual structures
6. Complete database and interface design
7. Identify the most current Human Domain maps of target areas and target populations to use in the visual portion of the database
8. Identify potential downfalls and problems with the database (operational blind spots due to conceptual skew or incompleteness)
9. Add data to database
10. Conduct user-testing with operators
11. Revise, adapt, and input new data based on operators feedback (repeat on a regular basis)

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## Section 4: Cognitive Engagement in the Cyber Domain

The first interaction an individual will have with a social movement, be it nonviolent or violent, will likely be through the Internet and therefore, cyberspace can be considered “*entangling ground*”. Sun Tzu considered entangling ground terrain that can be abandoned but difficult to reoccupy. Retaking the ground is more likely if the enemy is unprepared but if potentially disastrous if preparations are strong. MISO has historically been, and will continue to be, reliant on methods employed within the social sciences. Emerging research in cyberpsychology and neuroscience can be integrated with existing MISO processes to both create a set of individualized influence tactics and guide their implementation. Cyberpsychology is the interdisciplinary study of the intersection of human behavior and emerging technology. Neuroscience is the study of the nervous system while cognitive neuroscience is the study of the biological substrates of cognition. Research findings from the aforementioned fields, particularly as they apply to cyber-based communication technology (CBCT), can be synthesized with existing operational data to create a more empirically supported approach to cognitive engagement (Spitaletta, 2013).

The operational requirements of cognitive engagement in cyberspace require advances in both intelligence and targeting; a precise fusion of existing scientific and technical intelligence capabilities with applied neuroscience and psychological research (Spitaletta, 2014). Bio-psycho-social approaches can enable more precise access, assessment, and targeting (Giordano, 2012a, b, 2014). Deviations from empirically based methods, for expediency or tactical necessity, have limited the effectiveness of MISO (MacKay & Tatham, 2011). While existing neuroscience and technology has great potential to influence and/or deter targets in cyberspace, further research (such as that reported by Thompson as well as LaFon and Whalen) will allow planners to rely upon firmly established linkages between perception and actions when developing both their intelligence requirements and the desired psychological actions (Spitaletta, 2014).

The following group of papers identifies some current and future applications of bio-psycho-social approaches that should be considered across the Warfighting functions. O’Brien’s, in particular, address the confluence of influence operations in the human and cyber domains; a seem a resurgent Russia has demonstrated both a willingness and ability to exploit. Developing more robust capabilities in this area should be an increasingly priority for the US and USASOC in particular.

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## Cognitive Engagement in Active Cyber Defense

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Cybersecurity is traditionally seen as an asymmetrical relationship between adversaries and defenders, however recent research has attempted to reverse this trend by operationalizing cognitive engagement for the purpose of enhancing adversary attribution. In a traditional networked environment, adversaries have low risk (low chance of getting caught) and potentially high reward (getting high-level access to privileged information), while defenders have a large attack surface to cover (all internal and external network access) and limited resources (computing and manpower) with which to defend their resources. Using deceptive techniques within networks allows defenders to better attribute attack behavior, which allows for increased data gathering and more targeted interventions. We discuss attribution techniques including the use of game theory and deception to maximize adversary interaction in a safer networked environment.

- Network defense does not need to be biased to favor adversaries' attack behavior
- Cyber deception can be used to modulate adversary engagement
- High engagement improves attribution by increasing adversary interaction in the network
- Adversaries cognitive states can be intuited through limited and indirect online interaction
- Future trends may support more interactive environments with adversaries

### Background

With recent major hacks in government (e.g., OPM) and industry (e.g., Target, Home Depot), it seems like we're losing the war in cybersecurity. With a few pieces of software easily downloaded from the internet, a relatively novice hacker (referred-to as a *script-kiddie*) can severely damage the infrastructure of a large network if a vulnerability is undiscovered, or worse, left unpatched. Furthermore, passive defenses (e.g., firewall rules; anti-virus) can protect against known attacks, but may be vulnerable to previously unknown exploits in software (referred-to as *zero-day* exploits or *0days*). More sophisticated hackers, and groups of hackers (e.g., *Anonymous*) increase the challenges of Cyber Defense since they can penetrate sophisticated network defenses with little risk of being caught and are more likely to unleash 0days. In summary, there exists an asymmetry between the damage a single individual or small group can do and the resources required to protect our critical infrastructure against these attacks. What we need is active Cyber Defense, where we can engage adversaries in our own environments (i.e., have home-field advantage), attribute adversaries' intentions, and target our limited resources to their greatest effect.

Not all adversaries have the same goals or skills, so it is important to at least roughly-attribute adversaries to target optimal remediation. For instance, there are nation-state actors, non-state actors (e.g., groups such as *Anonymous*), and individuals of varying skills (e.g., the aforementioned script-kiddies). These adversaries may additionally come with differing goals. For instance, their attacks may target physical actions such as controlling a car, disabling an alarm, or shutting down a piece of technology. Alternately, these actions may be used for intelligence gathering by accessing protected files on a network. Finally, these actions may be used to gain influence by altering content and engaging in social engineering, such as hacking an individual's twitter feed to provide misinformation to their followers. Certain actions are more likely to be performed by certain adversaries; for instance, nation-

state actors may be more likely to perform interventions that lead to physical actions (e.g., in 2010 the Stuxnet worm attacked centrifuges inside Iranian nuclear facilities; or in 2015 with the Ukraine power-grid hack).

It is important to note that an attack is not necessarily a single penetration of a network in a single session. Adversaries operate according to an escalating *kill chain*, whereby they probe systems with the goal of compromise, then cycle between escalating permissions and reconnaissance until they are able to complete their attack. This attack may take time, in fact, the Ukraine power-grid hack started with a user clicking on a phishing e-mail, downloading malware onto a computer. That malware allowed hackers access to the system, then network, and over the course of six months these hackers reconnoitered the network exposing vulnerabilities until they were able to strike and simultaneously take-down numerous facilities leaving 225,000 customers without power (Sans Institute, 2016). Mandiant's (2015) annual M-Trends report claims that the average time between adversaries penetrating networks and their detection is still over 205 days (down from 243 in 2012).

A challenge in attribution is in detecting attacks as they happen. It is possible (and likely) for an adversary to wipe their trace from a compromised network. Despite knowing that an attack has occurred after the fact, there may be few or no logs with which to attribute the attacks or prevent further attacks. That said, there are mechanisms by which these adversaries can be discovered.

### *Honeypots and Deception for Cyber Defense*

First-line deception techniques for Cyber Defense include *Honeypots*. A honeypot is a decoy that detects unauthorized use of an information system by hosting or emulating services (or entire operating systems) that appear to be real and of value to adversaries, but instead are monitored in order to *detect, surveil* and *distract/deflect* adversaries that attack the honeypot. Honeypots are categorized according to two general flavors: low-interaction and high-interaction.

Low-interaction honeypots (such as *Honeyd*; Provos, 2003) tend to only emulate a single service to detect attacks without exposing the entire operating system to risk. While they only offer limited interactivity for potential adversaries, the risks of the honeypot being compromised are extremely low. Using virtualization, it is possible to deploy and recover numerous honeypots using a single piece of hardware. A difficulty with low interaction honeypots is that they are relatively static, that is, because they only emulate a particular service, experienced adversaries may be aware of the honeypot's fingerprint and detect it. Still, they are a good first-line defense to detect and log simple attacks (e.g., automated attacks from script-kiddies) and to collect downloaded malware samples.

High-interaction honeypots use actual services, software, and entire operating systems to obtain a more detailed picture of adversaries' kill-chains. When using actual (as opposed to emulated) services, it is possible for high-interaction honeypots to discover new vulnerabilities (e.g., new 0days). This possibility is also a risk: by using actual services and software, it is possible for high-interaction honeypots to be themselves compromised (for which the operator may be legally liable should the compromised honeypot then attack another computer). While high-interaction honeypots may be virtualized or real machines, experienced adversaries may be able to detect virtualization. Despite this, an advantage of virtualization is that infected honeypots may be rapidly recovered.

Deceptive by nature, traditional honeypots do not detect the engagement of adversaries, but instead are tools for logging and post-hoc attributing of attacks. Using active deception techniques can shift the

apparent advantage that adversaries exhibit back to network defenders by exploiting their own desire to succeed against themselves.

### *Operationalizing Active Cyber Defense*

The notion of *active* cyber defense means going beyond passive data collection to actively engage with adversaries. This does not mean to hack-back against adversaries (generally illegal in the United States), but instead use adversaries' own scripts/techniques against themselves and to engage adversaries' cognitive resources using techniques such as *game theory* (Vohs, Baumeister, Schmeichel, et al., 2014). By measuring and controlling cognitive engagement it is possible to maximize the effectiveness and opacity of deception techniques by modulating cognitive load such that attackers are more prone to ignore cues that may give away that they are in a honeypot environment, but also to accept the legitimacy of *deceptive credentials* and *fingerprinted documents* and make errors. In essence, the role of the active Cyber Deception is to *control adversaries' narrative*.

Passive techniques can help read adversary engagement and determine adversary goals, generally when an adversary is already engaged inside a Honeypot. These include psychometric analyses (e.g., keystrokes and temporal interaction), linguistic analyses (e.g., natural language processing, topic modeling, sentiment analysis), reverse-malware analyses (e.g., analyzing malware payloads), and attack pattern analyses (e.g., the use of which exploits and in what order). These passive techniques can help attribute attackers, for instance, by determining regional specificity within linguistic patterns in usernames and passwords. Attributing adversaries allows us to understand their motivations and behavior, making future defense easier (Rid & Ruchanan, 2014).

Active cyber defense techniques require an additional level of involvement, and come in two non-exclusive failures: (1) temptation techniques, and (2) engagement techniques. Temptation techniques attempt to entice particular adversaries into a deceptive environment by making them seem compromised and valuable. An example of a temptation technique is *reverse-phishing*, whereby a phishing e-mail containing a malicious website link or software is intentionally clicked-on within a deceptive environment with the goal of examining a particular adversary. Temptation techniques generally involve going outside a company's internal network to the Internet in order to learn more about particular adversaries/attacks. On the other hand, engagement techniques involve depleting adversaries' cognitive resources with the goal of increasing data collection, increasing the opacity of the deceptive environment, and inducing human error. To be effective, active engagement techniques involve online interaction with adversaries inside the deceptive environment.

An example of operationalizing active cyber defense is by using temporal keystroke patterns to estimate adversary engagement. A changing rate of keystrokes in a given temporal window may be used to predict stress, which also serves as a proxy for cognitive load (Vizer, Zhou, & Sears, 2009). Combining this with game-theoretic principles (Píbil et al., 2012; Carroll & Grosu, 2011), it is possible to increase adversary engagement within the system by determine which vulnerability they may access and in when they may access it. It is also possible to intermittently allow vulnerable credentials, further frustrating adversaries (Nicholson, 2015). This frustration can lead to real-world failures, such as failure to maintain/change connections through proxy servers (potentially exposing *real* IP addresses).

Wagener (2011) presents a real-life example of an active cyber defense architecture using a self-adaptive Honeypot in practice. This honeypot utilizes game-theoretic principles to produce a Nash-equilibrium (a state where neither attacker nor defender may gain by changing their current strategy). The honeypot has four potential behaviors: (1) allow execution of code, (2) block execution of code, (3)

substitute code, or (4) insult the attacker. This adaptive honeypot produced over three times the interactions against a baseline comparison honeypot (Heliza), providing substantially more information for attribution. Adversaries used more and more varied commands, spend longer online, and most interestingly, did not tend to disconnect after being insulted.

Most interesting is the option to actively insult an attacker, which generally violates the notion of being unobtrusive or opaque to adversaries. Even more interesting is that attackers only disconnected (via the *exit* command) 15.77% of the time when insulted. In one interesting anecdote, an attacker using a German IP address began to swear in Romanian after being insulting, implying that the attacker was Romanian and hijacking a German computer from which to launch an attack. This notion of interacting with hackers adds a new perspective to active defense. Minimally it may be possible to assist in determining bot-based attacks from human-based attacks via response to insult (or a lack thereof). Actively frustrating adversaries is a way of depleting cognitive resources, making it more likely to induce errors in judgment. Furthermore, as many attackers interacted with honeypot by replying to insults, this may provide additional linguistic clues beyond simply the language spoken.

In summary, active cyber defense via interacting with adversaries is a relatively new technique for measuring and modulating adversary engagement in the cyber domain. Active cyber defense provides more information for attribution, promotes human error in adversaries, and thus begins the process of reversing the asymmetry between attackers and the defensive resources required to counter them.

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## Leveraging Human Science in an Information Operations Environment: An Age Old Use of Bio-Psycho-Social Sciences in a New Era

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### *Abstract*

Whether the threat is a known individual or an unknown intruder breaching the gates of our national network defenses in cyber, the fact is, he or she is human. Thus, applying core behavioral and social psychological constructs in operations, offensive or defense, cyber or otherwise, is a natural application. There are core human responses identified in the bio-psycho-social fields such as cognitive bias fed heuristics and theoretical constructs such as evolutionary psychology that can be leveraged to defend against US National Security threats even in a cyber application.

### *Mental Shortcuts Create Opportunity*

The human brain of today was developed in a world of hunter-gathers; the mental processes which enabled human ancestors to survive our ancestral world are the same processes humans rely upon today, for better or worse (Tooby & Cosmides, 2003; 2004). Heuristics, which are efficient rules used in near-automatic decision making processes for basic problem solving, are some of these processes found in all people across many cultures.

