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AIR UNIVERSITY  
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## **Center of Gravity Analysis and Operational Design**

**Ensuring a Logical Linkage among  
National Strategic Objectives;  
Diplomatic, Informational, Military,  
and Economic Instruments of Power;  
and the Military Campaign**

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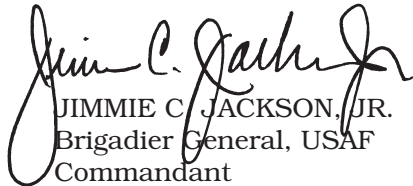
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## **Foreword**

It is my great pleasure to present another of the *Wright Flyer Papers* series. In this series, the Air Command and Staff College (ACSC) recognizes and publishes our best student research projects from the prior academic year. The ACSC research program encourages our students to move beyond the school's core curriculum in their own professional development and in "advancing air and space power." The series title reflects our desire to perpetuate the pioneering spirit embodied in earlier generations of Airmen. Projects selected for publication combine solid research, innovative thought, and lucid presentation in exploring war at the operational level. With this broad perspective, *the Wright Flyer Papers* engage an eclectic range of doctrinal, technological, organizational, and operational questions. Some of these studies provide new solutions to familiar problems. Others encourage us to leave the familiar behind in pursuing new possibilities. By making these research studies available in the *Wright Flyer Papers*, ACSC hopes to encourage critical examination of the findings and to stimulate further research in these areas.



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## **Abstract**

The United States has over the last 16 years demonstrated amazing proficiency in winning military campaigns, but failure in securing “a better peace” as Basil Liddell Hart advocated. There is a need for an interagency analysis model, owned by the National Security Council (NSC), that can determine how the different instruments of power (IOP) can contribute to the achievement of the national strategic objectives, including which combination of IOPs is most efficient, but it must also bridge the strategic level of war to the operational and tactical levels. Therefore, this paper proposes an analysis model based on Dr. Joseph L. Strange’s center of gravity (COG) model, Robert Pape’s concept of coercion, and effects-based operations (EBO). The model could create unity of effort in utilization of all national and international IOPs and in securing the necessary linkage among the three levels of war to affect the adversary’s will and his strategy.

First, until there is a Goldwater-Nichols Act II that establishes a more permanent strategic-level interagency staff or committee structure under the NSC that can be custodian of the proposed analysis model, the Joint Staff should be the custodian of the proposed model. The Joint Staff will be responsible for updating the Joint Operation Planning and Execution System (JOPES) and the joint operation planning process (JOPP) using the model. Second, the concept of COGs combined with Pape’s concept of coercion provide useful focus points for attacking the adversary’s strategy. Third, Strange’s COG analysis model shows how to affect the adversary’s COGs most efficiently. Fourth, merger of COG analysis and EBO can ensure the linkage among the three levels of war.





# Introduction

The United States has demonstrated over the last 16 years amazing proficiency in winning the military campaign, but it has failed to secure “a better peace” as Liddell Hart advocated. Consequently, the United States needs an interagency analysis model, owned by the National Security Council (NSC), that examines which combination of the instruments of power (IOP) that would best achieve the national strategic objectives (NSO). This model must also bridge the political ends to the military campaign. Recent updates to joint doctrine publications make clear that unity of effort is necessary to achieve the political ends. In order to achieve unity of effort, it seems reasonable to suggest that first there needs to be a common and shared understanding of the strategic environment by all strategic players. As Sun Tzu said, “Know the enemy and know yourself; in a hundred battles you will never be in peril.”<sup>1</sup>

This shared strategic understanding should guide the establishment of the NSOs, that is, objectives that are achievable by the use of the national IOPs and the national resources that the government will invest and allocate. This would involve US government (USG) departments and agencies other than the Department of Defense (DOD) because *all* diplomatic, informational, military, and economic (DIME) IOPs must be considered. The NSC is responsible for this interagency coordination at the strategic level, while the geographic combatant commanders are responsible at the operational level, assisted by their joint interagency coordination groups.<sup>2</sup>

However, a strategic-level interagency methodology or doctrine, which guides the NSC’s strategic analysis of contingencies or crises, does not exist. The DOD publishes Joint Operation Planning and Execution System (JOPES) volumes, not the NSC. This makes it hard to achieve the necessary level of unity of effort. An NSC policy coordination committee (PCC) might agree on a strategic analysis, but the lack of a common methodology or doctrine is likely to make it harder for higher-ranking officials from the USG departments and agencies to accept a JOPES product, since they don’t know how or why it was created.

The USG is working on ensuring unity of effort, though. The National Security Presidential Directive/NSPD-44 of

December 2005 has led to the creation of the Interagency Management System (IMS) for Reconstruction and Stabilization (RS), which aims at ensuring unity of effort in RS operations. The IMS includes PCC-level country reconstruction and stabilization groups created to focus exclusively on a single country or regional crisis. The IMS does not (yet) include a common crisis analysis methodology or doctrine, and it focuses narrowly on RS operations, rather than broader national security issues.<sup>3</sup>

US joint doctrine does not offer much help, either. Joint Publication 3-0, *Joint Operations* (JP 3-0), describes that the president and the secretary of defense (SECDEF) typically establish strategic guidance in the form of NSOs and end states; no other USG agencies are mentioned.<sup>4</sup> However, Joint Publication 5-0, *Joint Operational Planning* (JP 5-0), does acknowledge that other USG agencies might have a role, “The President, SECDEF, and Joint Staff—with appropriate consultation with additional NSC members, other USG agencies, and multinational partners—formulate suitable and feasible national strategic objectives that reflect US national interests.”<sup>5</sup> Both formulations, however, place the SECDEF and the military in the lead role in establishing NSOs and national strategy and seem to neglect the importance of keeping all IOPs in mind when formulating national strategy.

