



~~How to Analyse Wargames~~

How Not to Not Analyse Wargames

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Stephen Downes-Martin, PhD
Research Fellow, US Naval War College
401-935-4808
stephen.downesmartin@gmail.com
<https://sites.google.com/site/stephendownesmartin/>



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How Not to Not Analyze Wargames

I was asked to discuss how to analyze wargames. I decided it would be more useful to approach the subject from the point of view of how not to not analyze wargames. (I'm English, and it is not unknown for the English to avoid not using double negatives. A double negative means something subtly different from the non-negative statement, and it is this different topic that I will discuss with you.) How not to not analyze wargames is not the same thing as how to analyze wargames.

There are three reasons for my approach:

1. The fact that you are at a wargaming conference at a world class graduate research university means you already understand the broad subject of analysis and wargaming. The use of deductive, inductive and abductive logic, techniques for quantitative and qualitative analysis, the similarities and differences between and the strengths and weaknesses of Course of Action (COA) Comparison and Analysis of Competing Hypotheses (ACH), and many other techniques as well as how to apply them to the social interaction known as wargaming are well known to you.
2. What might be less well known – at least to relative newcomers to wargaming for sponsors – are the pitfalls and barriers to successful completion of a wargaming project caused by the natural pathologies inherent in the very act of wargaming and those created by your sponsors, your boss, and senior players.
3. You must understand not just “how to do good” but also “how not to do bad” if you are to successfully persuade your sponsors, your own chain of command, and the senior players to abide by the requirements of the Data Collection and Analysis Plan – a critical component of the Wargame design – which we will also discuss.



Stephen Downes-Martin

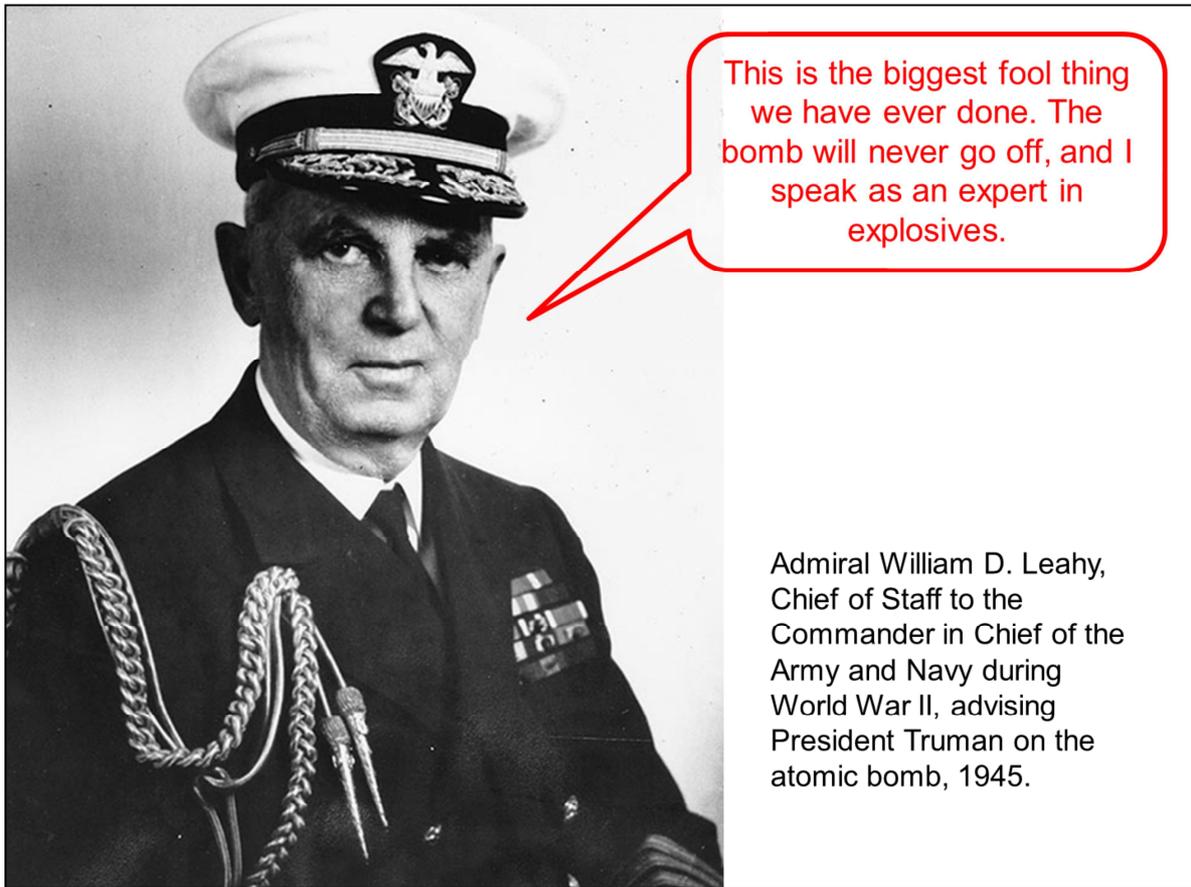
Dr. Stephen Downes-Martin has over 30 years of experience in developing and applying wargaming, game theory, decision analysis, and systems thinking to tactical, operational and strategic military problems for a wide variety of government, military, aerospace, and commercial organizations in the US and abroad. Stephen is currently a Research Fellow at the US Naval War College, where his research focus is on how to manipulate decision support, analysis and assessment methods to deceive decision makers, how decision makers misuse such methods to deceive themselves, how to detect such attempts and protect decision makers from them. His education includes a PhD in Relativistic Quantum Field Theory from London University, MA (with Distinction) in National Security and Strategic Studies from the US Naval War College (JPME Phase I), Master of Advanced Study in Mathematics from Cambridge University, and industrial and academic courses in business management, science and technology, and liberal arts. Stephen has published widely, and has been an invited speaker in the US, Europe and the former Soviet Union on business, international security and technology issues. He was a reserve military intelligence officer in the British Army, and is now a US citizen. Stephen deployed to Helmand Province Afghanistan for spring 2010 to support Regional Command (South West) as the Commanding General's Assessments Advisor, for which he was awarded the Superior Civilian Service Medal. He deployed to ISAF HQ in Kabul for spring 2012 advising General Allen's Afghan Assessments Group.