Fundamentally, heuristics follow some basic rules that there are a limited number of possible solutions to a problem; limited, either by experience or availability of information, creating a 'short-cut' to a solution (Lewis, 2012). These basic rules for processing information reduce cognitive load, and in human ancestors as in today, produce positive results often enough that they have been hard-coded. Cognitive load refers the increasing amount of difficulty in problem solving when additional data are required to support our mental schemas (Sweller, 1988). Mental schemas are how humans make sense of the world. When faced with mental challenges and decision-making activities, humans depend on mental landscapes or schemas to explain inconsistencies and solve problems (Sweller, 1988). If these schemas are missing data or have incorrect data, the blanks are filled in by information that is either easily accessible or that resembles data from other mental schemas. The availability bias can then occur. As cognitive load increases, quick thinking short cuts and errors in judgment are more likely to occur creating an environment ripe for misinterpretation (Kahneman, 2011).

Kahneman explains the two systems that make up the way humans problem solve and make decisions and assumptions. System 1 is fast, intuitive, and emotional; System 2 is slower, more deliberative and more logical. Fast thinking, System 1 thinking, is used when one is driving a known route or ordering one's favorite take out. With echoes of rote memorization overlaying long held mental schemas, fast thinking allows our intuitive impressions to be the basis for quick decisions. More often than not, these quick decisions are accurate because they are applied in routine, mundane, or monotonous problem solving activities. However, when System 1 thinking is depended upon when context or circumstance is more complicated, varies

and requires incorporating more novel stimuli into the employed mental schema, that is, when system 2 thinking should be employed, errors in judgment are likely to occur.

The fallacy of the availability heuristic, a tendency to value that which is immediately recalled, is often seen playing out in modern media. Some event catches the attention of media consumers (e.g. a kidnapping), the media saturates coverage of the one story and, as the story dies down, starts to cover similar incidents in an attempt to keep viewership up. Viewers in turn begin to think there is a rise in the occurrence of said event, but reality does not support this inference.

Narrow framing in that people do not consider the entire picture or framework, but rather depend on the stimuli in their immediate environment to make decisions (Tversky & Kahneman, 1981; Barberis & Huang, 2007) is another example. In part, people have been reinforced to continue this cognitive strategy, as this type of heuristic can be an efficient use of mental and physical effort when System 1 type thinking is appropriate. This success begets future use of this cognitive strategy. However, when additional stimuli, alternative contexts, and differing factors are presented in similar circumstances or that resemble the previous stimuli where that cognitive strategy was successful, people's inattention bias creates a scenario where one will employ System 1 thinking in a System 2 thinking required situation. Cognitive errors in judgment are bound to increase. Unless there is direct and clearly linked evidence to suggest one's cognitive strategy failed, one is less likely to attribute failure or even recognize failure due to the perception of his or her own performance in the past, present, and future as an over-estimate of reality resulting in an over estimate bias (Metcalf, 1998). Thus, one will stop trying to find the correct response before the correct solution is reached by the cognitive system, in combination with the employed heuristic. This inflated belief of one's accurate performance leads to overconfidence errors with a false perception of accuracy that then reinforces the use of the heuristic and System one making believe of one of the correct response before the correct solution is reached by the System 1 thinking. Thus, attribution of error is misinformed as well.

Over time, by its nature, heuristics foster bias. In part, they depend on human biases for the shortcuts that make them efficient and useful, but their use does leave one susceptible to errors in accuracy followed by misattribution of those errors. Thus, misleading stimuli presented to fast thinking scenarios leaves one susceptible to errors in judgment. If those stimuli are managed or influenced, this maximizes those biases on which the engaged heuristic is founded leading to an intentional misleading or deception. This is a core fundamental tenet in the denial and deception literature. Denial and deception techniques have been utilized in national defense strategies since before World War II (Godson & Wirtz, 2000; Lasley, 2000; Heckman, Stech, Schmoker & Thomas, 2015), primarily in a kinetic or "real world" environment, as opposed to an online or cyber environment.

From an operational standpoint, managing those stimuli that feed heuristics used by adversaries can be leveraged, but equal consideration needs to be paid to the message delivery method. Anticipating heuristic responses to stimuli can afford messengers opportunities not only to defend territory, but to reinforce desired behaviors. Examples of this method can be readily seen in the twitter bot networks purportedly launched by the Russian government to

sway opinion during and after the Crimean annexation.

In another example, the familiarity heuristic describes a situation in which an individual reacts similarly, or predictably, to what appears to be a similar set of events. While not counter-intuitive, this tendency to revert to learned behavior could effectively be worked into cyber defense to lead would-be attackers down false paths.

The use of managing stimuli feeding heuristics can also be useful when the adversary is unknown and attribution is almost impossible. Put into practice, network security can be enhanced by leveraging the expectations of how adversaries perceive the security and landscape of networks. Offensive campaigns can be augmented by an awareness of the existing use of adversaries' heuristics, assumptions and resulting cognitive errors.

### *A Mind Focused on Social Exchange*

Evolutionary psychology examines the human mind as a series of programs developed over time in response to adaptive tasks or problems encountered in the environment. If programs act in a manner so as to promote their propagation, natural selection will favor it. All programs are subject to the blind forces of natural selection and chance. The goal of evolutionary psychology is to map global elements of human nature, the ubiquitous architecture of the human species. Evolutionary psychology rests upon advances in cognitive psychology, paleoanthropology, and research countering the "blank slate" model of animal minds, and the development of evolutionary game theory as it relates to evolutionary biology, lending clarity to the processes of natural selection (Tooby & Cosmides, 2003; 2004; Sznycer, Tooby, Cosmides, 2011). As such, evolutionary psychology theory has much to offer in strategic considerations of national defense operations.

The human mind is well attuned to detecting violations of social exchange "if-then" rules, yet absent the social aspect, the majority of people are not successful at detecting violations of logic conditional rules when tested (Cosmides & Tooby, 2004; Ermer, Cosmides, Tooby, 2007). Other than detecting violations of social exchange rules, humans have success detecting violations of precautionary or permission rules (e.g. if taking action A, you must first fulfill prerequisite B) (Cosmides & Tooby 2004), but more complex or depersonalized rules violations go unnoticed more often (Ermer, Cosmides, & Tooby, 2007). Being able to predict, gauge, and respond to social standing or contextual threats was paramount to survival in our ancestors' world, and these mechanisms persist today.

Despite our larger social connectivity and the implications of social data limitations for the human brain, this mindset persists. Social exchanges are a strong element of the human mental architecture. Indeed, much of the human machinery appears to be designed to deduce intent or emotion (i.e. face recognition, assessing formidability, and theory of mind). The near sole focus on social data presents both an obstacle and opportunity; humans are quick to pick up on social data, implications they are paying the cost of a free rider, to identify opportunities for exchange in which they receive the maximum benefit, et cetera. As such, efforts, which seek to inform or modify social constructs need to either work with the existing narrative, or present a counter-narrative that is both believable from the messenger and message, and is well, received by the larger group. Classic examples of this kind of messaging can be viewed during times of war, such as "support the troops," but also in political campaigns calling to the base, or

seeking to expand the base by recruiting those sympathetic to the overall message. Media coverage of the MH17 flight, which was downed over Ukraine, could also be viewed in this light, with elements more sympathetic to the Russian side of the Ukraine conflict introducing elements of ever-present Western conspiracy against Russia.

The adaptive problems of our ancestors' early environment gave rise to internal mechanisms, which focused on detecting cheaters in social exchanges, and self-preservation through permission rules in regards to interacting with the surrounding world. Other than detecting violations of these policies, which largely focus on individual fitness, humans are not good at detecting violations of other "if-then" violations of logic (Cosmides & Tooby, 2004; Ermer, Cosmides, & Tooby, 2007). The Wason selection task (1966) is the classic logic puzzle many individuals fail. The puzzle usually involves four cards, even and odd number with differing colors on the backing, and the corresponding colors with odd or even numbers on the backing. The individual must identify which two cards must be turned over to prove a certain proposition (e.g. which two must be turned over to prove all black cards have even numbers?). In practice, cyber defense strategies could turn this kind of logic violation on its head; when the adversary knows network designs incorporate an "if x, then y logic", purposely deviating from that schema could effectively mislead or confuse efforts to penetrate networks.

Strategies that incorporate these less noticed violations, or those which modify the perception of social exchanges, could be leveraged in national defense operational scenarios. National strategies can also fracture coalitions by successfully messaging the existence of free riders. Group morality and cohesion can be undermined by evidence of free riders in the group. Tooby and Cosmides (2004) argue humans actively seek to eliminate free rider advantages, but note punishment of free riders is not always possible. In such instances group participants appear to reduce their own effort on the group task. (Kurzban, McCabe, Smith, Wilson, 2001). For example, in increasingly de-centralized units in asymmetric warfare, information still must be passed from group to group with some degree of confidentiality, integrity, and authenticity. Introducing evidence at any point that the messenger and/or message are corrupt will introduce an element of entropy into these networks. Bombardment of these kinds of messages, that individuals are either not really contributing to the fight, they are free riding simply to enjoy the rewards, or are potentially agents posing as in-group members, is increasingly frustrating for asymmetric groups because the stabilizing elements of leadership are so far removed and perhaps not even aware of individual members or cells.

### *Coalitional Strategies and Morality*

While relatively rare in the larger animal kingdom, human beings demonstrate observable coalitional strategies that promote within-coalition cooperation, and between coalition conflicts in a manner, which promotes the well-being of the individual participant. Evolutionary psychology theory follows the selection processes of conflict resulting in these coalitional strategies, which are expressed across a spectrum of human behavior to include war, politics, and morality (Tooby & Cosmides, 2010).

Within coalition programs are formidability programs, which enable the individual to deduce the capability of an adversary to inflict damage. This program can be thought to serve not only for self-preservation, but for threat bargaining as well. Theoretically, those with higher

formidability indexes reap the benefits more often, but an individual can also increase their formidability through alliances with others (Tooby & Cosmides, 2010).

Cosmides and Tooby (2010) theorize the evolution of morality as an outgrowth of coalitional psychology. The coalition (and the individual) seek to avoid, and theoretically punish, free riders, to maximize individual fitness by dispersing cost across the group, and to maintain formidability indexes above that of adversaries. Mechanisms for tracking alliance members can be demonstrated through costume (face paint, dress), or custom, the latter emerging as codes of conduct.

Given the premise of evolutionary psychology as a universal map of the human mind, certain “morals” emerge across all groups due to their fitness promoting elements. Other morals may be seen more to identify group membership as a coalitional adaptation. These group morals, which are in direct opposition to an adversary nation’s values, pose a unique challenge to overcome. The emergent group is bound by the moral code, and their argument needs to have an emotional resonate for the group to continue. Well-established nations largely do not require the emotional component for cohesiveness, and attempts to subvert the group with logic are challenged by the groups’ emotional force in recruitment. Messaging then, should attempt to counter emotional messaging with emotional messaging, whether it is appeals or counter-messages. A hypothetical example of counter messaging in an anti-terrorism campaign might attempt to elicit empathy, group membership (with the victims), and empowerment over the adversary by working with and receiving the formidability increase from the nation-state. Such messages might focus on specific elements at a time, and would likely require some articulable task for recruits to enhance self-identification with the group.

## Conclusion

Considerations of human behavioral components afford national security opportunities in operational strategies. This paper offers only a sampling of bio-psycho-social based interventions. Employing core constructs from social sciences in operations provides a scientifically rigorous framework on which to build sound offensive and defensive approaches. From this platform, additional core constructs can be applied within the social science field; however, it can also be used as the foundation on which multiple fields can build upon creating a multi-disciplinary, scientific, secure base from which to operate in defense of U.S. national security.

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## Social Engineering as a Sociocultural Tactic in the Human Domain

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### *Abstract*

The Social Engineering as a Sociocultural Tactic Cycle (SESTC) is a tool to provide common understanding and language in order to increase SOF Soldiers' ability to leverage U.S. national interests, maneuver effectively across a broad spectrum of human terrain, have better awareness of, and control over, foreign partner subversion, as well as influence enemy, adversary, neutral, and friendly individuals and groups to more effectively prevent, shape, and win.

- The SESTC is a bio-psycho-social approach to cognitive engagement to collect, analyze, and apply information in order to affect, influence, and manipulate human behavior.
- The SESTC provides an operating system to understand and account for cognition.
- The SESTC leverages the human condition to more effectively operate and engage within the human domain by enabling and developing the cognitive domain at the tactical level.

### *Introduction*

Following Special Operations Forces (SOF) White Paper, published February 2012, the Army Capstone Concept (ACC), published 19 December 2012, identified a capabilities gap with the Army's past functional construct. The ACC stated that in order to operate more effectively in the land domain, while still accounting for the human aspects of war and conflict, the Army required a new Warfighting Function. This new function was to encompass the tasks and systems to allow the Army to assess, shape, deter, and influence the decisions and behaviors of security forces, governments, and people through lethal and nonlethal means. To meet this requirement, USASOC was tasked by the Commanding General of the Army Capabilities Integration Center through an Integrated Capabilities Development Team Charter to write the concept and conduct a Capabilities Based Assessment on the Seventh Warfighting Function, now titled the U.S. Army Functional Concept of Engagement (FCE), to develop solution approaches that mitigate the Army's gaps in conducting engagement activities.