What makes this even more challenging is that US joint doctrine does not focus on “strategic art and design.” Joint doctrine only discusses the *ingredients* of grand strategy (ends, ways, and means) and the importance of unity of effort. But, then how to find the best combination of DIME strategic objectives to achieve the political ends remains a mystery. JP 5-0 tries to fill this vacuum by extending the definition of operational art and design to the strategic level: “In the final analysis, the goals of a sound operational design are to ensure a clear focus on the ultimate strategic objective and corresponding strategic centers of gravity (COG), and provide for sound sequencing, synchronization, and integration of all available military and nonmilitary instruments of power to that end.”<sup>6</sup>

Unfortunately, JP 5-0 is unclear on how this is accomplished. It offers the joint operational planning process (JOPP) that includes tools and concepts, but some of the definitions could be more clear and precise. In addition, JP

5-0 does not give much help in exemplifying the concepts. As a result, JP 5-0 fails to clearly describe and exemplify how operational art bridges grand strategic and strategic levels of war to the operational and tactical levels of war. This is a significant deficiency. In the words of Sun Tzu, "Strategy without tactics is the slowest route to victory. Tactics without strategy is the noise before defeat."<sup>7</sup>

Clearly, there is a need for a useful analysis model for *all* USG agencies that are part of the NSC and its PCCs. This model must determine the different IOPs' contributions to the achievement of NSOs including the most efficient combination of IOPs. It must also bridge the strategic level of war to the operational and tactical levels.

Therefore, an analysis model based on Dr. Joe Strange's center of gravity model, Robert Pape's concept of coercion, and effects based operations (EBO) is proposed. The model creates unity of effort by affecting the adversary's will and strategy, using all national and international IOPs, as well as securing the necessary linkage among the three levels of war.

First, until there is a Goldwater-Nichols Act II that establishes a more permanent strategic-level interagency-staff or committee structure under the NSC that can be custodian of the proposed analysis model, the Joint Staff should be custodian of the proposed model. The Joint Staff will be responsible for updating the JOPES and the JOPP with the model. Second, the idea of COGs combined with Pape's concept of coercion can provide useful focus points for attacking the adversary's strategy. Third, Strange's COG analysis model can be used most efficiently to affect the adversary's COGs. Fourth, the merger of COG analysis and EBO to ensure the linkage among the levels of war is discussed. Finally, the paper describes the resulting analysis model.

### **The Joint Staff as Custodian of the Proposed Model**

There are several reasons why the Joint Staff is the logical custodian of the model. First, the chairman of the Joint Chiefs of Staff (CJCS) normally remains on the NSC after a change of administration. Therefore, the Joint Staff secures continuity in how the NSC analyzes national security matters and creates grand strategy. Next, the military has

a long tradition of analysis models and planning processes documented in doctrine. As a result, the military does not need to create new procedures, processes, and documents; it only needs to update existing ones. Last, since the proposed model bridges grand strategy to the military campaign, the JOPES and the JOPP need to be updated with the model. As the Joint Staff is responsible for the development of joint doctrine, making the Joint Staff custodian of the model can ensure this update happens.

### **Centers of Gravity and their Relationship to Strategy**

*War is thus an act of force to compel our enemy to do our will.*

—Carl von Clausewitz  
*On War*

Clausewitzian centers of gravity provide useful focal points in affecting the adversary's will and strategy. Unfortunately, excellence in strategy does not seem to be an American strength.<sup>8</sup> Indeed, as the Vietnam War and Operation Iraqi Freedom have shown, tactical and operational military success does not guarantee achievement of national objectives. If the objective of war is a better state of peace and not just gaining military victory, then strategy must bridge the available means of force with the political ends.<sup>9</sup> A sound strategy thus orchestrates all national and international IOPs in the most efficient way toward achievement of political objectives. This is how the COG concept becomes useful.

### **Centers of Gravity Defined**

*As a centre of gravity is always situated where the greatest mass of matter is collected, and as a shock against the centre of gravity of a body always produces the greatest effect, and further, as the most effective blow is struck with the centre of gravity of the power used, so it is also in War.*

—Clausewitz  
*On War*

First, COGs must be defined and this is where the problems start. According to Dr. Joseph Strange, former professor at the US Marine Corps War College, COGs are “physical or moral entities that are the *primary* components of physical or moral strength, power and resistance. They don’t just contribute to strength; they ARE the strength. They offer resistance. They strike effective (or heavy) . . . blows” (emphasis in the original).<sup>10</sup> It falls outside the scope of this paper to discuss why Strange does not use the current US joint definition, but he argues convincingly that his definition is more faithful to Clausewitz’s COG concept and, more importantly, a lot easier to understand and use in the subsequent COG analysis.<sup>11</sup> JP 5-0 does offer help, however, in connecting COGs to objectives and strategy: the adversary’s COGs are truly critical for their strategy (as our COGs are critical for our strategy).<sup>12</sup> “The defeat, destruction, neutralization, isolation, or substantial weakening of a valid COG should cause an adversary to change its course of action or prevent an adversary from achieving its strategic objectives.”<sup>13</sup> COGs are subject to change at any time during a conflict; hence, they must be evaluated and reassessed continuously.<sup>14</sup> Next, the COG concept is expanded by connecting it to Robert Pape’s concept of coercion.

