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Report Author(s): Arden B. Dahl

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## Chapter 3

# Considering a Cognitive Warfare Framework

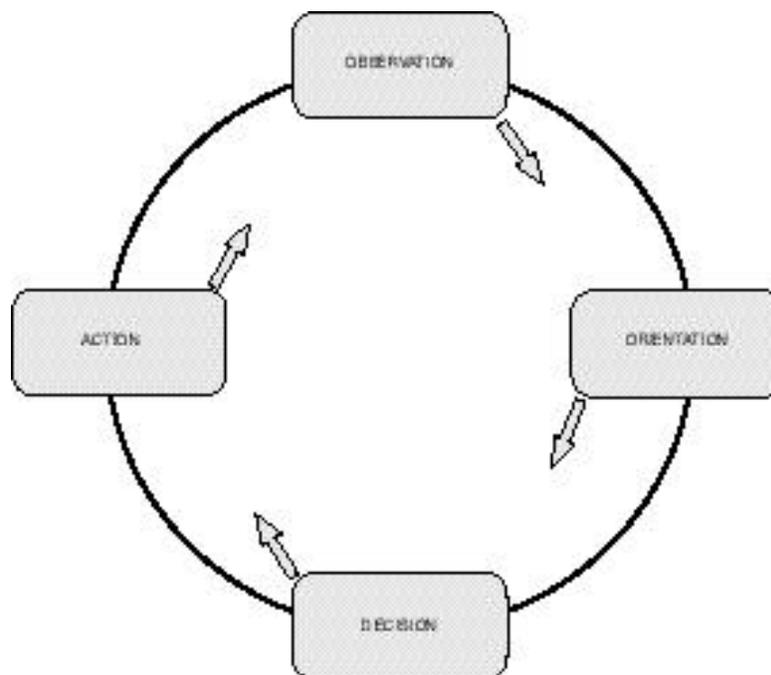
The analysis that follows reexamines the “mind” side of the command and control warfare (C<sup>2</sup>W) equation in light of the limitations and tensions of military decision processes discussed in the previous chapter.<sup>1</sup> It begins with an examination of John Boyd’s Observation-Oriented-Decision-Action (OODA) cycle to illustrate the different ways a C<sup>2</sup>W campaign may attack an adversary’s decision cycle. This sets the stage for analysis of the particular methods of such attacks. The end product is a simple cognitive warfare framework that will be used to examine the historical evidence of C<sup>2</sup>W in the following chapters.

### The OODA Loop and Two Approaches to Command Dysfunction

John Boyd’s so-called OODA Loop, illustrated in figure 2, is a simple and useful construct for conceptualizing decision cycles.<sup>2</sup> The basic notion is that commanders observe, orient, decide, and act. They then observe the outcome and begin the cycle over again. It is obvious that actual decision cycles are not this simple. Although there may be an overall command decision cycle that approximates an operational OODA loop, such as an air tasking order (ATO), there are a multitude of decision cycles in every operation.<sup>3</sup> Nevertheless, two cognitive warfare approaches to command dysfunction can be visualized by using the model.

If one compares the decision cycles of two opposing military commands to a “gunfight” between two antagonists, one can appreciate the requirements for good eyesight (observation), accuracy (orientation), and a fast draw (decision and action). If comparably skilled, the quicker of the two will tend to get the upper hand. However, a faster draw does not necessarily help a skilled gunfighter whose aim is obstructed by blowing dust. So it is with competing decision processes. Both speed and accuracy are required, and they are measured in relation to the speed and accuracy of one’s opponent.<sup>4</sup> These two factors become the basis of a cognitive warfare framework.

The antispeed approach attempts to slow an adversary’s decision cycle so his decisions are irrelevant at the time of execution. The focus is on degrading the efficiency of the decision cycle by denying the observation function the ability to see and impeding the flow of accurate information through the physical links of the loop. Data denial is usually achieved by preventing the



Source: Joint Publication 3-13.1, *Joint Doctrine for Command and Control Warfare (C<sup>2</sup>W)*.