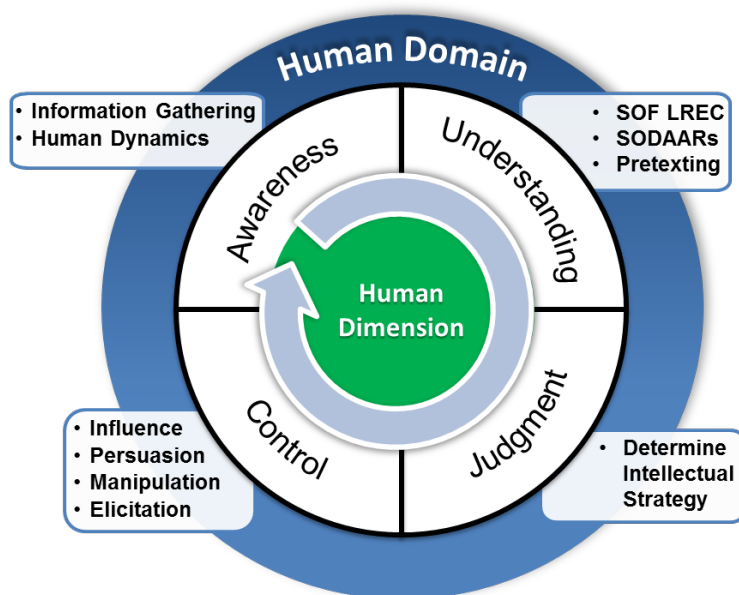
The content and focus of the FCE changed multiple times from start (SOF focus) to final concept (CF focus) and is still changing. The ongoing tenants of the FCE are gaining an understanding of the human aspects of the operational environment, building relationships, building partner capacity, and leveraging enabled partners to contribute to the multinational effort. The FCE can increase the Army's awareness of the human domain. The concept prioritizes sufficient knowledge of aligned regions, and provides guidance to better survive within the sensitive human, cultural, and political dynamics of an uncertain operational environment. USASOC's solutions will be submitted to the Army Requirements Oversight Council for approval and to take the FCE from a theory and implement it as doctrine. Separately, USASOC has also initiated and instituted educational and organizational changes such as Language, Regional Expertise, and Culture (LREC) programs throughout the force to grow the abilities of their personnel within this realm. As vital as these efforts are to prevent and shape future conflicts and



war, they primarily affect the strategic and operational efforts of our Army and do little to increase SOF Soldiers' capacity to win at the tactical level.

### *Social Engineering as a Sociocultural Tactic; Cognitive Engagement to Win the Fight*

Once it is realized how manipulative human interaction is, the boundaries and parameters traditionally influencing decisions become less definite and more a personification of the characteristics, morals, and beliefs of those that create or enforce the decisions. This is a relative constant across all populations, regardless of their diversity at skin level. Through understanding the power residing in the Human Domain, SOF have the capacity to further develop their uniquely people-focused capability at a level unparalleled by any other force. When utilized as a sociocultural tactic/weapon system, Social Engineering (SE), and the discipline of persuasion and influence, provide SOF a means to more effectively operate and engage within the land domain by leveraging the human condition.



**Figure 11. Social Engineering as A Sociocultural Tactic Cycle (SESTC)**

Figure 12 depicts the Human Dimension as the SOF Soldier's, and our Army's, core function. Around it, represented in blue, is the Human Domain. The Human Domain is the similar potential found internally to our organization through the Human Dimension, but is externally resourced and leveraged through the social, cognitive, and moral underlying forces of foreign populations, allies, or our enemies. To structure this model, the graphic is framed similar to the Observe, Orient, Decide, and Act (OODA) loop cycle. The model depicts four phases necessary to effectively navigate throughout the Human Domain and the cycle is repeated until the desired end state is achieved. Under each phase are

specific tactics, techniques, and procedures to provide the SOF Soldier tools to reach a desired end state with an individual.

Through application, while understanding the multiple internal and external influencers on an individual, a SOF Soldier can take advantage of this knowledge and can act quicker than the individual can execute his/her OODA loop. SE is a weapon system to navigate through the human domain (by leveraging USASOC's unique and experienced human dimension) to manipulate, control, or influence foreign people. This is how the SOF Soldier affects human behavior.

### *Situational Awareness*

In order to alter the way someone thinks, the SOF Soldier first must be aware of how the individual thinks. More specifically, in what modes. Information Gathering (IG) can be described as the process of determining an individual's dominant representational system. Humans are visual, auditory or kinesthetic thinkers. For example, in normal conversation, phrases such as "I can see how that would make you feel," "That looks good," or "I can picture that" are all examples of how visual thinkers often



subconsciously phrase their speech. As a result, when attempting to debate, negotiate, manipulate, or influence a visual thinker, the SOF Soldier must include visual inputs to accommodate this bias (i.e. light, size, movement, color, etc.). Visual thinkers need visual inputs to make decisions. Asking questions which contain some of these key dominant words or incorporate such inputs, observing the individual's reactions, and listening to how that person speaks can reveal what dominant representational system he or she uses. This observation is key when the SOF Soldier later decides upon an intellectual strategy and how to influence the individual on the opposite side of the table. (Hadnagy, 103-108)

Human Dynamics is represented under the Awareness phase of the SESTC. Understand, however, that like IG, Human Dynamics is being witnessed and noted during this phase in order to be subsequently applied to each following phase. Human Dynamics covers multiple forms of body language that tell the SOF Soldier what and how the individual is feeling, whether or not there is a desire to convey those feelings. (Hadnagy, 60, 109-111)

Some body language is more apparent than others. Tapping, jerking, or drumming of the feet or fingers are all very overt expressions that facilitate understanding the individual's thoughts at the time of engagement. Crossing of the arms or clammy hands are another example. Such actions are commonly associated with anxiety, nervousness, or a sense of tension as a result of the encounter. Identifying and understanding this behavior can help the SOF Soldier determine the appropriate rapport posture, and decide on an appropriate strategy to better influence the individual. Body position, the way the individual subconsciously or intentionally chooses to display themselves, and understanding how such cues relate to cultural norms within a given region is a valuable asset to the SOF Soldier. Similarly, facial cues provide an identical advantage during an engagement. However, this form of expression can often be much harder to identify depending on whether it is conducted as a macro or micro expression.

Macro expressions are those expressions that are controlled by our emotions. They can be faked and tend to be shown for a longer period of time on our faces. The key with macro expressions is that they are deliberate actions. Macro expressions are not involuntary but rather intentional. Conversely, micro expressions are involuntary muscle reactions produced by an emotional response. These expressions usually last for only a fraction of a second and are nearly impossible to control. (Hadnagy, 110-111)

By 1972, Dr. Paul Ekman identified six expressions that were specifically linked with biological or basic universal emotions. These six emotions are anger, disgust, fear, joy, sadness, and surprise (Ekman). There are numerous resources online depicting each of these emotions and how they are universally, and involuntarily, portrayed. The SOF Soldier's ability to read these expressions as they are involuntarily or deliberately presented will provide the most accurate depiction of the individual's internal disposition.

Charles A. Morgan, III with the Yale University School of Medicine & the National Center for PTSD tested the efficacy of Modified Cognitive Interviewing to detect the presence or absence of deception. The interviewing technique relies on the Cognitive Load Theory and requires those being questioned to recount information in an extremely detailed, novel like, narrative. However, interviewees must communicate the narrative with the sequence of events reversed (beginning with the incident and leading backwards to the beginning of the day). The technique is based on the belief, again under the Cognitive Load Theory, that the brain can only maintain an effective level of deception for a short period of time before becoming overloaded. Across a broad spectrum of subjects, the results proved the interviewing technique to lead interviewers to identify deception correctly over 75% of the

time (Morgan, 58). All of these observations raise the SOF Soldier's level of awareness and aid in effectively understanding the situation.

### *Situational Understanding*

As briefly mentioned above, this phase of the cycle entails quickly taking the observed cues and achieving situational understanding to account for the attitudes of the individual. Further, it is this phase which involves the SOF Soldier utilizing understanding of the political, social, and moral underlying forces of the region (through SODAARs, CIDNE reports, LREC programs, or through the use of external resources) to heighten the SOF Soldier's understanding of the individual's influences, biases, beliefs, and emotions. Having this foundation, and a sufficient understanding of the situation, further enables the SOF Soldier to intelligently approach an engagement and target an individual in a manner that is much more likely to succeed. This process of altering your approach, in SE, is referred to as pretexting.

After accounting for the external cultural influencers, the SOF Soldier must begin presenting the foundation, which will later manipulate, influence, persuade, and elicit the desired behavior. Pretexting is the process of creating a persona or false pretense, which facilitates achieving the desired action from an individual (Hahnagy, 78-79). The SOF Soldier's pretext should be just as calculated as the desired outcome. Through Joint Intelligence Preparation of the Operational Environment (JIPOE), the SOF Soldier's pretext can be roughly formed prior to engagement and refined on initial contact as well as throughout the continued interaction. The SOF Soldier should rely on actual interests and, as best as possible, make the pretext relatable. The SOF Soldier must research the identity of the individual, wargame how the pretext may be perceived, and develop a Plan of Action so that the SOF Soldier's social cues are received as genuine, spontaneous, and sincere.

A simple and adaptable approach is the most effective solution. Do not over analyze and over engineer the pretext. Focus on making the pretext natural and similar to the interests, life, and, most importantly, state of mind of the SOF Soldier. All of this is in an effort to allow the SOF Soldier's underlying subconscious emotions, and the micro expressions they create, to be in line with each other, complement each other, and feed off one another. That is how the SOF Soldier is able to create the perception of sincerity.

### *Situational Judgment*

After gaining awareness and understanding of the operational environment, the SOF Soldier must rely on the pretext and the academic and social information the SOF Soldier has cultivated to frame decisions. This occurs both prior to the initial engagement and throughout each subsequent interaction with the individual. The information the SOF Soldier pulls prior to and during an engagement will continually dictate decisions. The SOF Soldier's understanding of the social cues within each specific interaction, and the influence of the individual's emotions, experiences, and perceptions of the SOF Soldier's behavior, will control the direction of the engagement more than any personal emotions, feelings, or bias against the individual or mission. The SOF Soldier's understanding of the region and culture's effect on the individual, as well as plausible second and third order effects from the outcome of each substantial development, is paramount. All of these factors will guide the SOF Soldier's decision-making process. If the SOF Soldier's pretext is strong enough (relatable and believable), this process will occur naturally rather than strenuously. The more fluid each decision and adjustment to the SOF Soldier's strategy is, the more effective and ambiguous the control over the individual will be.

### *Situational Control*

The SOF Soldier's situational control or influence is a calculated and often reactive effort. Exertion is dictated more by the individual's reactions, than the SOF Soldier's interests. The way the individual reacts to specific tactics will dictate whether the SOF Soldier should press further or adjust. However, the deliberate engineering of the conversation remains constant. This is why the SESTC is designed as a continuous and self-correcting process.

The power of influence is a topic that has been heavily studied and documented. Within this field of study, it is agreed there are six factors, which cause a person to be influenced. These factors are: Reciprocation/Reciprocity, Conceding, Scarcity, Authority, Commitment and Consistency, and Liking (Cialdini).

Reciprocation/Reciprocity is a distinctive method to influence an individual. It is different in the sense that it can create a unique side effect where the individual feels a greater responsibility to, and sense of accomplishment with, the arrangement. This uniquely positive byproduct can be leveraged to make the individual more willing to conduct future arrangements. Reciprocation is emotionally ingrained into our psyche from the time we are children until the day that we die. It is the social construct that facilitates the development of a culture's existence and, as a result, indebtedness is a sensation that is extremely hard to ignore. Because of this socially conditioned dynamic, it is not unlikely for a person to give back more than they have received, just enough to no longer feel indebted. (Cialdini, 49, 33)

Generally, people have a greater urge to receive than to give. In fact, in many cultures it is disrespectful to turn down a gift. This sensation's effect on a person will dictate their decision making process more than their desire to give. Because of this, the SOF Soldier holds a key advantage over the individual. Due to this social formality, the individual often cannot choose nor predict who they may become indebted to. This provides the SOF Soldier an opportunity to seize the initiative and achieve an advantage. Never show up empty handed. (Cialdini, 31)

Conceding, for the sake of this paper, is solely referred to in the offensive sense. That is, a deliberate concession to cause the individual to feel the need to return the gesture in a similar manner. Calculating when to give a deliberate concession, choosing to highlight the occurrence, and demanding reciprocation from the individual is a possible, but very direct, approach. Rather, small concessions can be made over time that when compounded impose a deep sense of debt on the individual. This debt will lower the individual's guard and allow the SOF Soldier to more effectively manipulate and elicit a desired outcome. Conceding *without* seeking reciprocity can also build rapport early on and plant a seed to harvest dividends in the future. (Hadnagy, 194)

Commitment and Consistency can be the most powerful factors to gaining influence over an individual. Human beings feel the need to be viewed as consistent with their beliefs and commitments. Think of a man or woman that returns to an abusive relationship against the advice of friends and family, only to preach thereafter that they have never been happier. That person is indebted to the commitment. Further, that individual wants those whom are close to him/her to believe that they are living a socially acceptable life based on the terms of their close social network.

When liked, an individual feels at ease and compelled to drop their guard and allow themselves to be influenced. People typically like those that are like themselves. In other words, to be liked and trusted by a person, the SOF Soldier first must make the individual feel as if he/she likes them and cares

about their needs and interests (Cialdini, 167-174). It must appear to be genuine. Coming across disingenuous will cause the individual to shut down before the conversation has even started. This will greatly hinder efforts and take time to correct. As discussed before, micro expressions are the key clues as to whether an individual is being genuine in their actions. As such, faked expressions are difficult to do and, unless the SOF Soldier has developed the ability to control such expressions, are more times than not improbable.