His full bio can be viewed at:

<https://sites.google.com/site/stephendownesmartin/>

Image: Streptococcus pyogenes

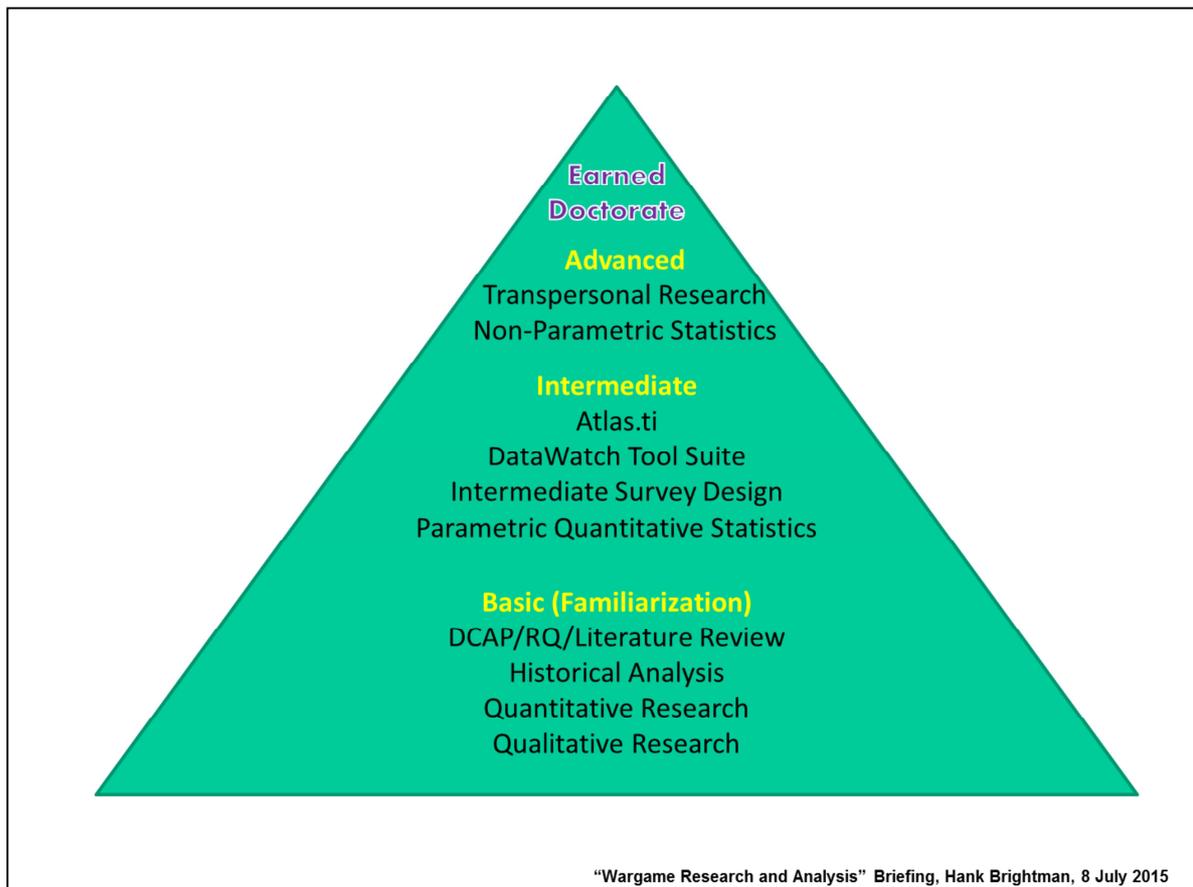
http://www.ehow.com/facts_5684939_causes-flesh-eating-bacteria_.html



Hire Analysts to Do the Analysis!

This sounds obvious ... and it is ... which is why it is amazing that so many non-analysts believe they should do, lead or influence the analysis. There are four kinds of people you should work very hard at excluding from the analysis effort:

1. Senior military officers at O6 or higher rank (Navy Captains, Colonels, and higher) and senior civilian executives. Even if they were once expert analysts, they are no longer so. We know from research into intellectual leadership that it is extremely difficult for an individual contributor to return to being an intellectual leader after they have been in a position of administrative leadership for any length of time. I do not mean "hard to get their old job back", I mean "after they have got their old job back as an individual contributor they tend to perform at nowhere near the same level as before they took a leadership position". This is why in the military they call very senior leaders "Generals", i.e. "Generalists", i.e. "not expert specialists anymore". They are resource providers, managers, leaders, but no longer expert at your job even if they once were. The problem is most people tend to interpret "people tend to" or "it is extremely difficult for" as "everyone else, not me". Your sponsor, your own leadership, and senior players in the game will all try to interfere with your analysis because they think their seniority makes them better analysts than you.
2. Military Subject Matter Experts (SMEs) – unless they have proven analysis skills and experience. There is no known correlation between being good at your job and being good at analyzing your job. If military SMEs have proven analysis skills and experience then hire them as analysts (but do not let them play), do not assume that topic expertise translates automatically into analysis expertise.
3. Leadership from the sponsoring organization or from any other organization that has a stake in the results (even if they are, or have analysts at their disposal). Their membership in these organizations introduces conflict of interest. Of course the sponsor and perhaps other stakeholder organizations have a right to the raw data to do their own analysis, but the official analysis is done by the wargaming organization. If an organization sponsors its own wargame and you are the analyst, then you must ask your organization chain of command to support the principle that the analysis will be protected from senior leadership interference.
4. Yourself, if you are not an analyst. Just having the job title is not enough.



Wargame Analyst Qualifications

How long does it take to become expert in analysis? Four years undergraduate followed by two years post-graduate education at a conservative 2,000 hours a year gives us 12,000 hours to gain a "Master's" Degree in a subject. Assuming very conservatively only 15% of the time is spent learning and doing "analysis" that gives us 1,800 hours of mixed education and experience just to become an entry level novice!