**Figure 2. The OODA Cycle**

adversary's observation function, or sensors, from operating effectively in one or more channels. Decisions and accompanying data are also slowed by neutralizing or destroying the communication links that connect the commander to the subordinates who carry out his will. Operations security, electronic warfare, and physical attack are used to execute this approach.<sup>5</sup> Contemporary American doctrine advocates domination of air, space, and the electromagnetic spectrums to achieve this effect. A successful antispeed strategy also indirectly affects the adversary's orientation. Late and missing data degrade accurate perceptions of reality.

However, a pure antispeed strategy against an enemy's communication links and observation functions is not normally sufficient to induce command dysfunction. Cutting communications and blinding sensors can seriously hamper command and control; they will, however, not go unopposed by an adversary who expects these kinds of attacks. An adversary may simply switch to unaffected media to communicate and observe. An adversary can also change his command arrangements, objectives, or strategy to compensate for his increased decision cycle difficulties. Potential countermeasures suggest that the effort to slow an adversary's decision cycles may not always work, and even if it does, other coping mechanisms can reduce the impact of the impediments.<sup>6</sup> This leads us to the second approach.

The second approach attempts to corrupt the adversary's orientation. The focus is on the accuracy of the opponent's perceptions and facts that inform his decisions, rather than their speed through the decision cycle. Operations

security, deception, and psychological operations (PSYOPS) are usually the primary C<sup>2</sup>W elements in the corruption effort.<sup>7</sup> The corruption scheme's relationship to decision speed is somewhat complicated. In fact, the corruption mechanism may work to vary the decision speed depending on the objective of the intended misperception. For example, the enemy might be induced to speedily make the wrong decision. Even so, an adversary decision process would likely slow down in an environment of increased ambiguity and apparent contradictions (if discerned). As with the narrow employment of a pure antispeed strategy, the projection of falsehoods and ambiguity into the enemy's decision cycle is not necessarily a sufficient strategy by itself. Other C<sup>2</sup>W elements may be needed to isolate the target from information channels that can undermine the corruption endeavor.

In summary, a cognitive warfare strategy can view an opposing decision process from the perspective of decreasing its speed, decreasing its accuracy, or both. The antispeed strategy prevents the adversary's OODA loop from keeping pace with events. If successful, the outcome makes the opponent reactive, ceding the initiative to the other side. The corruption approach concentrates on affecting decision accuracy and may or may not degrade the speed efficiency of the opponent. If successful, the adversary makes inappropriate decisions. A more complex strategy would combine the approaches. Figure 3 illustrates the two basic approaches. A closer look at the possible combination of approaches will follow later in the chapter. However, it is appropriate at this point to examine some formal insights into cognitive warfare expressed by military theorists.

