So a Wargamer and a Black Swan Walk into a Bar . . .

This paper is a slightly modified version of a presentation I gave as part of the keynote Panel for the Connections Wargaming Conference, a subset of the third Defense Modeling and Simulation Conference, held in Orlando from 10 to 14 March 2008. It grew out of a series of projects I directed at CNA in support of the Wargaming Department of the Naval War College. I presented an earlier version of this material at the MORS Workshop on Wargaming and Analysis held in October 2007.

We are well into the mythical 21st century, now nearly a decade gone. The close coincidence of the change in the calendar with the change in the global geopolitical system and an increasing belief in some fundamental changes in the physical climate has resulted in enormous pressures to cast all new work in terms of transformation and, at the very least, evolutionary change—if not, indeed, revolutionary change—in virtually every facet of defense policy and operations. Change is a wonderful thing. Except, perhaps, to a well-entrenched community of political pundits and defense demigods who long to apply "tried and true" (that is, old) modes of thinking to new, and a few not-so-new, problems. I am going to resist the almost overwhelming temptation to fire repeated broadsides at such slow-moving targets. Instead, I am going to focus on the positive contributions a very old technique—wargaming—can make to our understanding of and operating in the new world of the new century. Profiting from these contributions will, nevertheless, depend on our ability to break free from the shackles of our old ways of thinking about and doing wargaming.

My goal in this paper is to ground our thinking in some basic ideas about what wargaming is and is not, to discuss why we need it more than ever to help us prepare for the challenges of the 21st century, and to propose how we can apply wargaming in ways that are most likely to help us produce workable solutions to the challenges we face in the coming years.

Some of the most important of those challenges are events and situations we cannot even foresee from our vantage point of today. In the words of a best-selling book which swept the financial world—of all things—in 2007, these events are Black Swans.[1] Before I attempt the daunting task of trying to boil down the meaning and ideas associated with the Black Swan, however, let's start by discussing the subject nearest to my heart.

What is wargaming?

Too often, people in our business—the business of defense analysis writ large—use the term *wargaming* loosely, to refer to any type of warfare modeling, including exercises, campaign analysis, and computer simulations without players (or CSWP, pronounced Kaz-whip, as I like to call them). A more precise definition is:

> A wargame is a warfare model or simulation that does not involve the operations of actual forces, in which the flow of events affects and is

affected by decisions made during the course of those events by players representing the opposing sides.[2]

This definition excluded anything that involved the use of actual military forces carrying out military evolutions in the real, physical world—activities which I have characterized in the past as exercises, not wargames. But over the last few years I have come to recognize that some real-world activities, particularly the training evolutions at the National Training Center, can be what I would call "true" wargames. The really decisive point is that wargames first and foremost center on human beings (players) making decisions and dealing with the consequences of those decisions as the events of the game unroll. So, my new and improved definition is this:

> A wargame is a warfare model or simulation in which the flow of events shapes, and is shaped by, decisions made by a human player or players during the course of those events.

And, of course, when I say players, I mean people.

This is a picture of a team playing InfoChess at a Connections Conference way too many years ago. If you don't know about InfoChess, it is a clever extension of classic chess designed to educate people about some of the fundamental concepts of information warfare. It added to normal chess ideas like deception, reconnaissance, surveillance, command and control, and asymmetric operations. In addition to your array of pieces— which might not be the standard set of chess pieces, by the way—you received a supply of InfoChips, which you could use to buy those new information warfare capabilities. But, of course, you never had as many chips as you might want. In the picture, you can see a small pile of InfoChips on the table near the chess boards.