And of course, recruit the right analysts!

You need analysts who are not only skilled in analytic techniques but also experienced in analyzing wargames. It helps if they have as much education or experience in the subject matter of the wargame as possible.

But, your analysis team (even if they are also subject matter experts in the topic being wargamed) will engage with military subject matter experts during the analysis to ensure that topical data gained from the wargame is interpreted correctly and that nuances are not dropped. However, it is the analysts who are responsible for the analysis, not the topical SMEs.

The analysts must also be able to focus on the objectives of the wargame and not drift off into irrelevant philosophical discussions into the differences between epistemology and ontology.



What is the Purpose of your Wargame?

A few of the purposes for which wargames are used are:

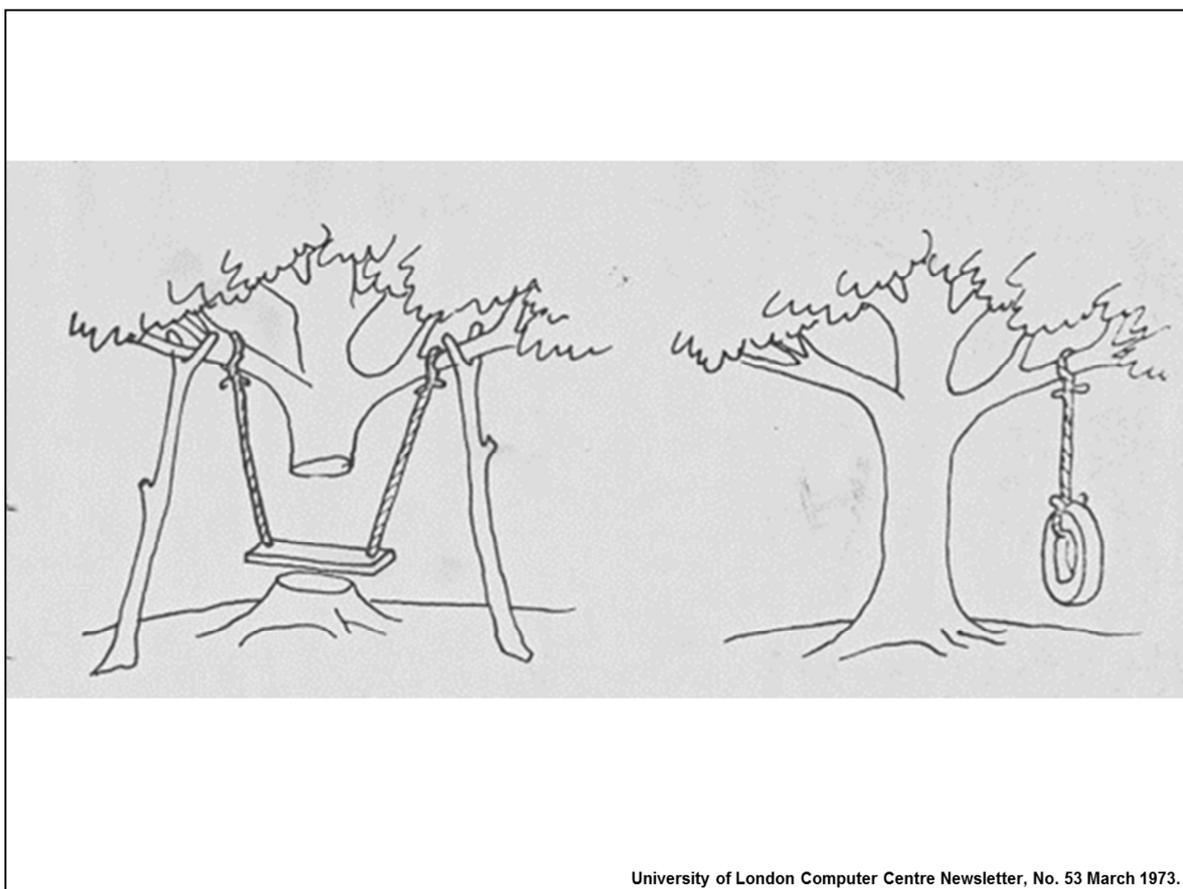
- Experiential: Games aimed at educating or training the players
- Analytic: Games aimed at gaining insight into hard problems
- Comparison: Games aimed at comparing courses of action or alternatives

When analyzing a wargame the purpose of the game will strongly influence what you are analyzing and the time horizon of your analysis.

For example, if you are analyzing an experiential game and the objective is presumably to educate or train, then data must be collected before and after the game to test if the players learned or increased their skills in a way that achieved the purpose and objectives. It may be necessary to test the players months or even years after the game, and to obtain the necessary data to exclude confounding effects. Collecting data solely from the game will severely limit the analysis of a game whose purpose included education or training, and this must be made clear to the Sponsor and the wargame organization's chain of command.

For research (analytic or comparison) games the data collection time horizon is the game, and it is the cycle of research that puts the results into future context with future games and analysis. (See

<https://wargamingcommunity.wordpress.com/2015/05/14/peter-perla-on-work-ing-wargaming/>)



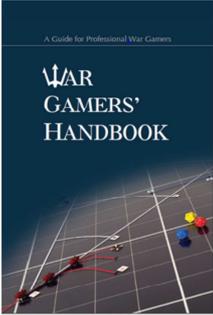
Analysis Starts with Design

You can't save a poorly designed wargame with brilliant post-game analysis. Analysis should start at the design stage, by looking at the objectives of the wargame. The Analyst must be part of the design team from the earliest stages.

This becomes obvious when one realizes that analysis requires data, that data is collected from the players, and that not only what is collected but how it is collected has to be built into the design of the game.

To quote the War Gamers' Handbook (Naval War College): "Since planning for analysis and adjudication are part of game design, the game design document will include a DCAP, written by the game analyst, and an initial adjudication plan, written by the game adjudicator."

Image: Earliest version of this cartoon that I know of is from the University of London Computer Centre Newsletter, No. 53 March 1973.