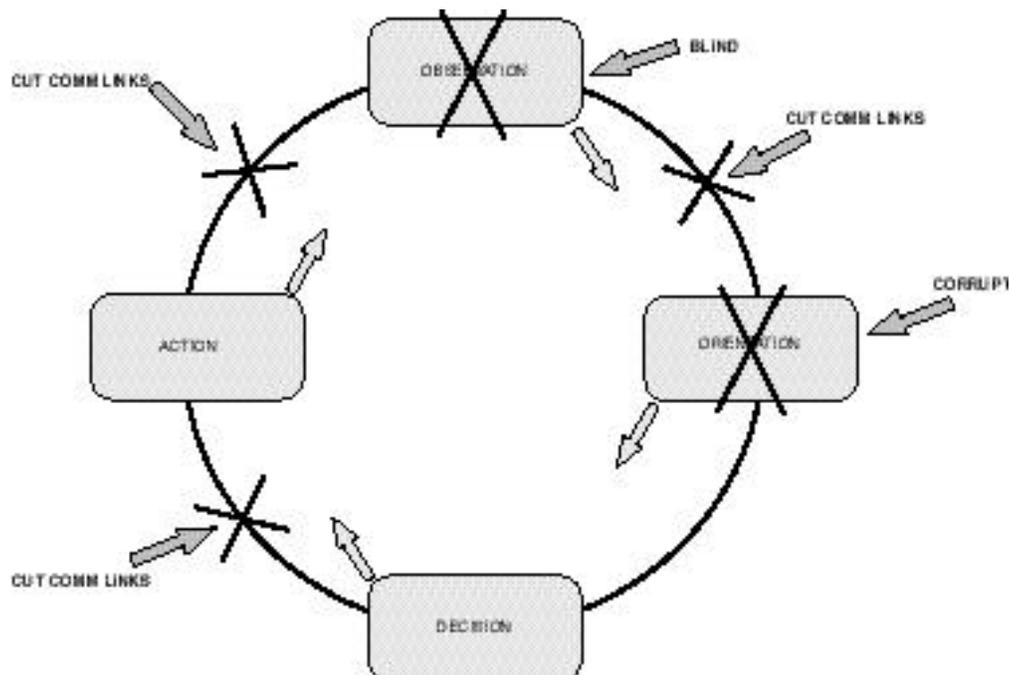


Figure 3. Cognitive Warfare Approaches

## **Cognitive Warfare Hints from War Theory**

Sun Tzu wrote as follows concerning planning and intelligence:

Therefore, regarding forces: By perceiving the enemy and perceiving ourselves, there will be no unforeseen risk in any battle.<sup>8</sup>

So, the battles of those sophisticated at strategy do not have unorthodox victories, are not known for genius, are not acknowledged for valor—because their victories contain no miscalculations.<sup>9</sup>

**Concerning alternative objectives:**

The enemy must not know where I intend to give battle. For if he does not know where I intend to give battle he must prepare in a great many places. And when he prepares in a great many places, those I have to fight in any one place will be few.<sup>10</sup>

**Concerning surprise and deception:**

Therefore, have a capability, but appear not to; make use, but appear not to; be near but appear far, or be far but appear near; show gains to lure them; show disorder to make them take chance. . . . Attack their weaknesses; emerge to their surprise.<sup>11</sup>

Sun Tzu's ledger of war truths can be of thought as a list of proverbial wise sayings. They are rationally appealing; simple to remember; and as the expression goes, easier said than done. Michael Handel writes that Sun Tzu was a prescriptive optimist regarding the planning and execution of warfare in general and C<sup>2</sup>W in particular.<sup>12</sup> His axioms assume an omniscient ability to gather intelligence in order to make detailed plans to win a victory—a victory that can be forecast. His explicit advocacy for deception in all aspects of warfare is cited regularly as support for its continued importance today.<sup>13</sup> There is, however, an internal contradiction between his assumption of accurate intelligence and the insistence upon deception. The presence of deception in the decision environment would seem to lessen one's confidence of accurate intelligence.<sup>14</sup> Another note of interest is Sun Tzu's position concerning command decision processes. His emphasis on methodical and detailed planning indicates an assumption of analytical decision making. His words on how decisions are made in the battle say little—but perhaps imply the requirement for pattern recognition and intuition:

Turbulence and ferment: while fighting amid chaos, we may not be confused. Rolling and tumbling: while controlling within gyrations, we may not be defeated.<sup>15</sup>

**Carl von Clausewitz wrote the following concerning planning and intelligence:**

Many intelligence reports in war are contradictory; even more are false, and most are uncertain.<sup>16</sup>

No other human activity is so continuously or universally bound up with chance. And through the element of chance, guesswork and luck come to play a great part in war.<sup>17</sup>

**Concerning surprise and deception:**

The two factors that produce surprise are secrecy and speed. . . . It is equally true by its very nature surprise can rarely be outstandingly successful. It would be a mistake, therefore, to regard surprise as a key element of success in war. The principle is highly attractive in theory, but in practice it is often held up by the friction of the whole machine.<sup>18</sup>

Plans and orders issued for appearances only, false reports designed to confuse the enemy, etc.—have as a rule so little strategic value that they are used only if a ready-made opportunity presents itself.<sup>19</sup>

Clausewitz's perspective is vastly different from Sun Tzu with respect to C<sup>2</sup>W. Clausewitz was pessimistic in his outlook concerning the costs and benefits of deception and surprise at the strategic and operational levels. This pessimism stemmed from the difficulty of hiding extensive logistics and troop preparations necessary for major campaigns and the relatively limited mobility of the armies of his era. Clausewitz saw more utility of deception and surprise at the tactical level in operations that took little time. Friction and uncertainty also gave him a healthy skepticism for the value of intelligence in planning and conducting the battle.<sup>20</sup> Clausewitz's major contribution to C<sup>2</sup>W thought is his realistic appraisal of the friction and chaos that confronts an operational commander and the requirements of courage and intuition to make the required decisions.

