Working Group
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In-Stride Adjudication

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Working Group
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Contents

1. Executive Summary

1.1 Mission

1. Produce a work in progress theory and practice resource for the wargaming community in response to the demand for in-stride adjudication.

2. Recommend research directions for extending the state of art and science of adjudication.

3. Engage the broader wargaming community in addressing the research issues raised by the demand for In-Stride Adjudication.

The working group was deliberately given a broad mandate, with "in-stride adjudication" described as "adjudication such that play proceeds continuously with little to no pauses imposed on game play by the adjudication process – play and adjudication occur simultaneously". This description was deliberately broad to ensure divergent thinking and avoid limiting the discussion prematurely. Flexibility and disagreement on the interpretation of "in-stride adjudication" creates better initial insights into the subject.

1.2 Process

In February 2018 we recruited a working group from as diverse a range of experience as possible without making the group too large and unwieldy. There are obvious gaps in experience (such as legal for example) that we would like to fill during later efforts. We were successful in covering the following non-exhaustive and frequently overlapping domains of gaming related expertise:

- DoD
- Industry
- Pol-Mil
- Intelligence Community
- Theater Security Cooperation
- Education
- Theory
- Historical Reenactment
- Dungeons and Dragons
- Role Play
- Hobby Gaming
- Mega Gaming
- Players and Adjudicators
- Practice

The group then followed a standard three-stage normative process:

Stage 1: Starting in February 2018 each member of the working group worked alone and wrote a paper on any aspect they chose dealing with in-stride adjudication.

Stage 2: During the five months preceding Connections US 2018 each member of the working group then collaborated by commenting on each other's papers and refined their own using a shared google folder.

During the Connections Conference we ran an open workshop. A subset of the working group papers was briefed to the workshop, who then discussed the papers in small subgroups of five to eight people facilitated by members of the working group. We collected the workshop participants' notes.

Stage 3: We invited the workshop participants to review all the papers in the shared folder, to think about the subject during the week following the conference and to submit their own papers and additional comments and notes. Two people joined the working group by submitting their own papers. Working group members commented on the workshop participants' notes, and continued commenting on and refining their own papers based on the discussions during the workshop and comments received from participants after the workshop. During the month following the conference the working group chairs with the assistance of the working group examined the papers and workshop notes for perspectives and insights, refined their papers, and created the working group report.

1.3 Emergent Perspectives

The working group produced a broad range of useful perspectives related to "in-stride adjudication". They are neither exhaustive nor exclusive, so they should be researched and experimented with in multiple combinations. Other perspectives will no doubt surface when we include other areas of expertise (such as legal for example) in the working group.

- Definition of "In-Stride"
    - Intent behind the demand for simultaneous play and adjudication
    - Deviations from an ideal of no pauses in play while adjudication proceeds
    - Tradeoff between complexity of adjudication and introduction of pauses in play

- Player agency; what they do, when and how they do it
    - Distinction between players playing the game versus supporting the game
    - Importance of player decisions versus the reasons for them
    - Types of prediction occurring during and after wargaming

- Psychological perspective on In-Stride Adjudication
    - Impact of opacity versus transparency on trust between adjudicators and players
    - Cognitive biases of individuals and groups and their effects on play
    - Empirical approach to best practices for In-Stride Adjudication

- Implementing In-Stride Adjudication
    - Effect of different types of wargame on implementing in-stride adjudication
    - Organization of wargames to achieve the intent behind the demand
    - Effects of established game design principles on in-stride adjudication

- Experimentation with different approaches to in-stride adjudication
    - Trade-offs between intent behind the demand signal and quality of adjudication
    - Use of models, simulations, and displays to support in-stride adjudication
    - Effect of group dynamics and group process pathologies on in-stride adjudication

Details for each of these perspectives are contained in the individual working group papers which follow.

2 Working Group Papers

2.1 Introduction to Working Group Papers

Although many of the working group know each other, the different perspectives and wargaming environments they wrote about both interested and surprised their colleagues and the discussion between them was vigorous, mutually informative and clarified significant disagreements on several key issues.