### **“Will” COGs and “Ability” COGs and How They Relate to Strategy**

*If you want to overcome your enemy you must match your effort against his power of resistance, which can be expressed as the product of two inseparable factors, viz. the total means at his disposal and the strength of his will.*

—Clausewitz  
On War

By merging Pape’s concept of coercion with Strange’s COG definition and the JP 5-0 COG descriptions, this paper concludes that at the strategic level, there is usually a “will” COG that decides on policy and strategy and at least one “ability” COG that is the agency/entity responsible for the main strategic effort. While this paper does not discuss Pape’s concept in full, his definitions of coercion and coercion strategies are useful for the understanding of COGs

and their relations to strategies. USAF doctrine (Air Force Doctrine Document 2, *Operations and Organization* [AFDD 2]) has adopted Pape’s concept, even though AFDD 2 has slightly modified the definitions. AFDD 2 uses coercion as an umbrella term for compulsion and deterrence, while Pape uses coercion in place of compulsion and has no umbrella term. For the purpose of this paper, the AFDD 2 terms will be used (coercion will be substituted for compulsion when paraphrasing Pape). AFDD 2 defines *coercion* as “persuading an adversary to behave differently than it otherwise would through the threat or use of force.”<sup>15</sup> This is too narrow a definition, as it insinuates the exclusive use of the military IOPs in coercion strategies and excludes the use of the other IOPs. Rather, according to Pape, compulsion (coercion) and deterrence strategies aim at affecting the adversary’s behavior by manipulating costs and benefits. Deterrence strategies aim at *preventing* a specific behavior by the adversary, while compulsion (coercion) strategies aim at *changing* the adversary’s behavior.<sup>16</sup> According to Pape, the logic of [compulsion] can be a simple equation:

$$R = B p(B) - C p(C),$$

- where: R = value of resistance  
 B = potential benefits of resistance  
 p(B) = probability of attaining benefits by continued resistance  
 C = potential costs of resistance  
 p(C) = probability of suffering costs.

Concessions occur when  $R < 0$ .<sup>17</sup>

Pape does not include deterrence in his theory, but since the same logic is at work, the equation can describe the logic of deterrence as well, by substituting *resistance* for *aggression*. B is the gain or benefits the adversary is trying to achieve, whether it is political, economical, or other types of gain. In other words, B is the value the adversary assigns to their NSOs—the stakes—in the conflict. When assessing B, “we must seek to understand how the adversary thinks and not ‘mirror-image’—ascribe our own thinking, motivation, and priorities to them.”<sup>18</sup> Usually B is not open for manipulation by the coercer,

so coercion strategies aim at altering the equation by increasing the costs (C), by increasing the probability of suffering costs [p(C)], by reducing the probability of attaining benefits [p(B)], or a combination thereof. Pape calls strategies manipulating the cost side of the equation, *punishment* strategies, while strategies manipulating the benefit side of the equation are *denial* strategies.<sup>19</sup>

### **Punishment Strategies**

*Supreme excellence consists in breaking the enemy's resistance without fighting.*

—Sun Tzu  
*The Art of War*

Punishment strategies aim at following Sun Tzu's advice by affecting what Strange calls the moral strategic COG (the "will" COG). Pape defines "punishment strategies" as strategies raising the costs or risks to civilian populations, but this definition is too limited, since the population might not be what the adversary's political leadership values the most. Rather, punishment strategies try to affect the adversary's will and resolve by targeting or threatening to target whatever the adversary's decision-making entity values the most (AFDD 2: "attack those things that an adversary values").<sup>20</sup> In other words, punishment strategies try to affect the adversary's moral strength, power, and resistance—their strategic will COG. The "strategic will COG" can therefore be defined as the entity that directly or indirectly decides on national strategic ends, the strategy pursued, as well as provides the moral strength (the will) for carrying out the strategy.

Identifying the correct will COG is therefore the first important step in developing grand strategy. Indeed, when considering a strategy that focuses *entirely* on affecting the adversary's will COG (i.e., punishment), it becomes crucial to correctly identify and analyze the will COG. Then one must correctly assess the value of what the enemy holds to be the stakes in the conflict (the "B" in Pape's equation). From Pape's equation, if one cannot threaten something worth more than what the adversary is trying to achieve (B), punishment will not work. This something could be on the order of popular support in democracies, the power

base(s) of an oligarchic elite, or personal economic interests of the political leadership. A proper assessment requires a deep knowledge and understanding of qualities like the adversary's leadership, their culture, how they think, and how they have acted historically. Historically, the United States has performed poorly in this assessment—mirror imaging and ethnocentrism are classic US pitfalls, as Vietnam, Operation Allied Force, and Operation Iraqi Freedom all show.<sup>21</sup>