In this particular game I had the inestimable pleasure of playing on the team opposing our heroes pictured above. This team was led by Colonel John Warden, USAF. John had risen to some prominence as the author of the book *The Air Campaign*,[3] and creator of the Instant Thunder campaign plan, which would ultimately evolve into the Desert Storm air operation. At this time, John was the commandant of the Air Command and Staff College and instrumental in the origins of the Connections conference series. To make a long story short, our team won the game in three or four moves, mainly because John played the players as well as the game. He knew that at least one of our opponents was a rated chess player, and John expected that he would approach the game from a chess player's perspective. We realized that such an approach might well be vulnerable to a prompt, unconventional, surprise attack using the oldest trap in the book, Fool's Mate, but only if that attack were well concealed and covered by a heavy application of Info Operations. It worked; we executed our plan and won the game in three or four moves. That game was the best representation of the cognitive aspects of asymmetric warfare and information operations that I have ever seen. It was all about understanding the mental models of the key decisionmakers, and how to exploit them to win.

Wargaming is NOT analysis!

One of the most difficult hurdles for most experts in the defense analysis community to overcome when thinking about wargaming is a tendency for the analysts to look at wargaming as bad analysis; analysis that is not rigorous enough or is based too much on assumption and not enough on "hard" data. This is more than just semantics; it affects fundamentally attitudes about the way wargames should be designed and used.

To understand the differences, let's look at a definition of analysis:

> Analysis is a scientific method of providing decision makers with a quantitative basis for decisions.

This definition is drawn from one of the foundational works of military OR, Morse and Kimball's *Methods of Operations Research*.[4]

There are those who would argue that this definition of analysis is too narrow, but the *DoD Dictionary of Military and Related Terms*, Joint Pub 1-02 defines operations research in these terms:

operations research — The analytical study of military problems undertaken to provide responsible commanders and staff agencies with a scientific basis for decision on action to improve military operations. Also called operational research; operations analysis.[5]

You can see that the key word found in both these definition is "scientific," and if science is involved, quantitative data, calculations, and reasoning is usually not far behind. So I contend that wargaming is not analysis in this classic sense. Can a wargame be an "analytical" tool? Certainly, but it is not the same sort of tool as a Markov chain model or a Monte Carlo simulation, and wargaming (the art and science of devising, playing, and applying wargames to derive useful insights) is about players and decisions, not about science and mathematics.

Wargaming is not . . . a lot of things

Nor is wargaming real. Sounds obvious, but I am continually surprised at how many professionals seem to remember this fact only when a game does not support their preconceived political positions.

Games can be good experimental testbeds, but they are not themselves the equivalent of Monte Carlo experiments. They are not duplicable; they are not replicable. You cannot iterate a wargame changing only the random numbers. The initial conditions can never be precisely the same. The players will never be identical, even if they are the same persons. Once you have played the game you have learned and experienced something that changes your "state of nature." And at its heart the game is the decisions the players make—decisions that are as variable and difficult to predict as any other human activity. A single wargame is more like a single "run" of a psychological experiment, and has the strengths and limitations of such tools, not the nicely reproducible artificiality of a Monte Carlo model.

As a result of what it is and what it is not, wargaming is not universally applicable. It is best used to explore the role and potential effects of human behavior and human decisions. Other tools, such as classic operations research techniques, are better tuned to deal with the more mundane, technical, and predictable aspects of reality. This is why it is critical to integrate wargaming with those other tools if we are to gain a well-grounded and well-rounded understanding of the problems we face.

On the other hand, in spite of, or perhaps because of, these characteristics, wargaming may be our best hope for looking long enough and deeply enough into the uncertain and unpredictable future to help us prepare to encounter the Black Swans waiting for us there—before they bite us in the butt!

Beware the Black Swan

What is a Black Swan? Some of you may know the book *The Black Swan*, by Nassim Nicholas Taleb. Taleb is an unlikely mix of philosopher and Wall Street quant, a fallen probabilist and a successful trader. James F. Dunnigan, himself a legendary wargame

designer, author,[6] and Wall Street trader/analyst tells me that the guys on the Street who agree with his ideas are known as the Taleban. (Sorry, couldn't resist.)