➢ Gordon Bliss provides an overview of the working group papers from Role Playing Games (RPGs) and refereed (hidden movement) miniatures games perspectives.

➢ William Lademan provides the USMC demand signal for in-stride adjudication (for their purpose built wargaming center currently under construction), which is a specific service demand signal for a current program to go with the continual demand from the DoD for more and better gaming decisions within the limited time available to game. His paper backs up the demand signal with a theoretical analysis of several interesting wargaming concepts such as "wargame at the speed of thought", "maneuver of knowledge", and "reflexive warfare (and deception)" combining into "an integrated, multi-domain information warfare strategy" that requires in-stride adjudication to wargame and provides concrete requirements for in-stride adjudication.

➢ Ed McGrady lays out a spectrum of discontinuity in play created by different game designs and their adjudication methods and argues for a specific seam on that spectrum at which adjudication becomes in-stride. He views the adjudicators to be involved in play and the players as still playing if they are involved in open adjudication, which leads to the interesting conclusion that "It's not so much whether you use in-stride adjudication, it's what you do with it" – how you balance and trade-off between "speed, accuracy, and flexibility" and quality of adjudication to maintain the credibility of the adjudicators and the wargame results.

➢ Peter Pellegrino examines the impact of wargame rules, information and time on adjudication and game design to conclude that in-stride adjudication can be used with simultaneous or alternating player moves and with both open and closed adjudication.

➢ Stephen Downes-Martin proposes a method of organizing wargames to implement the requirements and achieve the intent behind the demand signal for in-stride adjudication, splitting games that would normally be designed as a single seminar game into multiple small sub-games run many times.

➢ Jason Li and Merle Robinson examine in-stride adjudication from the players' perspective, the problem of maintaining the players' trust in the adjudicators and the in-stride process when that process increases the exposure of players to the adjudicators, and how to deal with problem players.

➢ Peter Perla examines what he believes is the only reason to take in-stride adjudication seriously: being to maximize the substantive involvement of the players in the central processes of the game. This involves coming to grips with the state of the game, making decisions to drive that state where the players want it to go and acting to implement those decisions efficiently and effectively. Methods for implementing on-stride adjudication must not interfere with these central game processes.

➢ Rex Brynen looks at lessons and insights for in-stride adjudication from his experience running large POL-MIL games, simulations and negotiation exercises, matrix games, megagames and dungeons & dragons/role playing games. Among several interesting topics, Rex examines cognitive bias problems among expert adjudicators and problem players, and how to deal with these very different issues that affect the quality of in-stride adjudication.

➢ Arius Kauffman examines the different challenges of in-stride adjudication generated by the different type of gaming being executed, whether it is an exercise or experiment, whether the players are playing themselves or someone else, or whether the intent is to discover or to educate.

➢ Deon Canyon discusses the in-stride adjudication system used in Transnational Security Cooperation Wargames (TSCW) and the key insights into best practices for in-stride adjudication revealed by interviews with adjudicators of the TSCW. These include: the importance of adjudicators having prior management and gaming experience, the importance of prioritizing adjudication on actions based on their complexity, urgency and relevance, and the importance of maintaining narrative coherence through adjudicator coordination and technological innovation.

➢ Robert Mosher introduces insights for in-stride adjudication gained from his experience umpiring Modern World War II Reenactments and his analysis of historical documents concerning umpiring large field exercises in WWII.

➢ Finally, and critically, Christopher Weuve wraps up by reminding us that in-stride adjudication, even if it is a Holy Grail of game execution, does not excuse the wargamer (whether designer or player) from paying attention to the well-established fundamentals of game design and execution. These fundamentals create constraints and restraints on the game designer, sponsor and stakeholders, and Chris examines the implications of these on in-stride adjudication.

2.2 Review of Working Group Papers from an RPG and Miniatures Perspective

Gordon Bliss, gblisscdsg@msn.com

Gordon Bliss has over 40 years' experience in board wargames, miniatures and role-playing games. He runs a wide variety of miniatures games at various game conventions and acts as the Game Master for a long-running science fiction role-playing campaign. He has over 20 years' experience in discrete-event simulation modeling and operations analysis at the Polaroid Corporation.