Since all information and assumptions are open to doubt, and with chance at work everywhere, the commander continually finds that things are not as he expected.

During an operation, decisions have usually to be made at once: there may be not time to review the situation or even to think it through. . . . If the mind is to emerge unscathed from this relentless struggle with the unforeseen, two qualities are indispensable: first, an intellect that, even in the darkest hour, retains some glimmerings of the inner light which leads to truth; and second, the courage to follow this faint light wherever it may lead.<sup>21</sup>

Sun Tzu and Clausewitz paint different pictures of the command environment. While Sun Tzu sees a predictable campaign in which deceptive ploys and surprises can be planned, Clausewitz sees fog as the primary instigator of surprise—wielded by chance.

B. H. Liddell Hart wrote as follows concerning movement and surprise:

Strategy has not to overcome resistance, except from nature. Its purpose is to diminish the possibility of resistance, and it seeks to fulfill this purpose by exploiting the elements of movement and surprise. . . .

Although strategy may aim more at exploiting movement than at exploiting surprise, or conversely, the two elements react on each other. Movement generates surprise, and surprise gives impetus to movement.<sup>22</sup>

Concerning alternate objectives:

The best way is to operate along a line which offers alternative objectives. For thereby you put your opponent on the horns of dilemma, which goes far to assure the gaining of at least one objective—whichever is least guarded—and may enable you to gain one after another.<sup>23</sup>

Concerning deception:

It is usually necessary for the dislocating move to be preceded by a move, or moves, which can be best defined by the term 'distract' in its literal sense of 'to draw asunder.' The purpose of this 'distract' is to deprive the enemy of his freedom of action, and it should operate in the physical and psychological spheres. In the physical, it should cause a distention of his forces or their diversion to unprofitable ends, so that they are too widely distributed, and too committed elsewhere, to have the power of interfering with one's own decisively intended move. In the psychological sphere, the same effect is sought by playing upon the fears of, and by deceiving, the opposing command.<sup>24</sup>

The renewal of maneuver warfare during World War II brought with it a resurgence in C<sup>2</sup>W thinking—and connected it to maneuver. B. H. Liddell Hart's contribution to C<sup>2</sup>W is the indirect approach.<sup>25</sup> The indirect approach avoids enemy lines of expectation (the line of greatest resistance) by taking a line that is not expected, and moves unexpectedly into the rear of the enemy. This physical movement dislocates the opposing forces from their lines of communication. This "sudden" dislocation also causes a mental dislocation in the mind of the commander—a "sense of feeling trapped." The unsettling psychological effect of having unexpected enemy forces in the rear tends to delay the commander's response. Liddell Hart's starting mechanism to unleash the war of dislocation rests on the use of a "distracter." This distracter can take two forms. The first is the creation of ambiguity in the enemy's mind as to one's real objectives among many (alternative objectives). The other is a deliberate deception ploy to create false certainty in the enemy commander's mind as to one's objectives.<sup>26</sup> That said, Liddell Hart's C<sup>2</sup>W dislocation effects were for the most part related to maneuver. However, the widespread practice of strategic and operational deception during World War II has also led to a resurgence of deception theory.

### **Development of Modern Deception Theory**

Deception advocates argue that the increasing sophistication and capabilities of battlefield surveillance have paradoxically increased the importance of and opportunities for deception.<sup>27</sup> They are important because the battlefield is only transparent in the physical sense.<sup>28</sup> They are opportune because of inherent perceptual biases—made ready by the mind's expectations.