History is full of successful punishment strategies. However, the United States has unsuccessfully applied airpower as the main punishment effort several times. A successful example of a punishment strategy would be England's coercion of Denmark to hand over its navy in 1807. Using a devastating naval bombardment against the capital Copenhagen, the English were able to ignore the Danish army in Holstein and affected the will COG directly by holding the survival of Copenhagen at risk.<sup>22</sup> Another example is the Vietnam War, where the North Vietnamese undermined the US domestic support for the war by inflicting military casualties using a guerrilla strategy (before 1968) together with media coverage to their advantage.<sup>23</sup> Allied Force in 1999 is the only case of a successful punishment strategy using airpower. But in this case, a *combined* DIME punishment strategy was required to coerce Milosevic into accepting NATO's demands, not airpower by itself.<sup>24</sup> Failures include the Allied bombing of Nazi Germany,<sup>25</sup> the US bombing of Japan,<sup>26</sup> and the punishment parts of Rolling Thunder in Vietnam.<sup>27</sup> In these cases, airpower was not able to threaten sufficiently [p(C)] anything worth more to the adversary (C) than the stakes in the conflict (B).

### **Denial Strategies**

*Thus, what is of supreme importance in war is to attack the enemy's strategy.*

—Sun Tzu  
*The Art of War*

Denial strategies, on the other hand, aim at affecting what Strange calls the physical strategic COGs (the ability COGs). Pape defines "denial strategies" as "thwarting the [adversary's] military strategy for controlling the objectives



in dispute.”<sup>28</sup> Again, this is too narrow a definition, since the adversary might not be pursuing a *military* strategy; it could be a strategy using one or several of the other IOPs. AFDD 2 defines denial as “a form of coercion strategy that destroys or neutralizes a portion of the adversary’s physical means to resist.”<sup>29</sup> But this definition is not much better, for the same reasons. A useful definition should take the adversary’s unity of effort into consideration. Therefore, denial strategies work to thwart or threaten to thwart the adversary’s DIME strategy. Remembering the JP 5-0 concepts of COG, then denial strategies work to affect the adversary’s strategic ability COG(s)—that is, the entity(s) that possesses the most critical capabilities (the ability) for carrying out a chosen strategy. As “strategy encompasses the ends, ways, means, and risk involved in securing policy objectives,”<sup>30</sup> ability COGs are the most critical objects of the specific *ways and means* (the main strategic effort) to achieve successful *ends*.

As mentioned earlier, the ability COGs might change from phase to phase of a conflict, bringing main strategic effort changes. There might also be multiple strategic ability COGs, although Clausewitz writes, “The first principle is that the ultimate substance of enemy strength must be traced back to the fewest possible sources, and ideally to one alone.”<sup>31</sup> Clausewitz’s advice is to avoid dividing your effort so you can “act with the utmost concentration.”<sup>32</sup> This remains sound, but there might be cases where it does not make sense to identify a single ability COG. Furthermore, there is *usually both* a will COG *and* at least one ability COG controlled directly or indirectly by the will COG. *Sometimes*, the will COG and the ability COG might be merged into one single COG. For example, insurgents animated by a cause rather than by charismatic leaders—here the insurgent group itself is *the* adversary-strategic COG.<sup>33</sup>

Keeping Pape’s coercion equation in mind, targeting ability COGs is intended to alter the adversary’s political calculations by undermining the adversary’s confidence [ $\sim p(B)$ ] in its own strategy. Thus, targeting the ability COG is a way to target the will COG. Nevertheless, the will COG remains the most important COG, since an adversary is not defeated until its will is broken. Defeating an ability COG might just cause the adversary to change strategy

(e.g., from conventional warfare to irregular warfare) as in Operation Iraqi Freedom. Therefore, any strategy focusing on the ability COG must consider how this will affect the will COG and how to affect the will COG sufficiently “to compel our enemy to do our will.”<sup>34</sup> It is likely that military actions or other actions need to be performed *after* the ability COG is disrupted in order to achieve the political ends (e.g., in reconstruction and stabilization operations). “Brute force” or annihilation strategies are examples of noncoercion strategies that primarily target the strategic ability COG in order to achieve decisive military victory and physically impose one’s will on the adversary. Additionally, affecting the will COG sufficiently will most likely require unity of effort, the use of all IOPs in an integrated fashion, since it is unlikely that military actions alone will bring a lasting peace—as the last 100 years’ conflicts have shown.

### **How to Affect the Centers of Gravity Most Efficiently**

After clarifying the relationships between strategic COGs and strategies, the paper now discusses how to affect the adversary’s COGs most efficiently. Strange’s COG analysis model does exactly that, but JP 5-0 has not adapted the model correctly. It is clear that victory in conflict/war requires the United States and its allies to attack their adversary’s will and strategy by affecting enemy-strategic COGs. Likewise, our own strategic COGs require protection since they are crucial to our strategy and the will to carry it out. There are different ways of doing that. Clausewitz told us to direct all our energies at the COG (strength against strength), while other strategists like J. F. C. Fuller and Liddell Hart advocated an indirect approach (strength against weakness).<sup>35</sup>