The game analyst delivers a postgame analytical report that

- addresses the sponsor's problem,
- provides a response to the sponsor's stated game purpose, and
- provides a coherent organization of player insights relevant to game objectives.

The analyst develops a data collection and analysis plan (DCAP) that describes what data will be collected, and how the data will be collected, stored, and analyzed.

War Gamers' Handbook, Naval War College

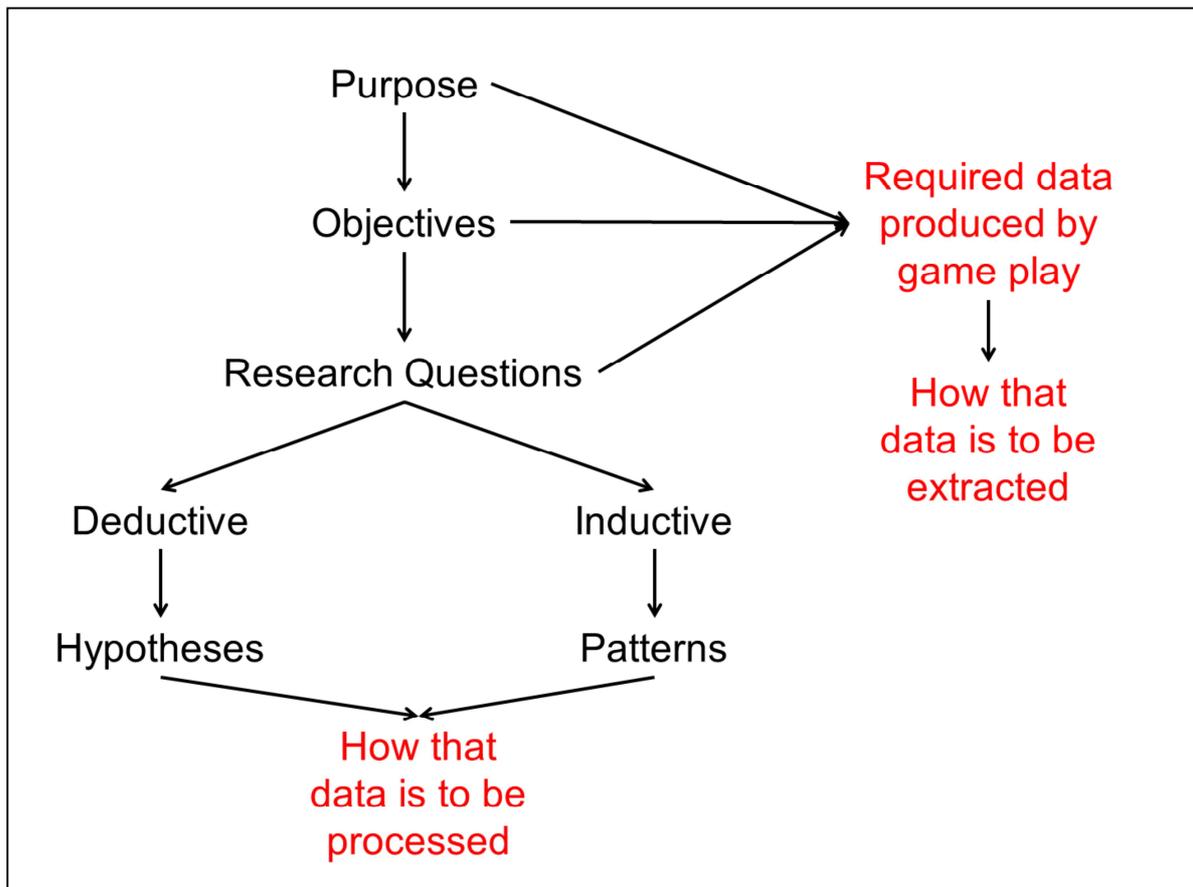
Responsibilities of the Analyst

- Participate in formulation of game proposal document
- Develop research questions
- Identify items needed from sponsor (e.g., personnel, products)
- Provide input to game design to ensure relevant data collection
- Lead game analysis planning process
- Identify data streams to be collected during game
- Create survey questions
- Identify data collection process of game products
- Write DCAP
- Participate in game development
- Train analysis team members (in-cell data collectors, postgame data analysts)
- Lead game analysis process, to include production of game report and briefing

Page 66 of the War Gamers' Handbook, Naval War College

The DCAP is part of the Game Design Document – Analysis is part of Design.

In addition provide advice on the game type – inductive or deductive for example – and decide on analytic methods appropriate to the type (qualitative and quantitative).



Design/Analysis Structure

The Game Designer and Game Analyst cooperate in engaging with the Game Sponsor to obtain the purpose and the objectives of the game. They use the three plus one questions:

- What do you want?
- Why do you want it?
- Why don't you have it?

And the fourth question

- How long are you in position?

The Sponsor's answers to these questions are not only required for game design, they are critical for game analysis. The Analyst has to know the objectives, why the Sponsor wants to achieve the objectives and why they are currently not achieved in order to derive the research questions and what information the game must produce to address the objectives and these questions. These are needed to understand what techniques are best suited to process the information from the game.

The Purpose and Objectives are contractual, the Research Questions are aspirational. It may be that the game goes in directions that either do not answer some questions or answer them weakly.