Anyway, a Black Swan, as Taleb defines it, is a highly improbable event that has three prime characteristics: it is unpredictable; it has enormous effects on things; and once it has happened we work hard to delude ourselves that we could have predicted it if only. The term itself originates from the fact that for centuries Europeans believed that all swans were white—for the simple reason that no European had ever seen a black swan. Until they did—in Australia. The black swan story is an example of one of the human race's major cognitive flaws—we are too ready to believe that the past is always a good predictor of the future; that absence of evidence is the same as evidence of absence. Not so much.

We behave as if Black Swans do not exist; as if we live in what Taleb calls *Mediocristan*, when in fact we live in *Extremistan*. Human nature is not programmed to accept the existence of Black Swans, at least not as the "normal" state of things. We prefer reasoning and thinking linearly. We have been fooled by the large number of phenomena that usually are well-behaved, and we tend to think of extremes as not only unlikely but also inconsequential. Linear relationships are easy to grasp; nonlinear ones are confusing, especially because once you break out of linear relationships, the number of nonlinear possibilities becomes nearly infinite.

The classic example of this flaw in human cognition revolves around the difference between physical qualities of human beings, like weight, and non-physical qualities like wealth. If you weigh a thousand human beings, adding the heaviest human you can think of will have a fairly inconsequential effect on the average weight. This is *Mediocristan*. If you total the income of a thousand human beings and then add that of Bill Gates, the latter will exert a huge leverage on the average, far exceeding that of other observations. This is *Extremistan*. When we behave as if we are in *Mediocristan* when in fact we are in *Extremistan*, we become vulnerable to the most serious of Black Swan consequences. Bankers are well known for being conservative, in dress as well as behavior. But they tend to act as if they live in *Mediocristan*. One result of this blindness is that in 1982, the simultaneous default of loans by South and Central American countries caused large U.S. banks to lose nearly all the money they had ever made—cumulatively in the history of American banking—everything. Indeed, this was "an event of an exceptional nature." In other words, a classic Black Swan.[1]

But if we cannot *predict* Black Swans—because by definition they are unpredictable—what can we do to *protect* ourselves from, or even profit by, their occurrence? The answer is that we can *prepare* for them. We can do that by being intellectually and emotionally ready to respond to the unexpected. By being observant, flexible, and adaptable. And the best way to train your mind to handle unexpected and complex situations is to practice dealing with lots and lots of unexpected and complex situations of all sorts.

Enter *The Logic of Failur*e, another thought-provoking book I recommend to you.[7] In it, Dietrich Dörner, a German psychologist, explores human decisionmaking in complex situations. He argues persuasively, and in a manner similar to Taleb's, that the human decisionmaking apparatus is simply not well adapted genetically to dealing with the kinds of complex situations that are the breeding ground for Black Swans (although Dörner doesn't use that term). He proposes that the most valuable tools for learning how to think about such situations are interactive simulations and games. But you cannot simply play the game and expect to hone your skills. You must also reflect on the game, through careful post-game analysis about what happened during the game and why—what we would call a hot wash-up. So, to help DoD prepare to deal with potentially world-changing Black Swans, we really need to use wargaming to create and build what I have called the *synthetic experience* we need to respond effectively to the unpredictable.

Wargaming the swan hunt

But what kind of wargaming? In the research that I and my colleagues at CNA and the Naval War College have been doing over the last few years, we have identified three distinct approaches to wargame design: what we call the Analyst, the Artist, and the Architect.[8] Most actual designs incorporate elements of all three approaches. Think of them as the axes of a three-dimensional coordinate system, which you can use to locate different game designs according to how much influence they exhibit from each of the three "pure" approaches.

The first of these approaches we call the Analyst. The Analyst uses data and theory to model the real world, including the players as elements of the model. It is very similar to other techniques of modeling and simulation in the defense community. In a game designed along the Analyst dimension, players are just another element of the model. You may often hear this approach described as "human-in-the-loop" modeling or wargaming. The model is the main point of emphasis in design and interest in play. For this reason, it tends to dominate the view of most defense professionals when we talk about wargaming. But it is not the most useful approach to most of the problems we face under current conditions. Our models, at their best, predict the past; Analyst wargames tend to imprison their players too tightly in that past for them to lift their eyes high enough to see the circling Black Swans.