Strange suggests that even strengths have critical vulnerabilities that can be exploited to defeat them, and he offers a model that permits insightful analysis of COGs.<sup>36</sup> He introduces three concepts for that purpose. “Critical capabilities” (CC) are what the COG can “do to you that puts fear (or concern) into your heart in the context of your mission and level of war [or the mission statement of the COG].” “Critical requirements” (CR) are conditions, resources, and means that are essential for a COG to achieve its CC.<sup>37</sup>

“Critical vulnerabilities” (CV) are those CRs, or components thereof, that are deficient or vulnerable to neutralization or disruption in a way that will contribute to a COG failing to achieve its critical capability. “The lesser the risk and cost, the better.”<sup>38</sup> Strange’s COG analysis model can set available IOPs against the adversary’s CRs to find the most critical vulnerabilities in a cost/risk/effect analysis. Some potential CVs might be vulnerable to one IOP at a specific time, while other CV candidates would be vulnerable to the use of all IOPs in a timely and integrated fashion. Similarly, there could be CRs that are potentially vulnerable, but the available ways and means might not be sufficient to exploit the weakness. Also, for various reasons, there might not be political willingness to apply available ways and means against those CRs. Friendly COGs must be analyzed also, and vulnerable CRs and CVs must be protected from enemy exploitation. The result is a logical and stringent concept for bridging available ways and means (DIME IOPs) to political ends. In other words, COG analysis is a robust concept for developing sound strategy.

The COG analysis model offered by JP 5-0 begins to apply Strange’s concepts, but the definitions of COG-CC-CR-CVs are not adequate. The definitions should be changed to reflect Strange’s concepts more closely. JP 5-0 clearly states the critical role of COG analysis: “a faulty conclusion resulting from a poor or hasty [COG] analysis can have very serious consequences, such as the inability to achieve strategic and operational objectives at an acceptable cost.”<sup>39</sup> However, JP 5-0 defines a CC as “a means that is considered a crucial enabler for a center of gravity to function as such, and is essential to the accomplishment of the specified or assumed objective(s).”<sup>40</sup> The JP 5-0 definition confuses CCs with Strange’s CRs and leaves Strange’s CCs out of the concept. This is unfortunate, since Strange’s CCs are very helpful for identifying and understanding COGs—CCs are what a COG *can do* for you or against you. JP 5-0 further complicates the situation by not spending enough space to explain the CC-CR-CV concepts. The reader is thereby forced to seek help from Dr. Strange and Richard Iron as well as other authors like Dale D. Eikmeier and Dr. Jack D. Kem who both use and understand Strange’s definitions.<sup>41</sup> Since the current US joint definitions do not seem to contribute any further

refinement of the concepts, but rather confusion, it is highly recommended that US doctrine adopt Strange's definitions.

Changing the US joint definitions is not sufficient. Although JP 5-0 states there is an essential relationship between COGs and objectives, JP 5-0 fails to make clear how COGs and their critical factors might logically link two levels of war and the associated objectives.<sup>42</sup>

### **Effects Based Objectives and Centers of Gravity: Logically Linking the Levels of War**

*To be truly effects based, plans must logically tie objectives at all levels together and must integrate objectives, effects, and actions into a logical, coherent whole.*

—AFDD 2, *Operations and Organization*  
3 April 2007

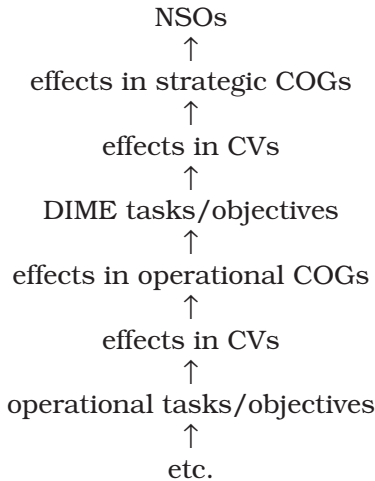
Effects based objectives have not been adopted into US joint doctrine, but EBO concepts of “effects” and “systems perspective” have been adopted.<sup>43</sup> The latest AFDD 2 has probably the best doctrinal definition and description of EBO and its impact on planning, execution, and assessment. However, a detailed explanation of the EBO concept falls outside our present scope:

“Effect” refers to the physical or behavioral state of a system that results from an action, a set of actions, or another effect. *Effects are parts of a causal chain that consists of objectives, effects, actions, and the causal linkages that conceptually join them to each other [emphasis in original]. . . . Objectives are the ultimate intended (desired) effects in a particular context or situation. Objectives at one level may be seen as effects at another, higher level [emphasis added]. . . . Effects based planning starts with objectives and works down to effects and actions. . . . Objectives start at the national level and extend down to the tactical level, at which actions are carried out.*<sup>44</sup>

JP 5-0 is not as clear as AFDD 2 on how effects at one level can be objectives at a lower level. Rather, JP 5-0 states, “The effect [statement] should be distinguishable from the objective it supports as a condition for success, not as another objective or a task.”<sup>45</sup> This consideration seems to narrow the use of “desired effects” to the NATO doctrine's criteria for success:

“Criteria for Success” (CfS). For each objective the Commander establishes criteria for success that provide measurable or observable requirements with respect to the essential physical, cybernetic or moral conditions or effects that must be achieved, as well as any conditions or effects that cannot exist for the objective to be successfully accomplished.<sup>46</sup>

