

The Last Word

Campaign Analysis to Support Operational Planning and Execution: A Useful Antediluvian Approach?

Jeff Kline, CAPT, USN (ret), Professor of Practice, Military Operations Research, Naval Postgraduate School, jekline@nps.edu

From a stratospheric view, campaign analysis can be regarded as assessing the ability to generate sufficient combat power when and where needed to achieve strategic and operational objectives.^a The ability to generate combat power is a function of existing ready force structure with its capabilities and capacities and available combat potential, the distance and time required to move elements of that force structure to the campaign objectives, and the logistics capability and capacity to move that force and sustain it for the duration of the conflict. Combat power's sufficiency is measured against the enemy's combat power generation capability. In this light, deterrence may be viewed as one's ability to disrupt and degrade any element of the combat power generation function through any means, kinetic, nonkinetic, or diplomatic.

Shaped by time, resources, and purpose, there are choices of analytical methods to employ in a campaign analysis. I'd like to describe three campaign analysis methods, each with its strengths and limitations, and suggests where each can be best applied. To categorize, we call these three the pyramid model method, the campaign analyst method, and the in-stride campaign assessment method.

“As for military methods: the first is termed measurement, the second, estimation [of forces]; the third, calculation [of numbers of men]; the fourth, weighing [relative strength]; and the fifth, victory. Terrain gives birth to measurement; measurement produces the estimation [of forces]. Estimation [of forces] give rise to calculating [the numbers of men]. Calculating [the number of men] gives rise to weighting [strength]. Weighting [strength] gives birth to victory.” —Sun-Tzu, *The Art of War* (1994, p. 184)

It is not my purpose to revisit the many fine references discussing campaign analysis, but, instead, to offer an overview of these three methods, and propose that as a military analytical community, we may be over-enamored with large campaign models when applied to actual operational planning at the cost of informing planners in each planning stage.^b

The Pyramid Model Method

Computing power's advancement inspired the familiar model pyramid progression with detailed physics models serving data to systems models, which in turn feeds engagement models that further pass data to mission models and on to campaign models. Along the way, modelers are informed by wargaming results, mission experts, weapon

and platform designers, emerging technologies, and intelligence on adversary capabilities. Warfare analysts then focus on model results to gain insights and as much as possible, quantitatively assess concept of operations, new capabilities, and future force structure alternatives. As with all analytical efforts, this process has its shortcomings. For example, variance of results, which actually represents decision maker uncertainty, is difficult to retain as data is passed from one model to the other, and the method is susceptible to a black box syndrome where decision makers, analysts, and modelers alike at times have difficulty understanding why certain results occur. In addition, the pyramid process is expensive and lengthy, usually involving several organizations

with their own modelers and analysts. Its benefit is that it provides tractable data with pedigree, and arguably the best technical assessments for systems not yet existing. Because of these characteristics, this method is used for future force structure analysis where the planning, programming, budget, and execution cycle provides the time and resources to employ a longer effort and decision support is related to capital investments.

The Combat Analyst Method

The opposite end of the campaign analysis application spectrum is a gross level assessment for each combat power generation capability, force availability, time, distance, and logistics lift, and deterministic models or basic simulations to measure combat power sufficiency. This usually involves time-distance calculations, lift capacity, and basic counting as measures of capability. Rough levels of attrition are applied across logistic lines using estimates from historical examples, exercises, or recent operations. Mission performance is judged with straightforward probability models, spreadsheet simulation, or existing tailored optimization tools. Combat power's sufficiency across the campaign is weighed with a high-level, and at times subjective, meshing of individual mission performance. The objective is to gain insight in important elements or identify high-risk missions to meet campaign objectives. Although sounding analytically sophomoric, this method has the benefit of timeliness and transparency. It can expose basic issues like the "n + 1" challenge, where the adversary has one more offensive missile than our force has defensive missiles, or that logistic force ship capacities are inadequate to maintain combatants on station. It can identify critical logistic nodes to maintain and quickly

determine impacts to planning when assumptions change. Although less expensive than the model pyramid, it does require operational planners with an appreciation for analytical wargaming, probability, historical combat operations, and mission and campaign models. It also requires combat analysts (Kline, 2003). These combat analysts have to be integrated with the future and current planning cells, something not characteristic of our current joint planning efforts. And, naturally, the results are subject to much greater variability, uncertainty, and subjectivity. This method is appropriate when planning must occur on a short time horizon where a large campaign models may not be responsive to unanticipated operational environments.