Rather, SOF Soldiers need to work on being sociable and able to communicate and relate to others. Typically, on first impressions, speaking with confidence, establishing initial rapport, synchronizing yourself to the person's influences, and having a positive attitude are all that is necessary to get a person to like you (Hadnagy, 210). There are a series of courses available to SOF that are invaluable in this regard.

Mirroring a person's behavior is another option to influence an individual to drop their guard. The SOF Soldier talking and acting how the individual talks and acts, mimicking their human dynamics, can cause the individual to feel comfortable and be at ease subconsciously with the engagement. (Hadnagy, 155-156)

Once an individual's guard is down, how the SOF Soldier frames the narrative and engagement posture, to influence the attitude of the individual, determines what type of decision the individual ultimately makes. The SOF Soldier's frame must be in line with the pretext. Identical to how the SOF Soldier's subconscious feelings and beliefs should validate the pretext, the SOF Soldier's pretext and frame must support and validate one another. Ensuring all of these aspects are in tune further gives depth to the SOF Soldier's interaction and the ability to be perceived as genuine. Without this sincerity, it is impossible to change attitudes, beliefs, and behavior. As the SOF Soldier observes the behavior of the individual and orients to the operational environment, the SOF Soldier must either find common ground between both frames of mind, extend opinions to create new similar ground, or continue to focus on the individual's feelings and beliefs to reveal new similar viewpoints. (Hadnagy, 223-227)

Relatable opinions that will act as bridges to pull the individual's state of mind closer to that of the SOF Soldier are good starting points. If unable to create such bridges, it is possible to change the frame of the individual. However, to do so, the SOF Soldier must utilize time, an understanding of the inherent hurdles between each party, knowledge of the subject, convincing logic, as well as relatable and enticing emotion to create change and action on behalf of the individual (Hadnagy, 223-227). Like everything else, it is a deliberate and time-consuming process. The feasibility of such efforts is largely dictated by the operational environment and the restraints placed on the SOF Soldier.

If unable to directly influence a person's behavior, persuasion and the ability to negotiate effectively, is invaluable. The SOF Soldier must understand the difference between position and principled bargaining. Think of position bargaining as the SOF Soldier standing firm in an argument and solely working to gain concessions. Conversely, principled bargaining is an effort on both sides to reach a mutual agreement through understanding each other's opinion. Though both methods are commonly practiced, it is difficult to know the proper time and place for each. A SOF Soldier's ability to do so is supported by the awareness gained during the Awareness and Understanding phases of the SESTC as well as comprehending the 'why' for each development that has occurred. Deliberate bargaining can give the impression of a successful agreement between the two sides. When in reality, if properly planned and executed, it can create an outcome, which supports the SOF Soldier's ability to win the fight.

Manipulation is a powerful tool, and one often held with a negative connotation in today's society. However, it is a common tactic in interrogations and is commonly used to instill the beliefs, values, and reasons of the manipulator onto the individual. Typically, through verbal and/or physical efforts, the SOF Soldier aims to increase the suggestibility of the individual, control their environment, create doubt and a sense of powerlessness, elicit a strong emotional response, or to intimidate. Social media today, and the level of accessibility to personal information, has made it very easy to accomplish many of these objectives. When attempting to manipulate, the key is to first understand cultural influences, then use those dynamics to instill personal ownership for whatever consequences/outcomes occur. Like gaining an initial commitment, successful manipulation is more likely achieved when it is perceived as being unsolicited and done under their own accord (Hadnagy, 233-234).

The purpose of these efforts (separately or cumulatively) is for the SOF Soldier to elicit a response, a desired behavior. Embedding subconscious commands and prompts is another means to do so. These can be injected through the use of certain phrases or triggers, which are tied in to the individual's dominant representational system. An example, would be deliberately tapping the table or changing voice inflexion (with certain key words or phrases to trigger the heightened focus of an auditory thinking individual) to subconsciously prompt a secondary behavior (Hadnagy, 55).

If the SOF Soldier is unable to obtain the desired end state with the initial efforts, the SESTC is repeated. The individual observes how the individual responded to the chosen tactics, reorients based off the outcome, decides a new intellectual strategy and re-engages with a refined approach.

Independently, no single component of the SESTC is unique or foreign to today's SOF Soldiers. However, when each element is executed in series, with this framework as a guide, therein lies a unique sociocultural tactic. It is the deliberate execution of each action, based off a superior understanding of the individual, the internal psychological and social influencers, as well as the external regional and cultural factors that can make a person with 'people skills' a valuable and unique weapon system within the Human Domain. With this capability, SOF can increase its ability to leverage U.S. national interests, maneuver effectively across a broad spectrum of terrain, have better awareness of, and control over, foreign partner subversion, as well as manipulate and influence members of enemy, adversary, neutral, and friendly individuals and groups to more effectively prevent, shape, *and win* in an undefined, fluid, and hyper-sensitive operational environment.

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## Section 5: Measuring, Visualizing, and Communicating Cognitive Engagement

An important part of data driven cognitive engagement is assessing the environment before any interventions are made and assessing the effects of those interventions. Assessment focuses on determining the effectiveness of a product or series over time and is accomplished by analyzing observable behaviors related to engagement objectives. Measuring the effectiveness of influence has been a scientific and operational challenge since the US formalized the set of tactics during WWI and remains difficult despite increased attention and effort. Effective evaluation requires not only measures that are aligned with the objective, but also assurance that the measures are valid. Validity is an enduring concern when establishing evaluation criteria, particularly as intelligence constraints and lack of information can result in a tendency to assume a causal relationship due to sequential occurrence. Evaluation is typically based on correlational research since an explicit causal relationship between friendly actions cannot be definitely linked to a target audience behavior due to the existence of innumerable extraneous and mediating variables.

Validity is a formidable concern when developing measures of effectiveness (MOE), particularly, intelligence constraints and lack of information can result in a presumptuous tendency to assume a causal relationship due to temporal order (the post hoc; ergo propter hoc fallacy). MOE assessment is typically based on correlational research since an explicit causal relationship between friendly actions cannot be definitely linked to an enemy behavior due to the existence of innumerable extraneous and mediating variables (Leong & Austin, 2006). Erroneous causal inference is but one threat to the establishment of useful MOE, there are also numerous other threats to internal validity. Those may include sampling bias (subject selection, statistical regression to the mean), attrition (subjects departing a target area, mortality), improper measurement (ineffective tools, poor technique), and/or artifact (reactivity of subjects to data collectors) (Kazdin, 2003 and Pollack, 1976).

Sampling bias is common, particularly in the case of opinion solicitation in a potentially hostile environment. Soliciting enemy opinion may require confederates and/or agents, thus complicating the operation due to its extraordinary reliance on high-demand, low-density human intelligence assets that may lack the necessary training to gather the pertinent information in a scientifically sound manner. Soliciting civilian (non-combatant) opinion often requires resorting to samplings of convenience since those who may oppose a particular operation will unlikely consent to being interviewed (Pollack, 1976). Also, change in opinion over time must be evaluated with the appropriate statistical tools as not to attribute change to the intervention when it may be the result of statistical regression to the mean (Howells, 2006). Interventions (operations) may be conducted against a particular target (be it a computer network, integrated air defense system (IADS), or a group of enemy combatants) with the explicit intent of physical destruction; thus attrition due to mortality is likely therefore must be considered during the planning and assessment processes (Waltz, 1998). Outdated or flawed sensory systems (human and/or automated) are examples of ineffective tools or measurement techniques for they may fail to accurately detect the appropriate level of degradation of a targeted enemy system (Starunskiy, 2003). Reactivity of the subjects/targets creates presents a dilemma for the 4GW planner, particularly if the operation is designed to influence the opinion of a target population (presumable anti-friendly forces) away from existing attitudes (Linebarger, 1954). Here, a planner must prioritize the greater threat to validity (artifact or measure) and sacrifice validity in order to gather some (albeit potentially imprecise) data.

Threats to external validity are not as formidable a concern as those to internal validity, since it is fairly well understood different theaters of operation possess an inherent degree of idiosyncrasy that would render extrapolation to a larger group inconsequential (Pollack, 1976). Often data is gathered post hoc, potentially through interrogation, and thus the results may be confounded by multiple possible moderators (Pollack, 1976). Information obtained through interrogation produces a set of phenomena that constitute multiple threats to validity that are beyond the scope of this paper, needless to say the process cannot be considered universally reliable and thus must be corroborated on a case-by-case basis to buttress the gathered data in the appropriate context.

Other threats to external validity arise from the lack of experimental control of the process and include measurement unreliability (aforementioned interrogation), sampling bias, and artifact (subjects being targeted through multiple means) (Kazdin, 2003). The most difficult aspect of MOE development is accounting for and mitigating threats to construct validity to ensure the methods employed actually assess the variables they're designed to measure (Kazdin, 2003). Some 4GW MOE may presume enemy behavior will be the result of degraded or corrupted situational awareness; however, that rationale may be the result of the projection bias and may not fully or accurately explain the behavior. This may be particularly relevant when the adversary is of a considerable different mindset (tactically, experientially, intellectual, or culturally) than the analyst (Nisbett, 2004). In the absence of historical evidence or intimate enemy doctrinal knowledge, presuming an enemy behavior is the result of the absence of a treatment/operation can result in potentially invalid conclusions.

**Table 2. Validity threats to Nominal Measures of Effectiveness (adapted from JCS, 2006).**

Example Quantitative MOE (JP 3-13)		Example Qualitative MOE (JP 3-13)	
Measure	Possible Threats to Validity	Measure	Possible Threats to Validity
Percentage of degradation of a radar system over time as measured by an appropriate sensor (JCS, 2006).	Construct: Does not take into account the degradation of enemy situational awareness, if sufficient redundancy is employed, single system degradation may not achieve the desired result (Starunskiy, 2003).	Target population position on a specific issue as gauged by a focus group or series of focus groups (JCS, 2006).	Internal: Sampling bias (in a hostile or potentially hostile environment soliciting representative opinion across the population may require confederates (contractors, coalition nations, etc.) which may also threaten external validity (Lamb, 2005 & Kazdin, 2003). Attrition. Regression to the mean (Howells, 2006).  External: Possible inability to extrapolate results to the broader population (Kazdin, 2003).
Number and size of civil disturbances over time as reported by own forces (JCS, 2006).	Construct: Numerous confounds which may motivate observed behavior; being purely observational may limit the utility of the measure (Kazdin, 2003).	Assessment of changes in supportiveness (or non-supportiveness) of public statements made by key leaders as measured against objectives and/or effects (JCS, 2006).	External: Subject reactivity to assessment, particularly in a hostile environment (Lamb, 2005).  Construct: Change in opinion may not be a result of public statement (Kazdin, 2003 & Qualter, 1962).  Internal: Regression to the mean (Howells, 2006).
Number of computer intrusions over time as measured by software (JCS, 2006).	Construct: As a defensive measure (OPSEC), it may provide a reasonable assessment of robustness of defense mechanism, however, as an offensive measure (CNA) the value of an intrusion is dependent on the value of	Assessment of changes in bias of foreign media outlets (JCS, 2006).	Construct: While behavioral changes can be measured and/or tracked; the cause of the change may not be easily determined (Kazdin, 2003 & Qualter, 1962).

	intelligence gained as a result of the operation.		Internal: Inherent problems of self-report if measure is derived from media outlets themselves. Regression to the mean (Howells, 2006). Attrition.
Trends in target population position on a specific issue as gauged by public opinion polls (JCS, 2006).	Internal: Sampling bias (in a hostile or potentially hostile environment soliciting representative opinion across the population may require confederates (contractors, coalition nations, etc.) which may also threaten external validity (Kazdin, 2003). Attrition. Regression to the mean (Howells, 2006).  External: Possible inability to extrapolate results to the broader population (Kazdin, 2003).	Instances of defections, surrenders, non-support of authorities attributed to impact and/or credibility of loudspeaker broadcasts or leaflets (JCS, 2006).	Construct: Procedural compliance is a valid indicator of effectiveness of a particular product; however, establishing a cause-and-effect relationship to the act of surrender may be presumptuous in that it excludes other possible causes and combinations thereof of the behavior (Linebarger, 1954 & Qualter, 1962).
Number of troops surrendering as instructed by a PSYOP leaflet operation (JCS, 2006).	Construct: Procedural compliance is a valid indicator of effectiveness of a particular product; however, establishing a cause-and-effect relationship to the act of surrender may be presumptuous in that it excludes other possible causes and combinations thereof of the behavior. Number of troops may be a function of the type of unit targeted and may not be indicative of the effectiveness of an operation without appropriate contextualization (Linebarger, 1954 & Qualter, 1962).		

Effective measurement also entails effective visualization and communication as those involved in evaluating the legality and/or propriety of, and ultimately approving, cognitive engagements may not possess the same academic and operational backgrounds of those designing said engagements. The following set of papers address not only different approaches of measuring engagement but also advises on communicating the results of those assessments.

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## A Biological, Psychological and Sociological Threat Potential Prioritization Model

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**Abstract:** The Biological, Psychological and Sociological Threat Potential model is designed to provide a methodical prioritization of countries based on the relative threat potential of each country. Threat potential is defined as the potential for an individual or group to exhibit acts of aggression and violence that threaten the United States (US) and its allies. This is accomplished by assessing Bio-Psycho-Social Indicators of Aggression compiled by the Strategic Multi-Layer Assessment (SMA) program; and the elements of organized aggression and violence in a country vulnerable to conflict or collapse.