My primary experience is as a hobby gamer and my comments will be from Role Playing Games (RPGs) and refereed (hidden movement) miniatures games perspectives.

Several of the papers reference Playing Games (RPGs) in whole or part as their Game Masters (GMs) need to constantly make in-stride adjudications.[1] One part of this that I don't think was heavily addressed is that there is a significant range in the nature of the ways an RPG can be run. Most that I am familiar with are run in the form of a free kriegspiel where the GM can loosely interpret or modify the published rules (if any) as they see fit for the betterment of the game and to better reflect the perceived realism of the setting. However, there are also games run strictly according to a published set of rules, which some or all of the players know as well as the GM and is more analogous to a rigid kriegspiel. An aspect that I don't recall reading in any of the papers is that in most RPGs the GM is effectively both the white cell and the red cell. This puts extra stress on the GM as they are both adjudicating the actions of the players and determining the actions and reactions of the opposition and any other factors involved, while maintaining credibility with the players that they are doing so both fairly and in a manner consistent with the setting. An additional complication is having perfect information and trying not to use it when determining red cell actions. While this is not usually an issue in a wargame with its own red cell, there may be times when the white may need (or want) to run a part of the red cell. For example, if it is a part the rest of the red cell don't know about, or have

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[1] Game Master is a more general term than Dungeon Master and is used throughout this review.

no control over, or is a rogue element. This may be part of the original scenario design or something that comes about because of an action during the game.

One of the challenges of running an RPG, or a refereed miniatures game, is keeping up with the pace of events. This is both so that players don't get bored and don't artificially get too much time to make decisions. During some situations in RPG games the GM will declare that they are going to game in real time (or close to it). This pushes to players to either make quick decisions or suffer the consequences of waiting. In some miniatures games I have played in or run that use simultaneous movement (these are usually WWII, modern, or future armor games), there is a time limit placed on the movement. A player can wait to see what their opponent is doing, but in doing so runs the risk of not doing anything at all - once time is called there is no more movement. I should note that in the system used in these game units are marked in advance what their planned action is - move, stay and fire, overwatch, etc. The more the GM has to handle, the harder it is to keep up the pace. Besides having multiple GMs to split up the work, an option sometimes is when the players know enough about the game to resolve some actions between themselves and thus relieve the workload.

Another item to consider is when a black swan event occurs in the course of an RPG. One of these can change the course of the scenario and sometimes of the whole campaign. Unlike what I expect in most wargames, in an RPG players may take the possibility of an extreme event for granted. I have heard players say that "anything is possible, given a sufficiently extreme die roll". Note that this is in an open-ended die roll system where it is theoretically possible to get a one in a million die roll - though the most we've had so far in a situation of significance is 1 in 2000.[2] This was a player-generated result where everyone clearly saw the extreme result. In a more typical situation where the GM secretly determines a result, the question comes up whether the players should know this or not. In my experience the GM usually says (or at least

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[2] The incident in question took place in my science fiction role-playing campaign in 1998. I had determined, somewhat arbitrarily, that in order to succeed at a task, the player would need to roll a 36 or better after accounting for the skill level involved. The system I use is 2D10 added (2-20) with a roll-over on a 20. Thus, the player needed to roll a 20, followed by a 10 on 1D10, followed by a 6 or better on 1D10. This resulted in a major change in the campaign. I have seen more extreme die rolls in my game and another, but they were not in as significant a situation and the extra extremity of the roll did not affect the result.

lets on) that an extreme result (which can be good or bad) happened - this helps maintain credibility with the players who might otherwise question why something happened but accept it if they know it was the result of an extreme die roll because, as mentioned above, they take that probability for granted. Wargame players may be less accepting of this.[a] In an RPG, an extreme event may be the source of more entertainment and while this can also be true in some hobby wargames, I've also seen some (hobby miniatures games primarily, hobby board games to a lesser extent) where it leads one side to say they only lost because of a fluke. And in a wargame being run for educational reasons it can destroy the point of the game. There's probably no clear answer, but in such circumstances, I would still favor stopping at that point, capturing the details and informing all sides what happened and how it could affect the result, and then resetting to just before that event and continuing from there. Unless it is a short enough game that several iterations of it can be run to see the range of possible results.