Game Purpose: "The overarching reason for which the game is planned, played, and designed to answer the sponsor's problem statement." (War Gamers' Handbook)

Game Objectives: "The stated goals that the game design and game execution must achieve in order to answer the sponsor's problem statement." (War Gamers' Handbook)

Research Questions: "Research questions are derived from the game objectives, and inquire about discrete facets of the broader game objectives." (War Gamers' Handbook)

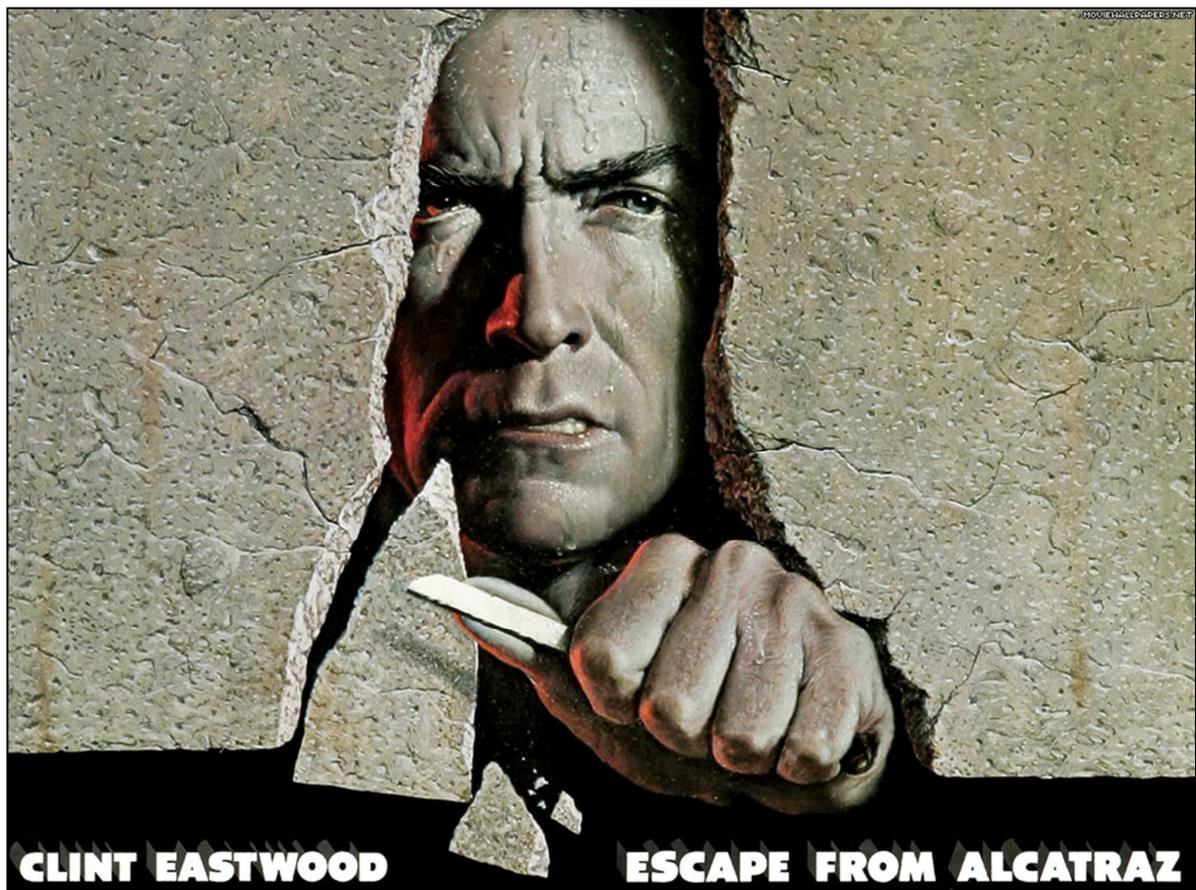


Recruit and Analyze the Right Players

Wargames are notorious for being pick-up games, low on the priority list even of their sponsors. Preferably the Game Analyst and Designer should identify the desired players for the game by experience, level of experience, level of education, and any other demographic characteristics implied by the game's purpose and objectives, and then the game's sponsor should assist in recruiting or directing those players.

Before the game start the players should be surveyed for their level of expertise, experience, skill etc for each of the identified characteristics. This will assist in identifying player gaps, identifying those players whose game decisions and reasons for making them can be ignored and those players to which most attention should be paid. The Game Analyst designs this and other surveys used for data collection.

On the pre-game survey do not just ask for self-assessed experience, knowledge or skill in game relevant topics, ask questions that provide some idea of the actual level of experience, knowledge or skill. You will thus avoid the consequences of the players suffering from Anosognosia getting into the game (see http://opinionator.blogs.nytimes.com/2010/06/20/the-anosognosics-dilemma-1/?_r=0 and http://psych.colorado.edu/~vanboven/teaching/p7536_heurbias/p7536_readings/kruger_dunning.pdf).



Don't Let Players Escape

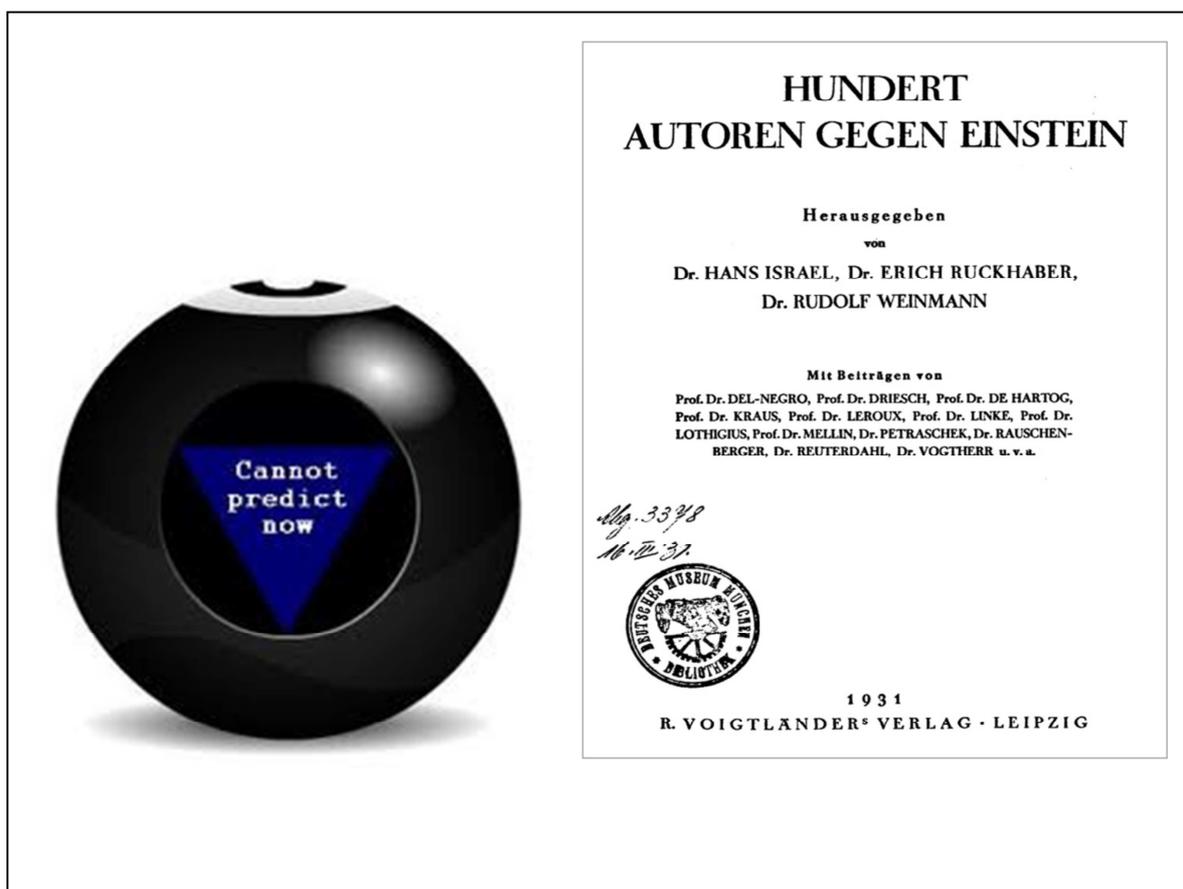
The majority of information generated by the game is contained in the players heads. If they leave with only a short hotwash you are throwing away a large amount of useful information. Instead, design and plan to analyze the data from a session (call it a “move” if you like) which is a deep drill down into “what interfered in the players ability to obtain their game objectives?” Use a disciplined process (such as “Language Processing”) and not just a BOGSAT or Brainstorm.