### Introduction

The whitepaper *Assessing and Anticipating Threats to US Security Interests: A Bio-Psycho-Social Science Approach for Understanding the Emergence of and Mitigating Violence and Terrorism* (March 2016) is a compilation of multi-disciplinary perspectives defining and further developing biopsychosocial approach components “to understanding, assessing, and influencing the cognitions and behaviors of individuals and groups that are devising, recruiting, training, and implementing organized aggression and violence.” An approach that can reasonably identify and prioritize Bio-Psycho-Social Indicators of Aggression to assess and anticipate threats provides a rationale for the emergence and mitigation of violence and terrorism in a country and a metric to assess the effectiveness of threat mitigation efforts.

The Biological, Psychological and Sociological Threat Potential Prioritization model is designed to provide a methodical prioritization of countries based on the relative threat potential of each country. The BPS-TP model goal is to answer -- *What is the relative potential for an individual or group to devise, recruit, train, and implement organized aggression and violence towards a country when BPS indicators are present?* The model is designed to answer this question by comparing various countries based upon the Bio-Psycho-Social Indicators of Aggression and the organized aggression and violence potential threat by an individual or group within the country.

The individual or group Bio-Psycho-Social Indicators of Aggression and their organized aggression and violence towards a country are defined and modeled in three separate segments: biological aggression indicator threat potential prioritization model (BAITP), psychological aggression indicator threat potential prioritization model (PAITP), and social aggression indicator threat potential prioritization model (SAITP). Each segment's outcomes can be used for independent decision analysis or combined to look for larger trends regarding a Bio-Psycho-Social interaction.

The threat potential presented within the BPS-TP is a two-dimensional problem: the threat posed by an individual or group to organize violence and aggression and their indicators of aggression within a country. The BPS-TP model is structured into a series of attributes that define these dimensions.

### Threat Identification

The assessment of the threat from an individual or group within a country is based upon measuring the known or suspected capabilities and intentions of an individual or group to devise, recruit, train, and implement organized aggression and violence and the country's vulnerability to conflict or collapse. The

Fragile State Index is an annual report published by the Fund for Peace. It is used to determine a country's vulnerability to conflict or collapse based on the twelve primary social, economic and political indicators of the Conflict Assessment System Tool (CAST) methodology developed by The Fund for Peace (Messner & Haken, et, al, 2016).

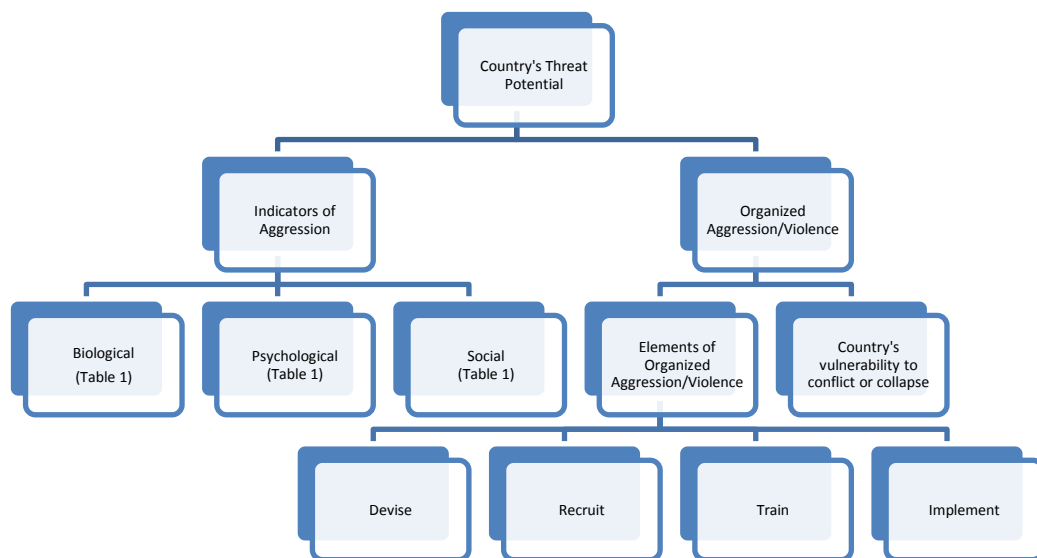
An individual or group elements of organized aggression or violence is measured by proxy data, which is used to define the extent of devising, recruiting, training, and implementing organized aggression and violence within the country.

The assessment of an individual or group indicators of aggression is based upon assessing three attributes: Biological, Psychological and Social. These indicators of aggression were compiled by the Strategic Multi-Layer Assessment (SMA) program as an attempt to summarize the contribution of papers to the study of bio-psycho-social indicators of aggression (Canna, S., 2016).

An individual or group biological, psychological and social indicators of aggression is measured by proxy data, which is used to define the extent of listed indicators of respective attributes in Table 1.

## Methodology

A multiple-objective decision analysis (MODA) framework is used for the BPS-TP model shown below.



**Figure 12: Depiction of the general decision model**

The MODA approach organizes the objectives into a hierarchy of factors (e.g., organized aggression/violence and indicators of aggression) where the lowest-level objectives are quantified by measurable scoring (Kirkwood, C. W., 1997). Then the MODA utilizes the “data” from the value judgments to construct the model. The MODA approach provides a logical way to observe and compare abstract concepts (in this case, ‘elements of organized aggression/violence’ and ‘aggression indicators’), or concepts that can only be approximated due to the limited amount of available data (Clemen & Reilly, 2004).

Organized aggression and violence is defined as the intent and capability of an individual or group to devise, recruit, train, and implement threats within the country. Organized aggression and violence has two supporting objectives:

- Intention and capability of an individual or group to devise, recruit, train, and implement organized aggression and violence defined by using constructed scales and scored by subject matter experts.
- Vulnerability of countries to conflict or collapse based upon the Fragile States Index ranking.

An individual or group indicators of aggression is based on the Bio-Psycho-Social Indicators of Aggression compiled by the Strategic Multi-Layer Assessment (SMA) program listed in Table 3.<sup>57</sup> Each indicator of aggression is defined by using constructed scales, scored by subject matter experts.

**Table 3. Bio-Psycho-Social Indicators of Aggression**

Simplified Indicators of Aggression		
Biological	Psychological	Social
Hormones <sup>i</sup> (e.g., oxytocin & trust; dopamine & reward)	Emotion <sup>ii</sup> (disgust, contempt, anger)	Environment (grievance, inequality, uncertainty, etc.) <sup>iii</sup>
Genomics & Epigenetics <sup>iv</sup>	In-group/Out-group polarization <sup>v</sup>	Identity, Significance & Belonging <sup>vi</sup>
Neural mechanisms <sup>vii</sup>	Stories & Narratives <sup>viii</sup>	Ideological & Cultural beliefs, Sacred values <sup>ix</sup>
Neuro-ecology <sup>x</sup>	Personal experiences (trauma, humiliation) <sup>xi</sup>	Social networks & connections <sup>xii</sup>
Childhood development <sup>xiii</sup>	Personality traits (narcissism, altruism, rigidity, dependency) <sup>xiv</sup>	Perception of threat <sup>xv</sup>
Innate biological factors (intrinsic aggression) <sup>xvi</sup>	Dehumanization of other <sup>xvii</sup>	Non-verbal behavior <sup>xviii</sup>
Information processing (heuristic, peripheral, systemic) <sup>xix</sup>	(Lack of) Empathy <sup>xx</sup>	Status & Glory <sup>xxi</sup>
Evolution <sup>xxii</sup>	Psychopathy <sup>xxiii</sup>	Self-interest <sup>xxiv</sup>
Pathology <sup>xxv</sup>	Low tolerance for ambiguity and low cognitive flexibility <sup>xxvi</sup>	
Neuroeconomics <sup>xxvii</sup>	Prediction error <sup>xxviii</sup>	
Physiological measures (heart rate, blood pressure, etc.) <sup>xxix</sup>	Loss aversion <sup>xxx</sup>	
	Incentives vs. rewards and punishments <sup>xxxi</sup>	
	Impulsivity control <sup>xxxii</sup>	
	Capacity to suppress moral	

<sup>57</sup> Full report available at <http://nsiteam.com/social/wp-content/uploads/2015/12/Anticipating-Threats-to-US-Security-Interests-MAR-2016.pdf>

	norms against harming others <sup>xxxiii</sup>	
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The BPS-TP model is a value model that analyzes alternatives from the defined objectives. There are essentially four components that comprise the BPS-TP value model: define attributes that measure objectives for evaluating countries, define value functions for each attribute into a common scale, assess weights for attributes when combining different attributes into one overall score, and calculate the overall relative value score by defining an algorithm that merges a country's attribute scores and the weights. The first component objectives evaluation measures properties include completeness, non-redundancy, independence and operability (Kirkwood, C. W., 1997). An attributes' independence condition is important when attempting to develop procedures to combine evaluation measure to determine the overall preference of alternatives. Preferential independence implies the preference order for one attribute does not depend on the other attributes score. Under this condition a weighted additive function is used to aggregate the attributes. When certain attributes depend on other attributes scores, this interdependent condition uses a multiplicative function to combine the two attributes (Ewing, Tarantion, & Parnell, March 2006).

A value model contains the set of objectives and the attributes to measure them. Then each attribute measurement is converted to a common value scale (e.g., zero to one) and the value functions for each attribute is constructed with subject-matter expertise. In BPS-TP, the majority of the value functions will be linear. The use of value functions allows the common measure "value" to be a combination of attributes that are aggregated.

Based on each attributes impact on the overall potential threat for the country, it is individually weighted by SMEs. After the weights are assessed, the scores of countries on individual attributes are aggregated into a single priority score, summing the components that are additive and multiplying the components that are interdependent as described in detail below (Parnell, Jackson, Jones, et. al., 1988). The BPS-TP model collects and analyzes data at a country-specific level. This data is used to score the attributes for each objective. The total weighted score of the attributes provides the threat priority score for the country thus reflecting its threat potential. This final score is then used to prioritize the modeled countries relative to each other for comparison.

To define the indicators of aggression attributes to an individual or group, the following multiplicative value model is used (the Biological, Psychological and Social indicator attributes are interdependent):

$$V(x) = \prod_{m=1}^n v_m(x_m)^{w_m}$$

where the attribute measure,  $x_m$  is the level of the  $m_{th}$  attribute measure,  $v_m(x_m)$  is the value of the attribute value function at level  $x_m$ , and  $w_m$  is the weight associated with that attribute measure. This also applied to the elements of organized violence and aggress. To define the extent of organizational aggression and violence, and the vulnerability of the countries conflict or collapse, the following additive value model is used to combine the overall organizational aggression and violence measures where the variable definitions are the same as in the previous equation:

$$V(x) = \sum_{m=1}^n w_m v_m(x_m)$$

## Conclusions

This paper outlined a Bio-Psycho-Social Science Approach for Understanding the Emergence of and Mitigating Violence and Terrorism utilizing value focused modeling with a multiple-objective decision analysis (MODA) framework. The BPS-TP model provided a logical prioritization of countries based on the relative Bio-Psycho-Social Indicators of Aggression and potential organized aggression and violence by an individual or group. Variations of the model design is frequently used by US government agencies in making strategic decisions.

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## A Hybrid Approach to Identifying, Quantifying, and Tracking Persuasive Messages Online and in Social Media

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### *Abstract*

Determining which extremist messages will be sticky enough to go viral, and persuasive enough to impact behavior is notoriously difficult. Identifying these messages in a crowded media environment is even more difficult. We propose a hybrid approach that combines behavioral science theory, applied empirical neuroscience, experimental populations surveys, and advanced web scraping technologies. We describe three capabilities based on this hybrid approach: 1) real-time neural measures of persuasion; 2) tools to forecast message virality; and 3) Automated discovery of persuasive extremist content in social media and the deep and dark web.

### *Overview*

We live in an information-rich environment in which information flows multidirectionally and its impact on destructive behaviors can be difficult to assess. Recent examples of such radicalization are seen in the ISIL “Flames of War” and “Abu Muslim” videos, which appears to be designed to recruit Westerners by glamorizing and romanticizing violent extremism (Castillo & Todd, 2014; Tharoor, 2014). ISIL, AQAP, and other international radical extremist organizations now regularly use Facebook, Instagram, Twitter, Telegram, JustPastelt, and other social media to try to persuade young people from around the world to join their ranks. Yet, asking people if they think a communication is “persuasive,” or “attractive” or “likeable” is nearly always unpredictable of its impact on *actions*. These types of questions ask respondents to report emotions to which they have little or no access--the brain is not designed to reveal its unconscious processes. This means that data generated from focus groups, surveys, and even expert analyses are most likely irrelevant or wrong.

The Center for Neuroeconomics Studies (CNS) develops methods to analyze and predict the persuasiveness of messages using neurological and physiological indicators. IST Research’s core technology is Pulse, a technology platform that aggregates and analyzes vast quantities of information from direct experimental survey data collections and from the open, deep, and dark webs, including social media. In collaboration, CNS and IST are applying a hybrid approach combining theory from behavioral science, custom applied neuroscience experiments, and cutting edge big data engineering to identify, track and assess persuasive messaging that may otherwise not be detected. This technology can assist in determining which messages can be ignored, flagging messages that should be countered, and tracking of individuals and groups producing, propagating, and receiving messaging likely to be highly persuasive. This paper discusses several specific applications stemming from this line of research. Some capabilities are already operational; others are still in development.