One area I am in slight disagreement with is on Arius's paper where he describes GMs that punish their players, possibly arbitrarily, as bad GMs and then goes on describe why they can be a good thing (and rightfully so) in a white cell. While I am in complete agreement about the main thrust of his paper; even in an RPG a GM punishing their players is not necessarily a bad thing. If the players make a basic mistake - for example forgetting to set security around their camp, then it is perfectly reasonable for the GM to make them pay for that if it makes sense in the game. Players usually get more out of a game if they have thought more and not been sloppy and assumed a lot of things will be done for them automatically. Not that they have to micromanage every detail - once they set up a perimeter security routine, simply reminding the GM when it is in effect will be enough. But it will help make sure they don't get lazy about basics.[b]

On the topic raised about player "shenanigans" (McGrady 2018).[c] A GM (or white cell) can't be prepared for everything and often needs to resolve these in-stride. If it clearly makes no sense or is impossible in the setting of the game they can be dismissed and if the player objects simply say it will be explained later. Here RPG GMs in some settings have an advantage because they also can say that because of the world they are in, their characters would never even think of such an idea.[d] Finally, if they determine that it could happen, or be tried, then

they need to get the player(s) to explain it through in more than one sentence. This will help both make sure that the player has thought it through and it is more than just a one-liner and give the GM more information to help adjudicate the outcome. Players will always find a way to go off-script at some point and it is just something that one needs to be ready for.

One additional thought. In running an RPG, if a situation arises that doesn't have a clear resolution path or has multiple valid options, in order to keep the pace of the game going it's common for the GM to make a secret die roll ("let the dice decide") to determine the direction and degree of the response. This may or may not be appropriate for a serious game.[e]

In all these situations it is important that the players (Li 2018) view the GM (Brynen 2018) as fair and credible or they may feel dissatisfaction with the results which defeats the main goal of entertainment in hobby games and the sponsors' objectives in professional wargames.[f] Additionally, some players of historical miniatures games can be more critical, looking for results that seem historically credible or an explanation of why they weren't. This aspect may carry over into more serious games.[g]

References

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Li, J. (2018). Peeking Behind the Curtain: In-Stride Adjudication from a Player Perspective. *In-Stride Working Group, Connections US Wargaming Conference,* August.

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Discussion

[a] Stephen Downes-Martin:
In professional wargames involving military officers dice rolling is viewed (irrationally in my opinion) with suspicion. A random number generator on a computer or an excel spreadsheet model, on the other hand ... Have you come across this attitude in your simulation modeling work?

Gordon Bliss:

No, but the random number generation was always done by the computer. In all the projects I worked on, no one, not even the engineers involved, wanted to know the internals of the simulation models. They only wanted to see the various results we arrived at. If anyone was concerned about the random number generation it was only me. I know they are a lot better now, but in the early years of my career, some computer pseudo-random number generators were not sufficiently random.

[b]   Arius Kaufmann:

I don't disagree with this, but only offer that in your example, it's not arbitrary and capricious. His decision to punish the player has a goal to improve the game for the players.

Gordon Bliss:

I agree that's true in this example, but it can be a fine line between that and the players feeling that a GM is arbitrarily exploiting a lapse on their part just because he can even if it makes sense in the course of the game. I've seen this result in an explanation after the session in order for the players not to consider the GM as 'bad'. On the positive side, in my experience, once punished I've almost never seen players make the same mistake twice.

Ed McGrady:

The note about DM's punishing players raises an important topic involving translating hobby behavior and practices to professional games. While hobby DM's can (and sometimes are) arbitrary, mean, or jerks, the professional controller cannot be any of those things if they expect to run more than one game. The power relationships that often enter into hobby games must be carefully controlled and subsumed in professional games to the game's purpose and players self identity. Not doing so makes for failure as control. This means that you simply cannot take hobby DM's and drop them into a professional game.