The In-Stride Campaign Assessment Method

Joint Publication 5-0, Joint Planning Process, provides ample guidance for integrating campaign assessment with the earliest stages of campaign design (Joint Chiefs of Staff, 2017). Assessment's importance in linking the commander's objectives with courses of action and metrics to weigh achievement are highlighted. Although an officer may be a talented campaign assessor without having all the statistical, combat modeling, optimization, and simulation skills inherent in a combat analyst, including these capabilities enable the assessment team (1) to provide quantitative calculations of relative risk during course of action evaluation; (2) talent to design, develop, and execute analytical wargaming inside the planning process; and (3) data analytical skills to apply to campaign metrics during execution. In this method, the campaign analyst conducts basically the same functions as during the combat analyst method, but

integrated fully into the assessment team's activities and providing quantitative support to the future operations and current operations cells (J5 and J3). This makes campaign analysis an integrated function of the joint planning process, which can inform planners and commanders at each planning step about potential risks to their combat power generation capability. As time allows, campaign analysts can call upon additional modeling resources for detailed mission analysis and campaign results. And, if there is no time restriction as in COCOM OPLAN generation without immediate execution, the campaign analyst can follow up this planning process with a pyramid method and use of a large campaign model as resources allow.

Observations

As a military analytical community, we may have become too enamored with what we can model and have placed too many resources in the computer and not enough in the campaign analysts' development. Enabled by a robust civilian analytical and modeling community, we direct most of our efforts to informing the large capital investment decisions concerned with future force structure applying the pyramid method. This is extremely valuable to the service providers, but shifts attention and personnel from possible contributions to current warfighting planning and operations. Granted, campaign analysts were integrated at various levels in the Iraq and Afghan conflicts, but as the conflicted waned, were drawn back into their analytical bastions. To capture the potential value of quantitative military assessments inside our combat commands, we must educate operations analysis officers to apply their analytical skills within the joint planning process, assign them to those staffs for

their full integration, educate their leadership how to leverage these officer's talents, and invest in their career progression, either as FA49s inside the land services, 61s inside the air service, and as 3211 unrestricted line officers in the Navy.

Regardless of the method, campaign analyses provide focused debate on the most critical issues around a campaign or force structure, give decision makers synthesized information, provide quantitative risk assessments where possible, and bound uncertainly where not possible. Rigorous analysts will also identify patterns of activity where certain capabilities are best utilized, produce side benefits like new tactics or concepts, and provide the basis for data driven decisions (Hughes, 2019).^c These are desired traits to have at all levels of decision making, but particularly in the complex adaptive systems of opposing systems called war. In this environment, campaign analysis can contribute most through the combat analysts and in-stride campaign assessment methods. Increasing the presence of warfighters skilled in analytical tools at the operational and campaign planning level will have great value for planning staffs, their commanders, and the operating forces. ↑

Notes

^aCombat power and available combat potential are defined in Dubois et al. (1998).

^bFor an overview of campaign analysis with references see Kline et al. (2010).

^cHughes (2019) provides an overview of how the artful application of basic combat models by a campaign analyst can provide critical insights to decision makers.

References

- Dubois, E., Hughes, W., and Low, L. 1998. *A Concise Theory of Combat*. Institute for Joint Warfare Analysis, Naval Postgraduate School, Monterey, CA.
- Hughes, W. 2019. *Informed Decision Making*. Unpublished Naval Postgraduate School paper, available upon request.
- Joint Chiefs of Staff. 2017. Joint Publication 5-0, *Joint Planning Process* (June 16), VI-9, 10
- Kline, J. 2003. JTF Commander: "Send Me Our Combat Analysts," *Phalanx*, Vol 36, No 1, 15–19.
- Kline, J., Hughes, W., and Otte, D. 2010. Campaign Analysis: An Introductory Review, *Wiley Encyclopedia of Operations Research and Management Science*, Cochran, J., ed. John Wiley & Sons, 558–566.
- Tzu, Sun 1994. *The Art of War*. Ralph D. Sawyer translator and introduction. Westview Press, Boulder.



About the Author

A retired naval officer with 26 years of service, Jeff Kline is currently a Professor of Practice in the Operations Research Department at the Naval Postgraduate School. In addition to teaching courses in joint campaign analysis, risk assessment, and systems analysis, he supports applied analytical research in maritime operations and security, tactical analysis, and future force composition studies. He has served on the Chief of Naval Operations Advisory Board for Fleet Architecture and several Naval Study Board Committees. His awards include the J. Steinhart Award for Lifetime Achievement in Military Operations Research, Superior Civilian Service Medal, and the Institute for Operations Research and Management Science (INFORMS) Award for Teaching of OR Practice. He is a member of the University of Missouri's Industrial Management Systems Engineering Hall of Fame, the Military Operations Research Society, and INFORMS.