Three recent innovations in the application of behavioral science and neuroscience combined with advanced web scraping technology enhance the ability of operators and analysts to identify and assess potentially radicalizing messages.

### *Real-time Neural Measures of Persuasion*

The first innovation is miniaturization. The technologies we have developed with DARPA and IARPA funding use expensive and delicate medical-grade sensors on the peripheral nervous system to collect copious amounts of data that are fed into algorithms that generate accurate predictions of post-message costly behaviors (e.g. Barraza, Beavin, & Zak, 2015). In 2016, we developed a low cost and sturdy wearable sensor that can be used inside and outside the laboratory to collect neural data while people read, listen, or watch extremist communiqués. Our algorithm development has similarly advanced; rather than needing weeks to process data, we now provide real-time measures of persuasion from multiple sensors simultaneously. This technology could support the ability to maintain a cohort of test participants, perhaps within target demographics and psychographics, who receive communications and have their neural responses measured. Such a cohort could serve as a standby participant pool for a persuasion measurement testbed; messages of interest could be tested on this group within days instead of the weeks or months typically required for similar research. With modest additional investment, and while respecting the difficult ethical and legal issues involved, the USG could develop a similar technology to collect data surreptitiously from individuals' own wearables.

### *Combining neural data with online behavior data to predict message virality*

The second innovation applies mathematical models of neural activity in social networks to quantify and predict when messages have mass impact ("go viral") (Penenberg, 2009). Predicting the timing or magnitude of viral tipping points has proven challenging; linear static models don't capture the dynamic nature of the persuasion process, particularly the cumulative effects of message exposure and the lag between message ingestion and behavioral outcome. In some key regards, the relation between persuasion inputs and outputs mirrors the multi-branch nonlinear behavior observed in hysteretic systems (Zakerzadeh, Sayyaadi, & Zanjani, 2012). Such systems are exceedingly challenging to model, but the Krasnosel'skii-Pokrovskii Hysteresis Model has been identified as a good candidate for predicting hysteretic nonlinearity. We propose that applying this model to our understanding of neural responses to persuasion over time may improve our ability to understand and forecast the impact of persuasive messages on behavior. Based on this approach, Romero's and Zak's group have developed a mathematical model of persuasive hysteresis, the point at which a message passes an inflection point after which it has mass impact. This model is populated with neural data that then predicts which messages will eventually reach a mass audience, then with data gleaned through online scraping to determine the rate and reach of message spread. This tool could predict which messages will go viral, and when.

### *Automated discovery of persuasive extremist content in social media and the deep and dark web*

Previous work in the application of discourse analysis to CVE has determined that an examination of integrative complexity in online media can provide information about the extent to which authors of social media posts hold radical, extremist views (Suedfeld, 2003). Integrative complexity is defined as the acknowledgement of multiple perspectives and the recognition of connections between those perspectives (Suedfeld, Guttieri, & Tetlock, 2005). Discourse characterized by integrative complexity is indicative of logical and balanced thought on a topic. To the extent that integrative complexity is evident in an author's thinking, the author places value on reason and is tolerant of dissenting ideas. These qualities are conspicuously absent from arguments espoused by



radicalized individuals; extremist arguments are highly emotional, are not logic-based, and are highly intolerant of dissenting views. They are also typically devoid of integrative complexity and low scores on complexity scales has been associated with extremist rhetoric and changes in these characteristics have been associated with impending kinetic actions (Suedfeld, 2003).

Similarly, previous work in the application of social psychology has determined that outgroup distancing, denigration, and dehumanization appears in groups' discourse preceding aggression against out-groups (Bandura, 1999). Believing that an out-group is less than fully human is an important step in rationalizing aggression (up to and including violence) against that group, and evidence of this can be seen in online communications. Outgroups are commonly dehumanized by portraying them as repugnant animals (e.g. cockroaches, rats, or pigs), machines (e.g. automatons or drones), or evil supernatural beings (e.g. demons or monsters). Most cultures condone killing any of these, so thinking of an outgroup in these terms makes it easier to rationalize violence against them.

Recent work in using social media to identify, predict, and counter violent extremism has focused on learning how to identify indicators of integrative complexity, and outgroup distancing in social media. For example, Toman, Kuznar, Baker, and Hartman developed a systematic methodology for identifying and interpreting out-group distancing in Arabic language texts (2010). Similarly, the Mixed-Initiative Discourse Analysis System (MIDAS) focused on using analysis of online communications to aide intelligent analysts in identifying emerging groups and characterizing their intent. The initial use case for MIDAS focused on identifying emergent groups through Twitter posts, based on increased in-group identification, out-group denigration (including dehumanization), and decreased integrative complexity (Patten, Koelle, Romero, & Pyszcynski, 2013). We propose to expand analysis tools to add the capability to identify indicators of persuasion as they emerge from the neuroscience research at CNS.

These discourse analysis tools could be combined with IST's web crawling and scraping technologies in order to search for and identify these indicators in online postings in the open, deep, and dark portions of the Internet. In current work, IST Research is developing means to search for specific keywords and activity patterns in Twitter, Facebook, Telegram, and What's App, as well as in online forums on both the open internet and on the dark and deep web (e.g. Tor sites). Augmenting these tools with the discourse analytics described above will enable users to execute searches for signatures of persuasive, extremist discourse. By combining these searches with keywords or seeding them with initial URLs, users could make these searches as broad or as focused as they desire.

Additionally, IST's Pulse platform is unique in its ability to integrate active population engagement along with monitoring and collection of data from social media and websites. Information obtained via one-approach seeds the execution of the other approach. For example, a reference to a leader in an SMS survey response can automatically initiate the crawls and scrapes of websites associated with that leader. At the same time, a trending local topic discovered via social media can guide direct engagements around that topic. Including scoring of integrative complexity and dehumanization in content uncovered through Pulse will enable automated discovery and identification of extremist activity in social media and websites.

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## Lessons from Advertising and Neuroscience Applied to Countering Violent Extremism: The Role of Attention and Emotion

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### *Introduction*

The advertising industry has made headway in applying neuroscience methods to the measurement, selection, and improvement of marketing. These same methodologies can and should be applied to our defense and counterterrorism efforts.

At first glance it may seem counterintuitive, oversimplified, and even objectionable to compare consumer-advertising methods to combatting terrorism. After all, how can we compare selling beer to stopping terrorists? Instead of focusing on the obvious differences, this chapter examines the commonalities, and how we can apply marketing methods to counter violent extremism (CVE).

Among other marketing strategies, the role of emotion in decision-making is a critical process that CVE efforts must actively take into account. In advertising, emotion is at the core of effective campaigns, yet CVE messaging efforts tend to take a more rational approach. This chapter delves into the effects of emotional tactics and how they can be applied.

In order to most effectively combat violent extremism, we must take a more interdisciplinary approach, integrating knowledge from government and private sector, academia and practitioners, science and art. Stemming from a human factors approach, it is the intersection of cognitive psychology and human behavior research with technology and design that can effectively bridge the worlds of academia, government, and private industry.

This chapter begins this integration process by providing:

- Commonalities: Advertising and CVE
- Attention in Advertising
- Measuring Attention
- Emotion in Decision-Making
- Emotion in Advertising
- Measuring Emotion
- Neuroscience and Psychophysiological Methods
- Future CVE Success

### *Commonalities: Advertising and Counter Violent Extremism (CVE)*

ISIS and other terrorist groups have done an effective job of utilizing modern technology in their recruiting efforts. Their messages seem to be working, at least for some, and there is no shortage of ISIS

media being distributed across the globe. Social media is core to ISIS efforts, video content is constantly produced and distributed, and other forms of digital and physical propaganda are broadly disseminated.

What we call propaganda for ISIS is akin to marketing in the world of consumer products. The goal of all advertising is to change people's perceptions and behaviors; to get them to think about something differently and then to act on it.

Consumer brands like Apple strive to produce brand evangelists. There are people with Apple tattoos and those who sleep in lines overnight to get the next new product. Even those who are less extreme are fans, advocates, and loyal customers.

For the purposes of this chapter, think of ISIS as a brand. For over 100 years Coca-Cola has worked to associate happiness with their brand image. Whether the logo or Coke's particular shade of red, their goal is to influence the feelings you tie to their brand. As a brand, ISIS has the same goals. Their flag contains their logo and their messaging often hones in on feelings of belonging, empowerment, and other key drivers. If ISIS is a brand then their tweets, videos, and posters are their marketing, designed to target their audience and change how people feel and what they do.

By that definition, there is no doubt that ISIS focuses heavily on marketing. With the emergence of CVE efforts, governments and NGOs have attempted to do their own messaging campaigns to try to prevent radicalization and counter-terrorism. Just like in advertising, CVE goals are to affect perceptions and behaviors. And just like in advertising, the effectiveness of the messages can make or break these critical efforts. CVE campaigns need a strong brand to help thwart the tide of terrorism.

### *Attention in Advertising*

When advertisers buy media space, they are buying "eyeballs." When public relations companies seek press, they are trying to get in front of an audience. When social media professionals post content, they are trying to gain followers. Yet no matter how many impressions a message gets, the quality of the message is of the utmost importance.

Every day the average person encounters thousands of brands and what seems like a limitless amount of stimuli vying for attention. Try to imagine the number of ads you saw, heard, or watched over the past week alone. Now try to think how many of them you actually paid attention to or still remember.

The fact of the matter is that capturing people's attention is no small feat. The competition for your awareness and interest in this digital age is greater than in any time in history. Meanwhile, if you can't get people to stop, look, listen, and process, then your message may as well have not existed.

### *Measuring Attention*

Take a look at the images below displaying second-by-second measures of cognitive attention. The neurophysiological measures that produced these graphs will be addressed later in the chapter, but for the moment, just note is that when these attention graphs are high, people are deeply engaged and when the metrics are low people are paying little attention. The general goal of attention measurement is quite simple: higher is better.



Figure 13. Attention Metrics - [Adidas Advertisement](#)



Figure 14. Attention Metrics - [Budweiser Advertisement](#) (<https://www.ispot.tv/ad/7xYS/budweiser-super-bowl-2015-commercial-lost-dog-song-by-sleeping-at-last>)



Figure 15. Attention Metrics - [Hillary Clinton Campaign Advertisement](https://www.ispot.tv/ad/Awgu/hillary-for-america-family-strong) (source: <https://www.ispot.tv/ad/Awgu/hillary-for-america-family-strong>)

Take for example Figure 15. This Adidas ad has some excellent moments. It starts out with a moderate amount of attention as people see a celebrity figure, David Beckham, and are invested in seeing what the story may entail. Attention drops quickly, however, as the story takes too long to get started. A compelling action sequence engages viewers and the climax of the action produces a moderate peak. However, the high peak results from the sense of anticipation following the climax. This dramatic pause and strategically placed silence is what really gets people to tune in. Unfortunately, the payoff from that dramatic pause comes too late and is weak, causing rapidly declining attention. A bit more action draws people back in, but it is repetitive and attention isn't sustained. By the time the brand, Adidas, is revealed people are already disengaged.

This data provides the ability to hone in on the exact moments where ads are succeeding in sustaining attention and where they are losing people. Cutting out the boring bits in the beginning, strengthening the anticipated payoff, and tightening up the brand reveal could make this Adidas ad far more effective.

By contrast, Figure 16 displays attention metrics from a highly engaging Budweiser ad. Even its worst moments are great. Figure 16, on the other end of the spectrum, has a compelling beginning but grows boring quickly. Democrats and Republicans alike shared this attentional pattern for this Clinton Campaign ad. The heartfelt story in the beginning gets people to listen and yet the recitation of Clinton's career history does little to maintain interest.

Attention is the holy grail of marketing. If a tree falls in the woods and no one is there to hear it, does it make a sound? If an ad plays and everyone mutes the sound, turns away, fast-forwards, or changes the channel, did it work? The obvious answer is this: Step 1 – Grab attention.

Just like with commercial advertising, CVE efforts should focus more heavily on ensuring messages, styles, and creative approaches can measurably capture attention.

### *Emotion in Decision-Making*

In the vernacular, making an “emotional decision” connotes a bad thing. It is commonly thought that good decisions are rational decisions. Scientifically speaking, that is not the case. In fact, unless you are solving a pure logic problem, one cannot make decisions in the absence of emotion. Whether

selecting a meal from a menu, deciding which car to buy, or what group to join, it is impossible to decide without major contributions from emotional processes.

Rational decisions involve analyzing a series of variables to come to a conclusion. The problem is that in the real-world variables are limitless and could never be fully analyzed. Unconscious processes, including emotion, provide shortcuts to analyzing these infinite variables. With these heuristics, people have the benefit of all past experience and human evolution.

Regardless of what a pro/con list might say, it is your “gut” that pushes you to choose. That “gut” feeling is rooted in emotion and is a critical part of making daily decisions, big and small.

This understanding often seems lacking in CVE campaigns, which exhibit an emphasis on rational arguments over emotional drivers. Knowing that all decisions are at least partly emotional, governments and NGOs should reconsider their approach to CVE messaging, emphasizing key emotional drivers behind the perceptions, decisions, and behaviors they aim to affect.

### *Emotion in Advertising*

Even when employing strategies to get people to pay attention, not all attention is created equal. It’s one thing to stop and look, another to cognitively process what you are seeing, and yet another to remember it later or be affected by it as you operate in daily life.