The discussion in chapter 2 on biases presented the concept that expectations influence what is perceived. New data are added to existing conceptions and images. The perceptions that form tend to do so quickly and, once formed, are resistant to change even in the presence of contradictory information. Other cognitive biases affecting probability estimation and the evaluation of evidence tend to reinforce the persistence of these perceptions. This persistence is the key lever for deception. It is easy to reinforce what is already expected. The issue is to understand the victim's expectations in relation to one's own objectives and intentions. The task is much tougher when the target's expectations do not match up with the deceiver's deceptive story. This is due to the strength of initial impressions. However, deception

can also work against the adversary's current expectations by weakening his confidence in them.<sup>29</sup> Appendix 2 lists the relationships between deception and perceptual and cognitive biases.

Fundamentally, all deception ploys are constructed in two parts: dissimulation and simulation. Dissimulation is covert, the act of hiding or obscuring the real; its companion, simulation, presents the false.<sup>30</sup> Within this basic construct, deception programs are employed in two variants: A-type (ambiguity) and M-type (misdirection). The A-type deception seeks to increase ambiguity in the target's mind. Its aim is to keep the adversary unsure of one's true intentions, especially an adversary who has initially guessed right. A number of alternatives are developed for the target's consumption, built on lies that are both plausible and sufficiently significant to cause the target to expend resources to cover them. The M-type deception is the more demanding variant. This deception misleads the adversary by reducing ambiguity, that is, attempting to convince him that the wrong solution is, in fact, "right." In this case, the target positions most of his attention and resources in the wrong place.<sup>31</sup>

Although the A-type and M-type programs are conceptually different, in practice they are used simultaneously in various shades and emphases. A deception program may start out as an M-type ploy to confirm the adversary's expectations about what is going to happen (usually what he expects on the basis of logic and experience). However, since most adversaries are prudent enough to consider other possibilities (of which one may be the real solution), the deceiver also may employ an A-type program to increase the number of alternatives. This, if effective, causes the deception target to spread his remaining resources over a number of possibilities.<sup>32</sup> Appendix 2 lists the main principles and techniques of deception.

## **A Cognitive Warfare Synthesis**

A comparison of the insights of Sun Tzu, Clausewitz, Liddell Hart, and the modern deception theorists reveals tension concerning command and the conduct of C<sup>2</sup>W. A tension exists between Clausewitz's call for making intuitive decisions amidst the chaos and Sun Tzu's prescription for detailed planning based on excellent intelligence. There is also a tension between Clausewitz's skeptical view of the cost/benefit value of deception and surprise and both Sun Tzu's and Liddell Hart's strong advocacy for it. Both Sun Tzu and Liddell Hart highlighted the dilemma of alternative objectives upon an adversary's mind made possible by movement. Clausewitz emphasized the weight of chance and consequences upon the commander's mind concerning the imponderables of battle. Twentieth-century deception theorists point out the tension between the modern trend of battlefield transparency and the opaque nature of intentions. The discussions of chapter 2 also presented a number of rational limitations, biases, and stress effects that affect decision making. The question, therefore, arises as to how one should use these different insights and issues for military decision making in settings that

range from peacetime training to those that are opposed, high-paced, ambiguous, and immediately consequential.

### Three Categories of Cognitive Warfare

One way to visualize the cognitive warfare approach of C<sup>2</sup>W is in a three-category framework depicted in figure 4. The categories include the adversary's command baseline, stressors, and deception.<sup>33</sup> The command baseline represents the adversary's existing decision-making characteristics. It consists of his expectations, perceptions, command arrangements, decision procedures, experience, training, tradition, culture, and any other significant factors that constitute his decision making. The baseline includes both strengths and weaknesses. Weaknesses include self-induced problems that affect the accuracy and speed of his decision cycle.<sup>34</sup> The command baseline establishes the opportunity "menu" for the other two categories.