Analyze the Adjudicators

Since adjudicators make decisions not only on the possible outcomes of interacting player decisions but also on which one occurred and on what information to give to the players, they are thus in fact not only players but dominant players—*diaboli in machina*—whose beliefs and consequent actions drive the game but whose decisions (like those of the other players) are unreliable predictors of what decisions would be made in the external real world the game is attempting to explore. Unless these factors are explicitly handled in design, execution, data collection, and analysis, the game will produce results that may be seductively compelling but are ultimately unreliable.

The argument might be made that adjudicators' decisions relate solely to the game and not to the simulated real world and are thus fundamentally different from the decisions of traditional players. However, if the design for a discovery game of a novel situation has done a good job of recruiting the best subject matter experts either to advise or be the umpires for that game, one might reasonably expect similar experts to be called on in some novel real-world situation as advisers. Their beliefs and actions during a game are relevant to the real world.



What, Exactly, are we Analyzing?

Research shows that “people are not aware of the reasons that move them; even an introspective person with incentives to estimate how he or she would have behaved with different information cannot do this.” This implies that decisions made during a war game by players and adjudicators are unreliable predictors of decisions that would be made in the external (and future) real-world situation the game is attempting to explore. However, research also indicates that human beliefs are robust even in the face of contradictory evidence. On the basis of this research, I argue that beliefs that surface during a game, indicated by the decisions made by the players, should be examined as possibly more reliable predictors of what would be believed in the external world than the commonly held belief that decisions in a game can be used as predictors of what decisions would be made in the external world.

See “Adjudication: The Diabolus in Machina of War Gaming”, Stephen Downes-Martin, US Naval War College Review, Vol. 66, No. 3.

Player Cell (any “color”)		Control Cell (adjudication)
War-Game Actions		
Desired reactions by control cell Player cell actions	compare	Control cell adjudication Desired reactions by player cell
Player cell assessments of risks and unintended consequences of player cell actions	compare	Control cell assessments of risks and unintended consequences of Control adjudications
Analysis of Possible Drivers of Actions		
Messages sent by player cell to Control (communications and actions)	compare	Messages received by control cell (interpretation of communications and intentions behind actions)
Messages received by player cell (interpretation of communications and intentions behind actions)	compare	Messages sent by control cell (communications and actions)
Player cell beliefs about self	compare	Control beliefs about player cell
Player cell beliefs about Control	compare	Control beliefs about self

“Adjudication: The Diabolus in Machina of Wargaming”, Stephen Downes-Martin

Include Control as a Player and Focus on Beliefs

First, explicitly treat the control cell and its adjudicators as players, whose behavior and demographics are collected and analyzed in the same way as those of other players.

Second, shape the war game as a “signaling game,” in comparing messages sent by players (including adjudication and Control), either explicitly as communications or implicitly in their actions, with how those messages were interpreted by the receiving players.

Since beliefs drive interpretation of information, the design should include collection of what players believe about themselves and about other players. From a player perspective, decisions serve to engage and motivate the players, but from the war-game sponsor and designer perspective they exist to force the players to confront and interpret (or misinterpret) information through the lens of their beliefs and to send messages back by their decisions or explicit communications.

The substantive thread of interacting decisions made by player cells and Control generates one possible story from a huge range of possible outcomes; they are not, in and of themselves, important. However, the contingencies that arise, including decisions not taken, can be important—especially those contingencies of decisions dismissed by adjudicators in their role of dominant players. The players’ *explanations for dismissing* a decision or a contingency cannot be taken seriously in a discovery game; it is the underlying beliefs and biases driving the decisions that are important, as well as the contingency itself.