Like the analyst, the Artist bases his game on real data, and lots of it. But instead of using that data to build a clock-work model—as the analyst does—the Artist uses data to build an immersive storytelling environment. The Artist is the storyteller, and he crafts the game's story to engage and affect the players both intellectually and emotionally, by communicating his own creative point of view on the subject matter. Within the constraints of that point of view, he invites the players to wander freely through the storybook world he has created. At its best, the Artist approach allows the players freedom to surprise themselves, but it can sometimes be difficult for them to surprise the Artist himself. Indeed, the Artist-designer has more to say to the players of the game than the players have to say to the Artist. This can be a good way to communicate insights that the players need to experience to open their own perspectives to new possibilities. It can show them that some specific Black Swans are lurking around that corner and in so doing

awaken their consciousness to the possibility of others that are not represented explicitly in the game.

The Architect-designer is also trying to produce a story, but it is not a story of the Architect's own creation. Instead, it is a story the players tell to each other as they live through the game. The Architect uses data, as all designers do, but he uses that data to create a representation of the game universe in which the players will live and work, but only to the level of detail and completeness necessary to allow the players to focus their attention on what the designer (and other stake-holders in the game) deem to be most critical. The Architect distills the data of the real world into a form that is more readily accessible to the players for making decisions in that universe. The decisions they make may be restricted somewhat to those the Architect's research indicates are the most critical. Game dynamics revolve around those key decision points, not around a central story thread or perspective, as in the Artist's game. The Architect's game is less demanding of time and engagement from the players than is the Artist's game. It presents the players a somewhat more restricted range of decisions than might be available in the Artist's approach, but in the context of allowing the players more freedom to develop their own overall story line. The Black Swans arise organically from the players themselves, stripping away their instinctive defense that somehow "Control" manipulated them into a trap.

Looking ahead

So where does all this leave us? Analyst games embody the classic analytical belief that we can model, predict, and explain the real world, including human behavior and randomness, with the precision of a physicist calculating ballistic trajectories. With Black Swans lurking in the bushes of 21st-century warfare, however, these confident beliefs in old techniques will not always help us when we confront the really hard and most world-changing questions of the future. Those questions will be of many types. What should we buy to face the future dangers and opportunities we see? How shall we hedge against what we can't see? How should we train our people to work in that uncertain future, whether in the cold, cruel world of acquisition, or the hot, crueler world of combat? Most of all, how can we help all of them—accountants and analysts, wonks and warriors—learn how better to think about the possibilities that the things we know, the things we don't know, the things we don't know that we know, and the things we don't know that we don't know all present to us in an uncertain future clouded in randomness? It is in this reorientation of how humans think about the future—in every domain of such thinking—that wargaming can have its most profound effects.

If we want our decision makers in all fields of defense and security to prepare better to face those unknown unknowns, we must help them experience examples of Black Swans. Black Swans of all types and in all functional environments. To do that, DoD needs new and revolutionary applications of wargaming, making more use of the techniques of the Artist and Architect to supplement those of the Analyst. Only a creative combination of every tool we can lay our hands one, whether new or old, can give us real hope of avoiding disaster and, instead, profiting from the positive opportunities that await us as we confront the Black Swans of the 21st century.

"Where you from?" says the wargamer.
"Extremistan," says the Black Swan. "You?"
"I'm a wargamer." is the reply. "I don't know where I'm from, but I do know where I'm going."
"Really?" says the Swan. "Where is that?"
"Back to the future," says the wargamer.
"Oh," the Swan replies. "I guess I'll see you there."
"Not if I see you first," says the wargamer.
Ba dum.

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End Notes

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[8] CNA Research Memorandum CRM D0016768.A1/Final, *21st-Century Wargaming: Returning to Our Roots*, by Peter P. Perla, ED McGrady, and Michael C. Markowitz, Oct 2007