COMMAND BASELINE	STRESSORS	DECEPTION
<b>COMMAND ARRANGEMENTS</b> LINE OF CONTROL DECISION PROCESS  <b>EXPECTATIONS</b> PERCEPTUAL BIASES COGNITIVE BIASES	<b>HIGH STAKES</b>  <b>UNCERTAINTY</b>  <b>TIME PRESSURE</b>	<b>ACTIVE</b> <b>A-TYPE</b> CREATE AMBIGUITY  <b>M-TYPE</b> CREATE MISDIRECTION  <b>PASSIVE</b> <b>OPERATIONAL SECURITY</b> SECRECY CAMOUFLAGE

Figure 4. Cognitive Warfare Framework

The second framework category consists of stressors. Stressors come in two sets: physical and psychological. The physical stressors are actions that complicate and degrade the adversary's decision making by pressuring his capabilities and time resources. This relates back to the antispeed approach discussed earlier. Targeted capabilities include the ability to communicate and use sensors. Increasing the tempo of operations reduces the adversary's time to make decisions. Other physical stressors that degrade decision making derive from the nature of the operational environment. Briefly, these include environmental extremes (noise, temperature) and physical hardships (lack of sleep, food, water, and hygiene). Common to all, physical stressors reduce decision resources in terms of information, time, and physical capabilities.<sup>35</sup> However, the introduction of physical stressors leads to the second kind, those that are psychologically felt in the mind of the target. For example, while an increase in operational tempo reduces available decision cycle time, the available time may still be sufficient to make effective

decisions. Nevertheless, the increased tempo may cause a decision maker to perceive significant time pressure and adjust his decision process. Whether or not this degrades his decisions is dependent on the severity of the perceived time stress and the types of coping mechanisms that are used to compensate. Similarly, other psychological stressors, including uncertainty and high stakes, affect the decision environment. The uncertainty in this case is based on the nature of chance—the unknowable events that are inherent in operational settings. This is in contrast to the uncertainty and ambiguity that is purposely introduced by deception.<sup>36</sup> The other major psychological stressor is the weight of consequential decisions. This is also an internal stress, induced by the adversary's own moral friction in the face of solving consequential problems.<sup>37</sup>

The final framework category is deception. The A-type deception program increases uncertainty by generating a number of alternatives for the adversary to consider.<sup>38</sup> M-type deception programs work in the opposite direction in terms of uncertainty and seek to convince the victim that he is “right” about the deceiver's methods and objectives, when he is objectively “wrong.” Both deception types exploit the command baseline's expectations and perceptions. They also both employ operational security measures to hide real capabilities and intentions.

## Conjectures and Implications

While it is apparent that there is a “targeting” relationship between the command baseline and the other two C<sup>2</sup>W “tool” categories, there might also be a number of interactions between the deception and the stressor categories. Examining time pressure and deception, the logic indicates that there may be either mutually reinforcing or interfering interactions. If one assumes the general notion that psychological time pressure causes decision makers to channelize information searches and analyses, then the question as to when to increase time pressure in conjunction with a deception program depends on the victim's primary attention or expectations. If his attention is already focused on the deceiver's plausible “story,” then time pressure (if applicable to the deceiver's operational plan) would likely assist. This is because the victim's channelization will attenuate his data search and analysis on what he considers the peripheral matters—the place where the deceiver has hidden the truth. On the other hand, if the deceiver needs to change an adversary's expectations, then adding time pressure will likely be counterproductive. In this case, time pressure may deny the victim sufficient time to perceive and consider the deception and reduce the victim's confidence about his existing perceptions.<sup>39</sup>

The real world application of intentional stressors and varied deception programs will require a sophisticated understanding of the stressor-deception interaction. This is in addition to understanding what cognitive and perceptual vulnerabilities are exploitable in the command baseline and having excellent intelligence resources that return feedback concerning the adversary's thinking.

In chapter 2, the discussion ended by describing the latent tension that exists between the requirements for decision accuracy and decision speed. The general idea was that given adequate time and information resources, the preferred way to decide consequential decisions was to use an analytical approach. If this was not possible due to time constraints, there was a need for experienced pattern recognition or some intuition to get an adequate decision in reduced time. The question now is how this tension between decision speed and accuracy fits into the designs of the cognitive warfare framework.