Coke does not expect you to see an ad and then immediately hop in the car and drive to the local gas station to buy a can. They expect to register on a deeper, unconscious level. They aim to embed in those shortcut, emotional processes that influence how you behave when at the point of purchase. Will you buy Coke or Pepsi? It is not only (perhaps not even mostly) the flavor that helps you decide.

Good advertisers get it. They tap into something deeper. Apple targets a drive to think differently and challenge the status quo. Apple appeals to the desire to be an innovator associated with the great minds of our time. They also appeal to the desire for simplicity, cleanliness, seamlessness, and the calming effect of reducing extra clutter and decision points. They target people who value form equal to function, those for whom beauty matters.

Meanwhile Android targets a different profile. They attempt to appeal to the desire to be individuals who don’t want to fit a mold. An open system that allows for co-creation and individuality fits well for that mindset. In fact, Android’s message challenges Apple’s mantra of “thinking different” because it takes “different” to an individual level where each person can be unique.

As you can see, great brands target emotional drivers in their marketing. Long ago they stopped trying to sell features or claim better technology. They aimed squarely at something deeper—a sense of identity. CVE messaging must do a better job of taking a similar emotion-centered mindset.

### *Measuring Emotion*

When we measure attention, we recognize that higher levels of attention are generally better—you don’t want people to tune out. Emotion is a bit more complex. Think about riding a rollercoaster—what makes it entertaining? If you were at the same height the whole time it would be boring, but the abrupt ups and downs keep you on your toes. In fact, they keep you releasing hormones that produce strong emotions from surprise to fear to joy.

When we measure emotion, the graph we use has 0 in the middle with negative numbers below and positive numbers above. Zero is neutral, negative numbers are negative emotions (negative valence) and positive numbers are positive emotions (positive valence).

The goal of a good advertisement is to avoid too much time hovering around zero and to reach high values (negative and positive) representing more emotional intensity. To that end, think about how a good story can make you feel scared, relieved, and then overjoyed. This rapid switching between positive and negative emotions is especially engaging, and this level of engagement is important to advertisers.

Consider Figure 18 below. This highly compelling ad tells a story that engages emotion intensely. Notice the various highs and lows. This emotional engagement serves more than just maintaining attention. When you have more intense emotions you release hormones like cortisol and epinephrine, which among other things makes you more likely to store information in memory.

The best ads are the ones that you remember later and extreme emotions, positive and negative, create stories that are more likely to affect you long term.

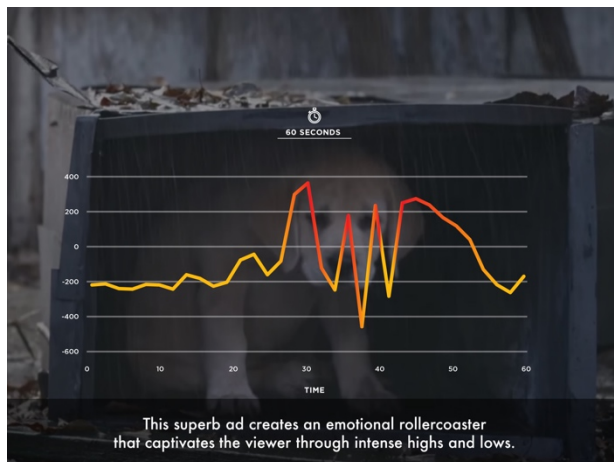


Figure 16. Emotion Metrics - Budweiser Advertisement (<https://www.ispot.tv/ad/7xYS/budweiser-super-bowl-2015-commercial-lost-dog-song-by-sleeping-at-last>)

### Neuroscience and Psychophysiological Methods

Traditionally, focus groups, surveys, and other self-report methods have been the basis for marketing research. These methods, however, have significant weaknesses. Focus groups, for example, suffer from significant biases:

- *Confirmation Bias*: Researchers inadvertently interpret responses to favor their own opinion.
- *Experimenter Bias*: Participants give answers to please the researcher.
- *Groupthink*: The loudest person sways the crowd.
- *Subconscious Emotion*: People typically aren't consciously aware of their emotions and can't report them accurately.
- *Lack of Granularity*: Current methods provide general feedback, but lack specific second-by-second data like exactly when an ad loses or gains attention.
- *Self-Report Data*: Asking people what they think misses real-world behaviors and feelings.



In order to overcome these issues, neuroscience can help get more objective readings of engagement, as seen in Figures 1-4. In this case, the psychophysiological measures that provided these outputs include:

- *EEG*: An electroencephalogram (EEG) records brain activity through the electricity emitted from your head. This is the basis for our attention measures and emotional outputs. By looking at different electrical frequencies, locations on the scalp, how the electricity travels, amplitudes, and key elements of neural activation associated with emotion and attention, a robust algorithm processes the data.
- *GSR*: Galvanic skin response (GSR) measures electrodermal activity, small amounts of electricity transmitting through your skin, especially through your palms and fingers. Surely you've noticed with heightened emotions, your palms sweat. That sweat conducts electricity and gives us a measure of emotional arousal.
- *Facial Expression Coding*: Every smirk and grimace provides an additional measure of what a person is feeling. A camera captures micro-expressions, movements of many muscles in your face, and translates these nonverbal cues into meaningful data.
- *Eye Tracking*: Measuring eye movements tells us exactly where you are looking with millimeter accuracy, providing a more precise understanding of the stimulus you are responding to.
- *All Combined*: When combining these various inputs into algorithms, we are able to produce robust and reliable measures of engagement.



Figure 17. SPARK Experience lab, conducting biometric research with EEG, GSR, Facial Coding, and Eye Tracking.

### *Future CVE Success*

This article began by introducing the idea that ISIS can be thought of as a brand and much like consumer brands, it has marketing goals to affect attention and behavior. In order to combat radicalization, CVE efforts must learn from consumer brands and lessons in advertising.

Among these lessons, a greater focus on objectively drawing attention is of the utmost importance. A boring campaign doesn't make a dent. If the goal is to affect beliefs and encourage

actions, professionals must better engage emotions. In fact, it is impossible to make a decision without emotion.

Current CVE work relies too heavily on facts and rational arguments. At best, these methods won't be remembered. At worst, they will backfire as they give people a space to counter-argue against one rational argument or another.

Much like brands from Coke to Apple focus on deeper emotional drives, it is critical to understand and target the emotions behind decisions that can help prevent radicalization. The need for belonging and a sense of purpose, for example, are heavily emphasized in ISIS messaging.

Just thinking about and designing with emotion in mind, however, is not enough. Emotion is complex and personal and just because the group behind the creative is of the opinion that they hit the mark does not mean that the target audience will feel the same way. A lack of user-centered, data-driven approaches typically backfires.

The latest neuroscience technologies, when performed with strong experimental design and validated algorithms, can efficiently give us real, objective measures of message and campaign performance. This data can help us select, target, and refine the content and creative approach. CVE is too important to skip this step.

## The Continuous Transformation of Analytic Tradecraft

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### Overview

Intelligence analysts, comprising approximately 20 percent of intelligence community professionals, serve diverse clients on issues, deriving intelligence from Open Source (OSINT), to SIGINT, MASINT, HUMINT, and GEOINT.<sup>58</sup> Analytic tradecraft assists intelligence analysts with perpetual problems of intelligence. Complex international developments, rapidly increasing magnitude of information, diversification of and emerging social networking communication platforms, and new analytic combinations challenge human cognitive capacity, necessitating continuous examination of the world of analytic tradecraft, the body of specific methodology for intelligence analysis.<sup>59</sup> Today, the utilization of structured analytic techniques for social media intelligence analysis may be better applied in unstructured ways to foster analysts to challenge judgments, identify mental mindsets, stimulate creativity, and manage uncertainty. Three areas of analytic tradecraft transformation addressed in this chapter are 1) structured thinking in an unstructured environment; 2) adapting to information magnitude and speed; and, 3) understanding rapidly changing environments.

### Structured Thinking in an Unstructured Environment

Emerging state and non-state adversaries possessing diverse and continuously changing capabilities require flexible, adaptable, and innovative analytic tradecraft methods and processes. Frequently, prevailing legal structures and authorities prohibit and/or seriously constrain analysts in unstructured environments while adversaries thrive on and within these restraints, due in great part to the lack of legal enforcement related to such activities.

Globally, there is evidence of attempts to better analyze data from Open Source/Social Media data platforms. An examination of Chinese analytic tradecraft training highlights an attempt to address structured thinking in an unstructured environment. Chinese scholars address a variety of methods under certain preconditions, including content analysis, secondary analysis, meta-analysis, and the morphological grid analysis method, network metering and text mining.

Chinese analytic methods comprise different concepts, approaches, methods and techniques, a distinction increasingly reflected in Chinese intelligence analysis education. Some maintain that intelligence analysis comprises a specific group of methods and techniques; yet one Chinese analysis scholar contends that these constructs underlie all fields of analysis, noting that the fact that methods of calculus are used in the physical, social science, or biological domains does not necessitate that they are termed physical or biological methods.<sup>60</sup> He suggests that, rather than examining such methods as solely analytic methods for intelligence, one might examine intelligence analysis from the approach level or

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<sup>58</sup> Thomas Fingar, "Analysis in the U.S. Intelligence Community: Missions, Masters, and Methods," [http://www.nap.edu/openbook.php?record\\_id=13062&page=3](http://www.nap.edu/openbook.php?record_id=13062&page=3), [Intelligence Analysis: Behavioral and Social Scientific Foundations](#) (2011) Board on Behavioral, Cognitive, and Sensory Sciences (BBCSS).

<sup>59</sup> "A Tradecraft Primer: Structured Analytic Techniques for Improving Intelligence Analysis," Central Intelligence Agency, March 2009, <https://www.cia.gov/library/center-for-the-study-of-intelligence/csi-publications/books-and-monographs/Tradecraft%20Primer-apr09.pdf>, accessed 18 January 2013.

<sup>60</sup> <http://www.miaoqihao.name/?p=3747&cpage=1>

the ways that the methods address specific approaches to analyze specific intelligence. Another example is the bibliometric method, which is a typical information science method, a component of library and information science. Similar to industrial and IT patent analysis, you can see the application basically at the methods level. Therefore, intelligence analysis within the social networks/Social Media areas is often very complex, involving multiple and various aspects of knowledge, sometimes visualized rather than read, reflecting the real world of intelligence analysis.<sup>61</sup>

Structured thinking in an unstructured environment comprises a unique relationship between human brain capacity and technology. A greater use and dependence on technology should augment, but not replace critical human analysis skills. Likewise Social Media analysis necessitates an understanding of the benefits and limitations of the available technology. In addition to utilizing the technology, it is critical to develop complex methodologies that augment analysis of tradecraft in the uncharacteristically chaotic and changing Social Media environments.

Often, intelligence analysis modes or methods consist of informal analytical thinking resulting from life experiences, combined with a formal combination of classification, analysis, synthesis, comparison, hypothesis testing, logical reasoning, and statistical analysis.<sup>62</sup> These comprise the cornerstone of intelligence analysis methodology building; yet, many lack this type of complex, almost layered mindset.<sup>63</sup>

An unstructured environment, such as that found in the intelligence analyst's world of diverse actions, interactions, and information sources, necessitates complex analytical thinking and abilities. In most cases, methodologies should be developed and followed in one way or another to obtain consistency of analytic function, despite their complexity or difficulty of application. While critically thinking about the diversity of conditions, actors, actions, and analysis of the different modes of thinking and methods, the analyst needs to maintain his or her focus on the intelligence question.

Analytic tools are multiplying rapidly inside and outside the Intelligence Community. Correct use of analytic tools and establishing ties between tool developers and analysts remain challenges.<sup>64</sup> Tool-builders often build tools that analysts find difficult to master. Analysts are often not imprisoned by organizations or sources but, rather, by the availability and utility of tools. Similarly, every agency has distinct research priorities and product lines, driving the need for a wide range of activities in research and development, training, and education that are a challenge to coordinate across the nation's intelligence community. The IC needs a focal point to connect research and development with the tool-building community to Intelligence Community analysts.<sup>65</sup>

### *Information Magnitude and Speed*

This is the era of big data, human processing, analysis, and refining.<sup>66</sup> Increasingly massive amounts of data transferred at unimaginable speed continue to perplex those involved in analytic tradecraft and intelligence analysis. From data sets, to large data, to big data, definitions change as rapidly as the speed and quantity of data that they describe. What is coined big data today may represent what we called large data yesterday. Research using big data may not accurately represent big data research upon completion. These constantly changing definitions demonstrate the critical need

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<sup>61</sup> Ibid.

<sup>62</sup> <http://www.miaoqihao.name/?p=3747&cpage=1>

<sup>63</sup> Ibid.

<sup>64</sup> Gregory F. Treverton, C. Bryan Gabbard, Assessing the Tradecraft of Intelligence Analysis, Rand National Security Research Division, 2008, [http://www.rand.org/content/dam/rand/pubs/technical\\_reports/2008/RAND\\_TR293.pdf](http://www.rand.org/content/dam/rand/pubs/technical_reports/2008/RAND_TR293.pdf) accessed 25 January 2013.

<sup>65</sup> Ibid.

<sup>66</sup> <http://www.miaoqihao.name/?p=3747&cpage=1>

for a common data lexicon as well as a constant re-examination of the lexicon to remain consistent with IC wide efforts to tackle the issues.

Speed is also of critical importance in the transformation of data analytics. The IC would benefit from vast investments into how best to leverage big data as there is no slowdown of the speed at which it is being generated. In addition, our mode of analysis must dramatically shift from batch mode to real time as the faster data is analyzed, the greater it's predictive value.