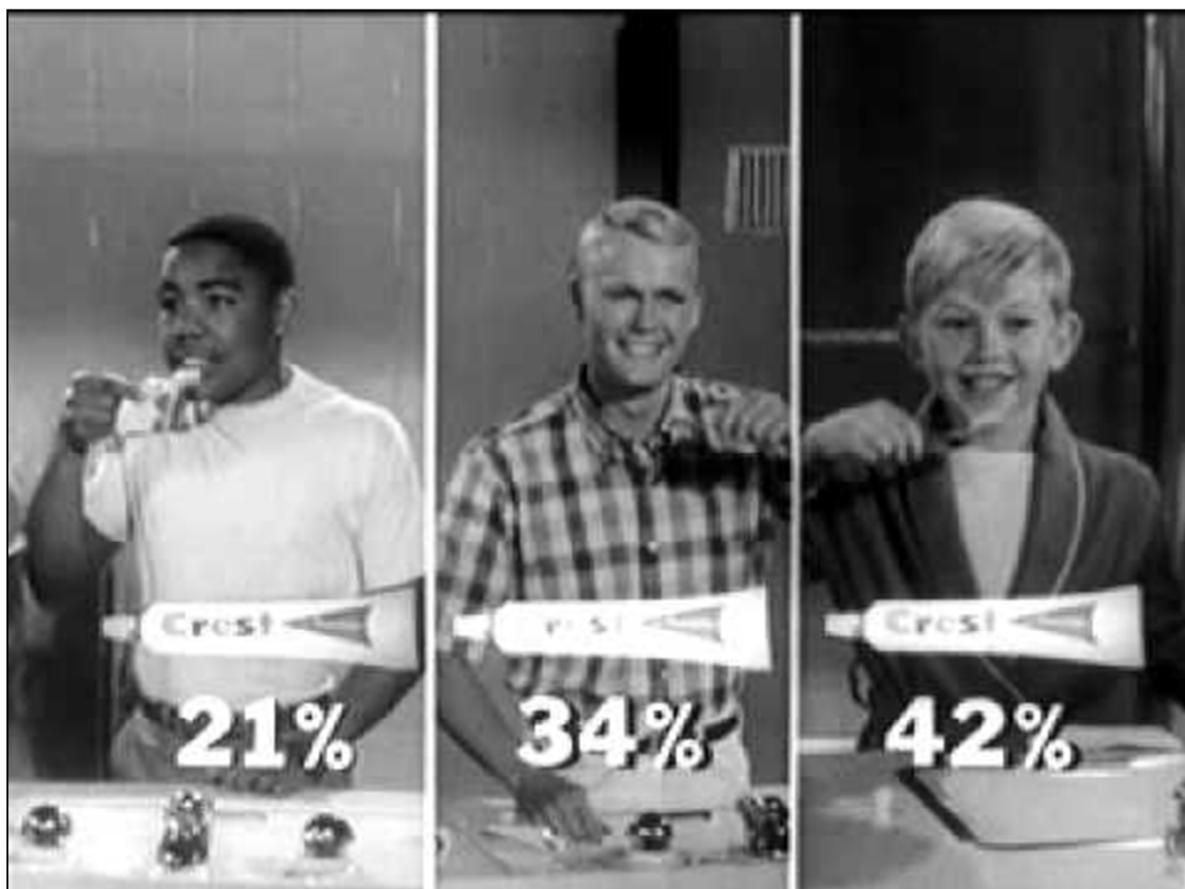
Unclear Objectives and Poor Design

In addition to well-meaning interference by analytically amateur senior leaders, Analysts will face a variety of obstacles to sound analysis. These can be dealt with using ethically sound methods that do not involve professional suicide. These obstacles fit within the larger subject of wargame pathologies. We will review some of them here.

The most obvious and easiest to deal with are unclear objectives or a poor game design. The Analyst must push the Sponsor for clear objectives and the Designer for the links between the objective and elements of the design. A rigorous drill down on the three questions (What do you want? Why do you want it? Why don't you have it?) will provide the necessary information. If it turns out that the Sponsor's problem is not best addressed by a game, then it is up to the game designer to point that out and suggest alternative methods. The Analyst can still assist in the design of those methods and the analysis of data acquired by them.

The hardest to deal with is well-meaning interference by senior leaders already touched on in this briefing. Assuming you, the analyst, have been chosen because you are an expert analyst, you must first do the best job of analysis planning and implementation possible, then spot the interference, then point out the damage the interference is doing to the objectives of the game, and then finally if senior leaders do not stop interfering you document the interference and its damaging effects on the objectives in the final analysis report.

There are however a plethora of other obstacles, some subtle, others not so!



“Prove This!”

There are many wargame pathologies that the game designer and game director have to deal with. The most egregious pathology that the analyst will face is the “Prove This!” problem. The sponsor either subtly or crassly states that the objective is to prove some assertion.

There are interesting varieties of this as sponsors become skilled at trying to slide the “Prove This!” past the game Analyst. The Technology Victory Machine (Blue gets photon torpedoes, transporter beams, replicators and the pet project of the sponsor, while Red gets Scuds and rotary dial telephones). The Logic Victory Machine is more subtle, involving assumptions about what Blue can do (If Blue can do X, Y, Z, then Blue can win).

There are three ways to deal with this;

- (1) Professional suicide – tell the sponsor to pound sand. I can state from experience that the immediate satisfaction gained from this is only matched by the pain of the consequences.
- (2) Suggest that what is wanted is a demonstration of the concept, idea, tactic, whatever, not a game since a game risks surfacing downsides to the sponsor’s idea.
- (3) The preferred approach which is both ethical and effective is to point out that a game can provide the sponsor with knowledge of possible downsides to the idea along with possible mitigations. The sponsor may take these into account to strengthen the idea or be for-earned about possible outside criticisms, or may even change his or her mind about the validity of the idea. The drill down on “What do you want?”. “Why do you want it?” and “Why don’t you already have it?” is critical here.

Dataset Name	Inherent Value of Data	Primary Analytical Technique & Tool(s)
Cell-Based Move Sheet	Collective Insights/Macro-level Themes	Grounded Theory using selective coding with ATLAS.ti and Data Visualization using Analyst's Notebook
Post-Move Participant Survey (Likert Scale Questions)	Individual Insights	Descriptive Quantitative Statistics using Microsoft Excel
Post-Move Participant Survey (Open Ended Questions)	Individual Insights	Grounded Theory using selective and in-vivo coding using ATLAS.ti
Facilitated Discussion Session Threaded Discussions/Open Notes (Cell-Based and Plenary)	Macro-Level Insights	Content Analysis and Grounded Theory using selective coding, in-vivo and serendipitous coding with ATLAS.ti
Ethnographic Notes from Blue/Purple and Red/White Plenaries Sessions and Final Group Session	Macro-Level Insights	Content Analysis and Grounded Theory using selective coding, in-vivo and serendipitous coding with ATLAS.ti

"Inductive Analysis in Wargaming" Briefing, Hank Brightman, 20 Nov 2014

Analytic Considerations

Ethnography: Purpose is to understand the relationship of individual or group behaviors in the *context of culture*. Passive recording of a particular group for common behavioral characteristics. Uses observation, journal entries and collection of artifacts (e.g., player notes) as primary forms of data collection. The DCAP and training must address collection procedures up-front for recorders (e.g., non-engagement).