If one had insight to the decision process and expectations of the enemy command, a logical question may follow: On which end of the speed-accuracy tension is the enemy strength? Is it experienced-based intuition or rational analysis?<sup>40</sup> An exploitable weakness on either end may indicate the deception-time pressure strategy to use to manipulate the enemy's decision process. If the adversary has no weakness on either end of the decision spectrum, then one might determine what strategy places the enemy command in a position in which it has insufficient time to analyze the deception puzzle and not enough intuitive confidence to see through all the alternatives. The point here is that approaching the cognitive side of C<sup>2</sup>W from the perspective of the adversary's decision process may provide some insight on the overall C<sup>2</sup>W operation.

## Conclusion

This chapter considered two basic ways to approach a cognitive warfare strategy. The first approach attacked the speed of an adversary's decision cycle; the second focused the attack on its accuracy. These approaches roughly line up with the two tool categories of the cognitive warfare framework: stressors and deception. More often than not, one would expect these approaches to coexist and overlap in use and effects. The idea that there is an interdependent relationship between time pressure and deception was also considered. Although our knowledge of this relationship is incomplete, the logic indicates that there are both reinforcing and interfering interactions.

Most important is the fact that the overall cognitive warfare approach is dependent upon the enemy's command baseline—the decision-making processes, command characteristics, and expectations of the decision makers. The skillful employment of stress and deception against the command baseline may be a principal mechanism to bring about its cognitive dislocation.

## Notes

1. While acknowledging that specifics of any C<sup>2</sup>W campaign depend greatly on the target's character, this argument will focus on the universal perceptual and cognitive aspects of decision making.

2. John R. Boyd, "A Discourse on Winning and Losing," August 1987. A collection of unpublished briefings and essays, document no. M-U 43947, Air University Library, Maxwell AFB, Ala. For an in-depth analysis of Boyd's theory in the context of strategic paralysis, see David S. Fadok, John Boyd and John Warden: Air Power's Quest for Strategic Paralysis

(Maxwell AFB, Ala.: Air University Press, 1995); and Department of Defense, Joint Publication (JP) 3-13.1, Joint Doctrine for Command Control Warfare (C<sup>2</sup>W), A-1, A-2.

3. An operational commander most likely has a number of personal decision cycles running simultaneously on a varied set of problems and concerns. Many supporting OODA loops operate within the commander's staff and at subordinate echelons. Each step within an OODA process also has an OODA loop. For example, a subordinate reconnaissance organization will run its own decision cycle while executing the higher echelon's "observation" function.

4. One can be much less wrong in perception than another, but still far enough off the mark to frustrate sought-after objectives.

5. Physical attack includes air, ground, special forces, and as information warfare techniques mature, electronic attack. See JP 3-13.1, II-8.

6. This suggests that the concept of cutting communications and blinding sensors not be viewed from a narrow technical perspective. The idea is to slow the decision process to induce command dysfunction. This may not occur by reducing electronic transmissions to a certain level.

7. Because C<sup>2</sup>W usually employs PSYOPS to influence a broader population, this analysis will focus on deception as a tool to influence enemy decision processes.

8. Sun-Tzu, Sun-Tzu: The New Translation, trans. J. H. Huang (New York: William Morrow and Company, Inc., 1993), 52.

9. *Ibid.*, 55.

10. Sun Tzu, *The Art of War*, trans. Samuel B. Griffith (Oxford: Oxford University Press, 1963), 98.

11. Sun-Tzu, Sun-Tzu, 40–41.

12. Michael I. Handel, *Masters at War: Sun Tzu, Clausewitz and Jomini* (London: Frank Cass and Co., Ltd., 1992), 102–31.

13. Joint publications cite Sun-Tzu often. See JP 3-0, JP 3-13.1, and JP 3-58.

14. Handel, 117.

15. Sun-Tzu, Sun-Tzu, 59.

16. Carl von Clausewitz, *On War*, eds. and trans. Michael Howard and Peter Paret (Princeton: Princeton University Press, 1976), 117.

17. Clausewitz, 85.

18. *Ibid.*, 198.

19. *Ibid.*, 202–203.

20. Handel presents a similar argument. See Handel, 101–31.

21. Clausewitz, 102.

22. B. H. Liddell Hart, *Strategy*, 2d ed. (New York: Penguin Books, 1954), 325.

23. *Ibid.*, 329.