### *Big Data and Analytic Tradecraft*

One of the main large data applications today is prediction, yet greater intelligence value may be realized from understanding what is occurring or what has occurred. Big data can assist in establishing the foundation of a status quo and in understanding the potential associations to develop expectations of potential future outcomes. If the data set is too large, it is very difficult to make specific inferences and if it is too small, the ability to make accurate inferences may be missed. Large data does not constitute a solid foundation to forecast the future. As noted in the *New York Times*, "Big Data is Great. But so is Intuition."<sup>67</sup>

Intelligence analysis of large data sets necessitates continuous development and innovation of platform architecture. China's Aster Data CEO Mayank Bawa notes that critical data analysis platforms comprise four main features including: 1) iterative development and constant update features; 2) full data storage including structured and unstructured forms; 3) analytical analyses tools; and 4) use of private and public information.<sup>68</sup> The platform should also be able to access a variety of development tools and graphic data analysis and query time geospatial dimension. A key value component of the platform is a variety of data sources using a variety of tools. Diverse data leads to greater insight. China's Teradata Unified Data Architecture (UDA) uses analysis and storage infrastructure components; application logic exists and executes with the data.<sup>69</sup> Teradata Aster uses a "Massively Parallel Data-Application Server and a "SQL-MapReduce with parallelized data processing and applications" to address what the company calls Big Data challenges.<sup>70</sup>

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<sup>67</sup> Steve Lohr, "Sure. Big Data is Great. But so is Intuition," *New York Times*, 29 December 2012, [http://www.nytimes.com/2012/12/30/technology/big-data-is-great-but-dont-forget-intuition.html?\\_r=0](http://www.nytimes.com/2012/12/30/technology/big-data-is-great-but-dont-forget-intuition.html?_r=0)

<sup>68</sup> "Co-president of Teradata Aster: Data Analysis Should Duhua," *Kui Heng Network News* (Source: North American Sina) 2013-01-31, <http://news.cnyes.com/Content/20130131/KH5LQ5EYXTS86.shtml>

<sup>69</sup> Ibid.

<sup>70</sup> "Distributed Systems Architect- Aster Data," *Tera Data Aster*, <http://www.linkedin.com/jobs/jobs-Distributed-Systems-Architect-4152705>, accessed 9 February 2013.

## Integration of Concept with Practice: Improving Intermediary PSYOP Communication

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The operationalization of neuroscience theories requires close, continuing communication between scientists and PSYOP practitioners. This communication could be improved by providing training courses<sup>71</sup>, providing a strong academic foundation for PSYOP through both candidate selection and educational opportunities<sup>72</sup>, and ensuring science communication principles are effectively applied throughout the process. The authors of this paper have previously written on the application of science communication best practice to scientific and technical intelligence.<sup>73</sup> Comparable to scientific and technical intelligence analysts, PSYOP officers must act as intermediaries between disciplinary specialists, such as psychologists and other scientists, and the operations community they support.

### *Problems Communicating Scientific and Technical Information*

Applying academic research in an operational context requires effective communication between disciplinary specialists and military professionals. However, the disparity in backgrounds between these two groups can make communication difficult. As disciplinary specialists, scientists, for instance, are specifically trained to use specialized language that does not appear in common usage, but which helps them communicate more precisely with other scientists.

For example, the author of a recent academic paper stated: "... the process of becoming a scientist inevitably involves learning to talk and write science according to the norms of the scientific community. These would include generalizing and abstracting rather than building on examples, stories, and anecdotes, and using accurate descriptions rather than analogical approaches. ..." <sup>74</sup> In a December 2014 conference on communicating science topics in the defense community, one panel member noted, "... many researchers seem incapable of explaining what they do to nontechnical audiences, and often fail to recognize the source of audience incomprehension." <sup>75</sup> As specialists, scientists are so immersed in their field that many are often unable to connect with non-experts due to communication problems.

Unfortunately, many members of the PSYOP community do not necessarily share the same background with their academic counterparts who study many of the applicable theories. According to a Naval War College thesis, less than 6% of PSYOP officer students at the U.S. Army's John F. Kennedy Special Warfare Center and School had undergraduate degrees in Psychology or Behavioral Science,<sup>76</sup> suggesting that few PSYOP officers have the same training as the disciplinary specialists who conduct research on topics related to their operations.

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<sup>71</sup> Martin, Otwell, Seese, Stangle, & Linera, 2016, p. 171

<sup>72</sup> Horvath & Sharpe, 2013, pp. 115-117

<sup>73</sup> See Greenlee, 2015, Holmes & Greenlee, April 2016 and Holmes & Greenlee, June 2016. Portions of this chapter were previously published in those works.

<sup>74</sup> Baram-Tsabari & Lewenstein, 2012, p. 57

<sup>75</sup> Leed, Easop, Genie, & Hoskins, 2014, p. 3

<sup>76</sup> Horvath & Sharpe, 2013, p. 60

The disparity between the backgrounds of academics and PSYOP operations practitioners is analogous to the disparity between the broader policymaking community and the science and technical experts that support them. A 2009 article in *The Economist* showed that, worldwide, most politicians come from a legal, business, diplomatic, or military profession.<sup>77</sup> In contrast, only about 7 percent of them come from an engineering, medical, or academic background, despite a preponderance of issues centered on these sectors. Even if any sort of scientific background were more common in the national security community, the specific nature of foreign policy problems makes it unlikely that a given consumer would immediately understand the scientific nuance underlying each issue. Science naturally involves the work of specialists, but policymakers make decisions as generalists, especially when they work at the strategic level.

Because policymakers are most often generalists, scientific information in briefings and reports must be “translated” for the consumer into more accessible language. Scientific language is often unique because information on other topics, such as political or military issues, often falls within the experience of the policymakers and does not incorporate the same jargon and style that scientists cultivate.

The field of science communication is the study of the problems and potential solutions in communication between scientists and non-scientists. Although it is a recent academic field, some research on best practices for written communication has emerged and presents a new opportunity for the intelligence community. Specifically, harnessing lessons learned from research on science communication could aid officers that research technical or specialized topics, as well as their reviewers and editors, in communicating with others in the operational community. Science communication research offers methods of conveying concepts through linguistic techniques like figurative language and stories.

### *The Intelligence Community's Approach*

In 2007, the Office of the Director of National Intelligence (ODNI) issued Intelligence Community Directive 203, aimed at standardizing analytic tradecraft. Upon close inspection, aspects of this directive can address some of the problems of communicating scientific or technical information. For example, Tradecraft Standard 5 states that intelligence should “demonstrate customer relevance and address implications ... Products should add value by addressing prospects, *context*, threats, or factors affecting opportunities for action” [emphasis added].<sup>78</sup> The “context” of scientific and technical intelligence includes the science information necessary to understand the issue.

The ODNI updated ICD 203 in 2015 and added Tradecraft Standard 9, which caters to technical information conveyance, if used properly.<sup>79</sup> The standard was initially carved out from aspects of Tradecraft Standard 6 and guides the intelligence community to employ visuals when information and concepts can be conveyed better in graphic form. Many science communication articles emphasize the importance of using visuals and even drafting visual “strategies.” An MIT research scientist offered these statements about the topic in a 2012 article:

“Images are becoming what our society is about’... so it’s becoming more important than ever to get the images right — and that requires understanding, thought and planning...dynamic imaging...is

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<sup>77</sup> *Economist*, 2009

<sup>78</sup> Office of the Director of National Intelligence, p. 4

<sup>79</sup> Office of the Director of National Intelligence, pp. 4-5



‘opening up another door’ that can help to convey meaning in ever more engaging ways — if it’s used thoughtfully.”<sup>80</sup>

### *Science Communication Guidelines for Written Communication*

There are three primary science communication principles for written communication. The most commonly discussed principle is the use of jargon. Most researchers agree that jargon is to be avoided in nearly all circumstances. In the words of H.G. Wells:

“The reader for whom you write is just as intelligent as you are but does not possess *your* store of knowledge, he is not to be offended by a recital in Technical language of things known to him (e.g. telling him the position of the heart and lungs and backbone). He is not a student preparing for an examination & *he does not want to be encumbered with technical terms*, his sense of literary form & his sense of humour is probably greater than yours. Shakespeare, Milton, Plato, Dickens, Meredith, T.H. Huxley, Darwin wrote for him. None of them are known to have talked of putting in ‘popular stuff’ & ‘treating them to pretty bits’ or alluded to matters as being ‘too complicated to discuss here’. If they were, they didn’t discuss them there and *that was the end of it.*”<sup>81</sup> [emphasis in original]

Jargon has become a marker of the scientist, but it does not serve to improve communication. Rather, it alienates the non-expert reader who by definition is unfamiliar with those particular words. Although jargon achieves the highest possible technical precision, it often fails to convey meaning. One science journalist summarized the point: “... The terminology of the layman is an absence of terminology; the precision of the layman is an accuracy of impression rather than an accuracy of specific fact.”<sup>82</sup> Rather than attempting to use the precise language of experts, the best approach is to sacrifice precision of vocabulary in favor of accurately conveying concepts.

The second principle is grammar, especially as it affects readability. Science papers often have poor Flesch readability test scores, an established measure of reading ease that uses sentence and word length.<sup>83</sup> Researchers also tend to use passive voice,<sup>84</sup> which can confuse the reader by obscuring the primary action. Concerns about readability underlie most of the suggestions in one of the most definitive texts on English grammar, William Strunk and E.B. White’s *The Elements of Style*:

“[William Strunk] felt that the reader was in serious trouble most of the time, floundering in a swamp, and that it was the duty of anyone attempting to write English to drain this swamp quickly and get the reader up on dry ground, or at least to throw a rope.”<sup>85</sup>

The third principle of effective science communication relates to structure. A deliberate structure that builds on existing understanding helps to convey new information. One article termed this structure a ‘scaffolding explanation’. Scaffolding explanations begin at a level appropriate to the audience and incrementally reveal the differences between existing knowledge and new information.<sup>86</sup> This process ensures readers are not overwhelmed with too much information.

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<sup>80</sup> Chandler, 2012

<sup>81</sup> Quoted in Shortland & Gregory, 1991, p. 20

<sup>82</sup> White, quoted in Gregory & Miller, 1998, p. 39

<sup>83</sup> Baram-Tsabari & Lewenstein, 2012, p. 58

<sup>84</sup> Alvin, L., 2014, p. 13-14

<sup>85</sup> Strunk, W. & White, E.B., 1935/2000, p. xviii



These basic style guidelines are not unique to communicating technical topics, but they are especially critical in this context. Thoughtful communication will enable better collaboration between disciplinary experts and PSYOP practitioners, and therefore more effective operational results.

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## Section 6: Concluding Remarks

Strategic Multi-Layer Assessments provide actionable, systems orientation to complex operational/ technical challenges. They often entail input from multiple government agencies, military units, as well as industry and academia. This White Paper is the latest in a series that has attempted to improve the way the US influences adversaries, be they state or non-state entities. The improvements are often recommendations about how to operationalize the latest research findings from a variety of academic disciplines. The focus of this White Paper was cognitive engagement, the tactics of a shaping conditions and influencing behavior. Doing so requires a rich contextual understanding of the a priori conditions in a specific operating environment as well as those key individuals whom the US would like to influence. The papers included in this volume present numerous approaches to do just that regardless of whether the operating environment is physical or virtual localized or distributed.

Developing a robust capacity for cognitive engagement still requires more data to inform not only what to do but how to assess, select and train those who do it. Some of the concepts addressed in this White Paper represent current capabilities while others recommend capabilities that may one day be leveraged. In the meantime, additional applied research and development as well as testing are required to maintain and/or accelerate progress. One such approach is war gaming; a concept the OSD-SMA network has recently leveraged to test a variety of engagement ideas (Linera, Seese, & Canna, 2016). The approaches suggested by Bumphus as well as Gerrol & Blinner might make for interesting research questions in future simulations. The ideas suggested by Baroni and Holmes & Greenlee might also make for interesting integration as the intelligence support to MISO is something that is difficult to simulate and thus does not necessarily make it into staff mission rehearsal exercises.

There is a growing number of US government-funded research programs that address both the domains and methods addressed in many of the papers included in this volume. The Minerva Research Initiative, the National Academies of Sciences, Engineering, and Medicine, the Defense Advanced Research Projects Agency, the Intelligence Advanced Research Projects Activity, and the Counter Terrorism Technological Support Office to name but a few. Many have run programs and/or projects related to cognitive engagement in the past; however, additional resources are necessary to understand not only the basic science components of the relevant challenges but also potential applied solutions. Those domains may not be within the scope of a single major program but there is value in the process of studying both. As Clausewitz wrote; *“Theory cannot equip the mind with formulas for solving problems, nor can it mark the narrow path on which the sole solution is supposed to lie by planting a hedge of principles on either side. But it can give the mind insight into the great mass of phenomena and their relationships, then leave it free to rise into the higher realms of action”* (Klinger, 2006 p 88).

This White Paper is not, and is not intended to be, the definitive product on cognitive engagement. Rather it is a continuation of an effort of a dedicated community of interest who wish to improve how the US engages in contemporary conflict. These efforts will continue and the authors of the papers encourage the readers to get involved and contribute in their own way.

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This publication is cleared for public release

*Narrative Simulation Insights*. Washington, DC: Strategic Multilayer Assessment Office, Office of the Secretary of Defense.

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