AFDD 2 has a similar term, “success indicators” (SI), defined as “the conditions indicating attainment of objectives.”<sup>47</sup> The CfS definition leaves less room for misunderstanding. The proposed analysis model applies a holistic perspective on the adversary by trying to identify not only critical nodes (COGs, CRs, and CVs) in the adversary’s political, military, economical, social, infrastructural, and informational systems (PMESII) but also the *linkages* between enemy systems. The COG/CC/CR/CV concept helps integrate objectives, effects, and actions/tasks into a logical, coherent whole:



A clear understanding of objectives is essential. Joint doctrine defines an “objective” as “the clearly defined, decisive, and attainable goal toward which every operation is directed.”<sup>48</sup> Further, JP 5-0 mentions three primary considerations about objectives: “First, they should link directly or indirectly to one or more higher-level objectives; next, they should be as unambiguous as possible; finally, they should not specify ways or means for their accomplishment.”<sup>49</sup> That objectives be unambiguous seems commonsensical, but at the political level, ambiguous objectives are often preferable, as they leave more political maneuvering room.

Although the political point of view might be understandable, ambiguous objectives are often what lead to failures like Vietnam. The solution is to attach CfS and measures of effectiveness (MOE) to each objective that are clear benchmarks indicating actual progress towards the objective.<sup>50</sup> A third consideration, the use of *passive voice* can facilitate stating objectives without inferring potential ways and means. Conversely, active voice should be used to state effects and tasks which should infer ways and means.<sup>51</sup>

### **The Proposed Analysis Model**

With a sound understanding of objectives, effects, and tasks in place, it is now time for the proposed model. War can be viewed as a chess game, to—win—one must analyze the adversary's potential moves and plan to counter them. At the same time, one must predict the adversary's likely countermoves. This requires multiple iterations of the analysis, as each move produces a number of potential countermoves. Every iteration makes incremental refinements to the operational design. The best chess players are those that are able to look furthest ahead and counter all the adversary's potential moves. In war, however, there are more than 64 squares, and all the adversary's chessmen are seldom known. In the highly complex and dynamic operational environment (OE) of modern warfare, it might even be hard to know who the enemy is. This obviously makes war much more complicated than chess—but the basic concept is still the same.

When the plan is executed, it is crucial to look for anomalies in the adversary's behavior—deviations from the expected—rather than looking for confirmation. The devil is often in the details, and the small anomalies might be the tip of an iceberg that could wreck the whole plan if one does not recognize them for what they are and adjust the plan accordingly. Therefore, looking for anomalies rather than for confirmation is a crucial mind-set difference required for successfully executing the plan produced by the center of gravity analysis model. The process starts by analyzing the OE from the perspective of the side with the initiative. For the purpose of this paper, this is the adversary.

## **Step 1. The Adversary's Objectives and Decision Makers**

Part A of this step is to *assess* the adversary's presumed NSOs comprising a desired national strategic end state. Next, for each NSO, *develop* CfS and MOEs. The NSOs and their CfS should broadly describe desired effects and conditions in the PMESII systems in the OE.

Part B of this step is to *identify and analyze* the adversary's will COG. The adversary's strategic will COG can be determined by identifying the entity that possesses the following general critical capabilities: directly or indirectly deciding on national strategic ends, the strategy to be pursued, as well as providing the moral strength (the will) for carrying out the strategy. The COG analysis uses the COG/CC/CR/CV concept. Assess what value the will COG holds for the NSOs (the B in Pape's equation)—domestic-political value, international-political value, economic value, et cetera.

Finally, part C of this step is to *assess* the adversary's desired effects in CRs. The effects must ensure that the COG maintains its critical capabilities. The CRs will be adversary-strategic decisive points (DP) and will be arranged together with their desired effects on the adversary's strategic lines of operation (LOO) to protect the COG.<sup>52</sup>

## **Step 2. The Operational Environment as Seen from the Adversary's Perspective**

Part A of this step, still keeping the adversary's preconflict perspective, is to *analyze* the PMESII systems of all the actors in the OE. Part of this analysis is *assessing* the preconflict NSOs of the actors, thereby *identifying* potential allies, neutrals, as well as opponents to the adversary. For the purpose of the model's illustrations, the analysis is limited to the United States and the adversary's "victim" (the object of the adversary's aggression). Consequently, the US long-term (preconflict) NSOs regarding the region (the OE) and the adversary in particular, are now identified.

Part B of this step is to *identify and analyze* the United States' and the victim's strategic will COGs. As in step 1B, *assess* what value the friendly will COGs hold in the NSOs.

Part C of this step is to *assess* the adversary's desired effects in these will COGs as well as the CVs. The desired effects in the COGs *must* support the adversary's NSOs. *Add* them as CfS if they do not match existing CfS (from step 1A). The CVs become DPs to be arranged together with their effects on the adversary's strategic LOOs. These effects must add together to achieve the desired effects in the COG.

### **Step 3. Preconflict Friendly and Victim Grand Strategies**

Part A of this step is to *identify* the victim's and the United States' current strategies to achieve the NSOs from step 2A. This model does not go further back and analyze *how* the strategies were *decided*, instead, the strategies are described by the preconflict actions/policies the adversary could observe. The adversary's perspective on *who* decided the strategy was determined in step 2B's analysis of the friendly's strategic will COGs.