24. *Ibid.*, 327–28.

25. The indirect approach was not new, but it seemed new, being reborn after the frustrations of World War I.

26. A review of Liddell Hart's historical analyses shows that he leans more toward the creation of ambiguity through alternative objectives as the distracting mechanism.

27. One such advocate is Michael Dewar. See Michael Dewar, *The Art of Deception in Warfare* (Newton Abbot Devon, United Kingdom: David & Charles, 1989), 116–17.

28. The advent of stealth technology seems to have tempered the trend toward the "transparent battlefield." Other technologies may someday expose current stealth. In any case, the argument follows that no matter how well one can sense the environment, one cannot discern intentions of the mind.

29. Richards J. Heuer, "Cognitive Factors in Deception and Counterdeception," in *Strategic Military Deception*, Donald C. Daniel and Katherine L. Herbig, eds. (New York: Pergamon Press, 1982), 42–60 *passim*.

30. Barton Whaley, "Toward a General Theory of Deception," in *Military Deception and Strategic Surprise*, John Gooch and Amos Perlmutter, eds. (London: Frank Cass and Co., Ltd., 1982), 183.

31. Donald C. Daniel and Katherine L. Herbig, "Propositions on Military Deception," in *Strategic Military Deception*, Donald C. Daniel and Katherine L. Herbig, eds. (New York: Pergamon Press, 1982), 5–6.

32. Daniel and Herbig, "Propositions on Military Deception," 6; Barton Whaley, *Stratagem: Deception and Surprise in War* (Cambridge, Mass.: Massachusetts Institute of Technology, 1969), 134, 140–41.

33. Taking the concept further, the cognitive warfare model actually is two-sided (assuming two combatants), so there are two sets, or six categories.

34. The list of self-induced problems that may be present can be lengthy. Besides perceptual and cognitive biases, the list may also include poor command lines of authority and muddled organizational processes (Allison Model II); self-serving motivations (Allison Model III); and individual biases (risk taking, hubris, hubris-nemesis).

35. The lack of sleep is one of the significant physical stressors not addressed in this paper, among others. Depriving an enemy commander of sleep is a primary way to reduce his cognitive effectiveness. Col David R. Jones, USAF Medical Corps, Retired, interviewed by author, 18 May 1996, Air University Library, Maxwell AFB, Ala.

36. For this framework, chance and friction cause the stressor of uncertainty. The other source of uncertainty and ambiguity comes from a third category tool, A-type deception. The difference between the two is subtle. A-type deception intentionally promotes lies to create uncertainty. The uncertainty of chance and friction is probabilistic in nature. For this reason the framework maintains them in separate categories.

37. Some operational capabilities, though not intended specifically as  $C^2W$  measures, can induce psychological stress. The threat of Allied tactical airpower complicated the German decision for a defensive strategy in France, a decision that the Germans never resolved completely. See chapter 4.

38. Heuer makes an interesting point concerning A-type deception. Once a decision maker is sensitive to the possibility of deception, then its use tends to become overestimated. "Factoring in the possibility of deception imposes yet another intellectual and psychological burden. This undermines the credibility of whatever evidence is available and reduces the likelihood of arriving at a meaningful analytical conclusion to guide decision making. As a consequence, decision makers and analysts alike often resist seriously coming to grips with this possibility." Heuer, "Cognitive Factors in Deception and Counterdeception," 64.

39. There appears to be little written about the interaction of deception and stress. Deception literature and joint doctrine include timing as a critical factor, but in the sense of giving a victim sufficient time to validate the "truth" of complex deception plans. The idea of limiting the time for an enemy to discover a deception ploy is mentioned by Michael Dewar. See Dewar, 15; Michael I. Handel, "Introduction: Strategic and Operational Deception in Historical Perspective," in *Strategic and Operational Deception in the Second World War*, Michael I. Handel, ed. (London: Frank Cass and Co., Ltd., 1987), 27; and JP 3-58, *Joint Doctrine for Military Deception*, 6 June 1994, I-3.

40. This assumes that one has the initiative to attack the enemy's decision process.