Content Analysis: A non-obtrusive, indirect method of examining the "relationship between a specific piece of information and the larger body where it resides". Could include looking for general phrases or ideas in open-ended surveys to determine their prevalence, counting the number of times a specific word or phrase appears in responses, identifying trends in players' non-verbal communication shown during the decision-making process in ethnographic notes.

Grounded Theory: Allows us to inductively identify trends and patterns based on data collected in a natural setting. Often explores "human interactions, and how they result from and influence one another". Requires a systematic method of coding data collected in interviews and observations, so that relationships and interrelationships can be identified. New data are continually collected throughout the process and compared and contrasted with prior findings.

"Inductive Analysis in Wargaming" Briefing, Hank Brightman, 20 Nov 2014

Analyst's Notebook

Credibility	Classic spy who passed classified info	Archived data for LHM, as instructed	Stashing Intellectual Property for his next job	Tailed to Chinese but passed no classified info	
WHL's wife was FBI/CIA informant	Credible	Inconsistent	N/A	N/A	Neutral
WHL had a record of cooperating with the FBI and CIA	Credible	Inconsistent	Consistent	N/A	Consistent
Massive amounts of material were transferred to UNCLAS disc drives	Credible	Very Consistent	Consistent	Very Consistent	Very Consistent
WHL admitted he had disclosed sensitive info to a foreign govt	Credible	Inconsistent	N/A	Consistent	Consistent
WHL did not report all his meetings	Credible	Very Consistent	N/A	N/A	Consistent
PRC's W-88 sketch had revisions made after WHL lost access	Credible	Inconsistent	N/A	N/A	Consistent
99% of W-88 info on the Internet	Credible	Neutral	Consistent	Inconsistent	Consistent
No proof any classified documents were passed to the PRC	Credible	Inconsistent	Neutral	Neutral	Consistent
WHL was in regular contact with senior Chinese nuclear scientists	Credible	Consistent	Consistent	Consistent	Consistent
Entered lab at 0130 Christmas Eve	Credible	Very Consistent	Inconsistent	Consistent	Inconsistent
Did not download user manuals	Credible	Inconsistent	Inconsistent	Consistent	Neutral
Took computer files home	Credible	Very Consistent	Inconsistent	Very Consistent	Very Consistent
Moved files to UNCLAS computer	Credible	Very Consistent	Very Consistent	Very Consistent	Very Consistent

ACH

"Wargame Research and Analysis" Briefing, Hank Brightman, 8 July 2015

Some Analytic Tools

Analysis of Competing Hypotheses (ACH): "Analysis of competing hypotheses, sometimes abbreviated ACH, is a tool to aid judgment on important issues requiring careful weighing of alternative explanations or conclusions. It helps an analyst overcome, or at least minimize, some of the cognitive limitations that make prescient intelligence analysis so difficult to achieve. ACH is an eight-step procedure grounded in basic insights from cognitive psychology, decision analysis, and the scientific method. It is a surprisingly effective, proven process that helps analysts avoid common analytic pitfalls. Because of its thoroughness, it is particularly appropriate for controversial issues when analysts want to leave an audit trail to show what they considered and how they arrived at their judgment." <https://www.cia.gov/library/center-for-the-study-of-intelligence/csi-publications/books-and-monographs/psychology-of-intelligence-analysis/art11.html>. See <http://www.parc.com/publication/2942/analysis-of-competing-hypotheses-ach.html> and <http://competinghypotheses.org/> for (free) software.

Atlas.ti: "Supports qualitative analysis of complex unstructured data – data that cannot be meaningfully studied by formal, statistical approaches. ... It supports analysis of written texts, audio clips, video files, and visual/graphic data ... includes highly sophisticated tools to help you manage, extract, compare, explore, and reassemble meaningful segments of information from large amounts of data." See <http://atlasti.com/>.

IBM Analyst Notebook: "IBM® i2® Analyst's Notebook® is a visual intelligence analysis environment that can optimize the value of massive amounts of information collected by government agencies and businesses. It allows analysts to quickly collate, analyze and visualize data from disparate sources." See <http://www-03.ibm.com/software/products/en/analysts-notebook>

IBM SPSS: "statistical analysis, data and text mining, predictive modeling and decision optimization" See <http://www-01.ibm.com/software/analytics/spss/>



Questions?

Some Answers!

War Gaming at the US Naval War College:

- <https://www.usnwc.edu/Research---Gaming/War-Gaming.aspx>
- <https://www.usnwc.edu/Departments---Colleges/Center-for-Naval-Warfare-Studies/Warfare-Analysis-and-Research.aspx>

“War Gamers’ Handbook: A Guide for Professional War Gamers”, Shawn Burns (Ed), <https://www.usnwc.edu/getattachment/Research---Gaming/War-Gaming/WGD-HB---Complete-2.pdf.aspx>

“Wargame Research and Analysis” Briefing, Hank Brightman, 8 July 2015

“Inductive Analysis in Wargaming” Briefing, Hank Brightman, 20 Nov 2014

“Your Boss, Players and Sponsors: The Three Witches of Wargaming”, Stephen Downes-Martin, Naval War College Review 2014, Vol 67, No. 1, pp 31 – 40

“Adjudication: The Diabolus in Machina of Wargaming”, Stephen Downes-Martin, Naval War College Review 2013, Vol 66, No. 3, pp 67 – 80

Image: Lawrence Olivier and Dustin Hoffman in the 1976 movie “Marathon Man”