Part B of this step is to *identify and analyze* the victim's and the United States' strategic ability COGs supporting their strategies. The strategic ability COGs are the agency(s)/force(s) or component(s), thereof responsible for the main effort(s) in the strategy. The COG's critical capabilities are the *essential tasks* it has in regards to this strategy.

For part C of this step, repeat part C of step 2, except for the adversary's perspective of the identified friendly and victim ability COG(s).

### **Step 4. The Adversary Grand Strategy**

Part A of this step is to *assess* the adversary's strategy. This is the hardest part and requires a deep knowledge and understanding of the adversary's leadership to succeed—qualities like their culture, how they think, or how they have acted historically.<sup>53</sup> Assess the adversary's most likely and most dangerous strategic courses of action (COA) by arranging the DPs with desired effects identified in steps 1–3, in different strategic LOOs.<sup>54</sup> The effects in the DPs should combine to achieve the desired effect in the COGs. Assess whether any adversary CfSs remain unfulfilled when the adversary has achieved the desired



effect in the United States' and the victim's COGs. Often there will be other required effects, like stabilization and reconstruction (or ethnic cleansing), before the adversary reaches the desired end state. *Develop* these remaining effects into DPs and arrange them as well on the adversary's LOOs—and again, different COAs might require different effects. COAs *might* differ by the COGs and DPs they focus on, the means used, the risk involved, and so forth. The COAs must include the specified tasks for each relevant adversary government agency responsible for achieving the desired effect in the DPs.

Part B of this step is to *identify and analyze* the adversary's strategic ability COG(s) critical to each COA. There might be different COGs for different phases of the COAs.

Part C of this step is to *assess* the adversary's desired effects, for each COA, in the identified ability COGs' CRs, in order to protect the COG(s) (as in step 1C). *Update* the adversary COA with the resulting DPs/effects.

### **Step 5. Conflict-specific National Strategic Objectives**

Part A of this step is to analyze from a US perspective and develop US conflict-specific NSOs. Faced with the adversary's presumed intent described in a most likely and a most dangerous COA, the United States must *establish* NSOs (with CfS and MOEs) that deal with the adversary's aggressions as well as support the preconflict US NSOs from step 2A (unless a friendly policy change makes the preconflict NSOs obsolete).

Part B of this step is to *validate* the US strategic will COG, identified in step 2B, as the will COG for these NSOs. In other words, might the adversary's actions in step 4 result in a change in the US political leadership? *Reanalyze* the US will COG in relation to impact/effect from the adversary's COAs and *assess* what value the will COG holds for the NSOs established in step 5A (like step 2B).

Part C of this step is to *update* the adversary's desired effects in the CVs, as necessary, and *use* new DPs/updated DPs *to update* the adversary's COAs from step 4C. Furthermore, *establish* US desired effect in the US CRs in order to protect the US COG. These will be DPs on US strategic

LOOs. Last, *revisit* the adversary's COGs (steps 1B and 4B) and *establish* the US desired effects in the COGs and the CVs. *The desired effects in the COGs must support the US NSOs. Add* them as CfS if they do not match existing CfS. The CVs become DPs that will be arranged together with their effects on the US strategic LOOs.

### **Step 6. The US Conflict-specific Grand Strategy**

Part A of this step is to *develop* US strategic COAs by arranging DPs in different LOOs, as described in step 4A (adversary COAs).

Part B of this step is to *identify and analyze* the US strategic ability COG(s) critical to each COA.

Part C of this step is to *establish* the US desired effects in the CRs, in order to protect the COG. These will be DPs on the US strategic LOOs, consequently, *update* the US LOOs. Additionally, *assess* the adversary's desired effects in the US ability CVs. The CVs are potential DPs in the adversary's counteraction COA sequels/branches.

### **Step 7. The Adversary's Counteraction**

For part A of this step, take the adversary's perspective again and *assess* the most likely and most dangerous adversary counteraction COAs to defeat the US strategy (the US reaction) by arranging DPs from steps 5 and 6 in LOOs. *Update* each of the adversary's main COAs (step 4C) with counteraction branches and sequels representing the counteraction COAs.

Part B of this step is to *identify and analyze* the adversary's strategic ability COG(s) critical to each updated COA. There might be different COGs for different branches/sequels of the COAs.

Part C of this step is to *assess* the adversary's desired effects in the CRs. These will be DPs on the adversary's strategic LOOs; as a result, *update* the adversary's COAs and LOOs from step 7A. Likewise, *establish* the US desired effects in the COG(s) and CVs. The desired effects in the COGs *must* support the US NSOs. *Add* them as CfS if they do not match existing CfS. The CVs are potential DPs in new US strategic branches and sequels.

### **Step 8. The Friendly Counter-counteraction**

This step is the US equivalent of step 7. Time and resources will determine how many iterations can be made—the more iterations, the higher fidelity of the analyses and the more branch and sequel plans will be available.

### **Step 9. The Operational Level**

The desired effects in the DPs on the US LOOs become specified tasks to the USG agencies and coalition partners. *Develop* the specified tasks to the USG agencies into (DIME) objectives, mainly by changing from active voice to passive. The objectives tasked to DOD are called military strategic objectives (MSO). *Develop* Cfs and MOEs for each MSO. The other agencies should do the same for their objectives.

There are two kinds of adversary operational COGs (OCOg). The first are those critical strengths that the adversary can put between you and the achievement of the MSOs. They support an adversary branch plan in their overall operational strategy that will counter the friendly operational strategy. The others are the primary forces tasked with the adversary's main effort at the operational level and can/will be different in different phases, branches, and sequels. Our OCOGs are determined in the same way. OCOGs *can* be strategic DPs or closely related to them.

## **Conclusion**

Combatant commanders already use the COG concept when analyzing their operational environment (OE); however, this analysis is normally performed *after* the president has established the strategic objectives for the USG agencies. This defies the purpose of analyzing the strategic COGs: determining the adversary's vulnerabilities to available instruments of power. This paper recommends that strategic COG analysis be done at the NSC level. Therefore, *the NSC and all USG agencies involved in national security should use the proposed model*. The model contributes to a shared understanding of the OE and provides an analytic framework for achieving the national strategic objectives with the best combination of the DIME instruments of power while ensuring the crucial linkage between NSOs and

the military campaign. The analysis model is challenging as it incorporates several series of actions, reactions, and counteractions, but the model must take into account the operational environment of the future which promises to be highly complex and dynamic.

Refining the operational design does not stop when the strategy is executed. Rather, it is a continuous, iterative process where it is crucial to find the anomalies in the adversary's behavior—deviations from the expected—rather than looking for confirmation. The devil is often in the details—the small anomalies might be the tip of an iceberg that could wreck the whole plan, if one does not recognize them for what they are and adjust the strategy and plan accordingly. Therefore, looking for anomalies rather than confirmation is a crucial mind-set difference required for successfully executing the plan produced by the model.

Unity of effort among all USG agencies is not achieved by introducing a common analysis model only, but it is an important step. Proper training in the concepts and tools of operational design will be necessary for all involved departments and agencies. It is the final recommendation that an interagency NSC level planning exercise test and evaluate the proposed model.

### Notes

(All notes appear in shortened form. For full details, see appropriate entry in the Bibliography.)

1. Sun Tzu, *Art of War*, 84.
2. Department of Defense (DOD), Joint Publication (JP) 3-0, *Joint Operations*, II-9.
3. Herbst, "Stabilization and Reconstruction Operations."
4. JP 3-0, I-16.
5. JP 5-0, *Joint Operational Planning*, I-15.
6. *Ibid.*, IV-4.
7. Sun Tzu, *The Art of War*.
8. Gray, "Irregular Enemies," 54.
9. *Ibid.*, 51-52.
10. Strange and Iron, "Understanding Centers of Gravity," part 2, 7.
11. *Ibid.*, 1. "The source of power that provides moral or physical strength, freedom of action, or will to act. JP 1-02."
12. JP 5-0, IV-10.
13. *Ibid.*, IV-15.
14. *Ibid.*, IV-8, IV-15.

15. Air Force Doctrine Document 2 (AFDD 2), *Operations and organization*, 7.
16. Pape, *Bombing to Win*, 12.
17. *Ibid.*, 16.
18. AFDD 2, 8.
19. Pape, *Bombing to Win*, 12–13, 16.
20. AFDD 2, 7.
21. Johnson, *Learning Large Lessons*, 65, 110–11; Pape, *Bombing to Win*, 178–79, 189–92; and Clodfelter, *The Limits of Airpower*, 125–27.
22. Hinde, *George Canning*, 175; and Christiansen, “War with England.”
23. Clodfelter, *Limits of Air Power*, 114–15.
24. Johnson, *Learning Large Lessons*, 83–86.
25. Pape, *Bombing to Win*, 2–56, 260–62, 311–13.
26. *Ibid.*, 89, 134–36.
27. *Ibid.*, 189, 193–95.
28. *Ibid.*, 10.
29. AFDD 2, 7.
30. *Ibid.*, 5.
31. Clausewitz, *On War*, 617.
32. *Ibid.*
33. Read Dr. Joe Strange and Dale C. Eikmeier for a more detailed discussion on centers of gravity in Strange and Iron, “Understanding Centers of Gravity and Critical Vulnerabilities,” part 2; and Eikmeier, “A Logical Method.”
34. Clausewitz, *On War*, 75.
35. *Ibid.*, 596; and ACSC WS-510 Lecture, 6 November 2007.
36. Strange and Iron, “Understanding Centers of Gravity,” part 2, 5–7.
37. *Ibid.*, 7.
38. *Ibid.*, 8.
39. JP 5-0, IV-8.
40. *Ibid.*, IV-11.
41. Strange and Iron, “Understanding Centers of Gravity,” parts 1 and 2; Eikmeier, “A Logical Method”; and Kem, *Campaign Planning*.
42. JP 5-0, IV-15.
43. *Ibid.*, III-12–III-18.
44. AFDD 2, 85–86, 89–90.
45. JP 5-0, III-15.
46. NATO, Allied Joint Publication 5, 3–13.
47. AFDD 2, 95.
48. JP 5-0, GL-18.
49. *Ibid.*, III-11.
50. *Ibid.*, III-60–III-63.
51. United States Joint Forces Command, *Commander’s Handbook*, III-4–III-6.
52. JP 5-0, IV-16–IV-19.
53. *Ibid.*, IV-14.
54. *Ibid.*, IV-22.



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