Gordon Bliss:

I don't have any direct experience with professional wargames, so I am making an estimation of what may usefully translate from the hobby to a professional game. An RPG is an entertainment and often a socialization experience and is thus fundamentally different from a professional game. An historical miniatures game can be somewhat more professional as most players will have an expectation of a certain level of knowledge of the period from the GM in order for them to be credible but is still fundamentally for entertainment and only secondarily (if at all) for educational reasons.

Only tangentially related to this, in my professional experience the group I was with would sometimes have a customer who came to us to do a simulation model or other analysis in order to validate a decision or assumption they had already made. Fortunately, only once that I recall did we have to explain to them afterwards why we arrived at a different

answer. In an in-stride adjudication situation where the players, and possibly the sponsor, all assume that a system will behave in a certain way or that an action will have a specific result; but that the white cell, in their professional opinion, adjudicates differently, what is the best way to avoid disrupting the flow of the game as a result of the potential contention this may cause without stopping to explain/justify the adjudication ? I am just putting this out as a question for thought.

[c]   Ed McGrady

As a point of clarification, when I speak about shenanigans I am talking about something that can be done ("lets dump a body in the water off of Spain and have it carrying false plans on the invasion") but in execution would be problematic (body must be found, enemy must believe it, etc.). I tend to advocate for allowing such things to proceed, but at a low probability and high possibility of backfire. Even if they do succeed they often do so in a muddled way that has little effect on actions (OK, we hold 1 armored division back in case that intel was right). In a professional game if the players have thought of they can think of it. However, whether they would be allowed to execute it, and whether said execution would work, is often problematic.

[d]   Stephen Downes-Martin

In professional national security wargames this is equivalent to gaming "what might happen" given "fixed red and/or blue decision-making cultures and doctrine" as opposed to "what could happen that best serves the objectives of the decision-maker".

[e]   Stephen Downes-Martin:

In professional national security wargames this is equivalent to deductive versus inductive adjudication. If the GM makes a die roll then it's a deductive game in which the adjudicator is relying on a given probability distribution of outcomes and has to live with the result of the die roll as do the players. Alternatively, the adjudicator can decide on the outcome (so long as it is possible, based on SME or given probability distributions of outcomes) so as to drive the game in a useful direction.

Gordon Bliss

Though GM's use of this method vary, I usually view this as something to use when there is no single clear useful direction to drive the game and one doesn't want to delay the game by working out a determination process.

[f]   Ed McGrady:

In general, I think that we often lose perspective when translating between hobby games and professional games. We have a lot more flexibility in hobby games, while in professional games there are many constraints that don't arise in hobby games. While good "Dungeon Mastering" is a critical skill (in my opinion) for executing successful professional games, it is a base skill and the real skill is built on top of it. You have to reframe the entertainment aspects of hobby games into something that speaks to the professional game players assumptions, identity, and ambitions. Building technical

credibility, for example, plays a similar role in professional games as rules knowledge and world building does in hobby games. It makes the players realize that you are a credible source of adjudication. Being in charge without being a jerk requires confidence and self-knowledge (and knowledge of the materials) that lets the players identify with you as the "alpha" in the room and become more willing to listen to what control says. However, eventually, the "best" (my definition) controllers eventually loop back to their RPG roots and know how to carefully titrate entertainment into professional games. That's when you sell a lot of games.

Peter Perla:
Creating respect for the alpha geek in the room without becoming an overbearing PITA is essential and often difficult to achieve. You better have your facts right and your politeness turned up to 11. Of course, you may have to smack down the occasional loud mouth, but better to do so by taking them aside or getting the sponsor to do it for you. The other important balancing act is to be found in the introduction of entertainment without descent into farce. It is seldom sensible to allow shenanigans to have a critical effect on the course and outcome of the game. This is, to me, a big danger of extreme matrix gaming. On the other hand, letting players flex their creativity a bit will keep them immersed and involved and may reveal surprising and important insights. From my own experience, however, it can become a slippery slope to chaos, so you need to keep your finger on the pulse of the game at all times — often a difficult task, especially in large games. And especially when hobby gamers are playing in professional settings, forgetting where they are!

[g] **Stephen Downes-Martin:**
In professional wargames this is equivalent to players spotting and complaining about unrealistic aspects of military behavior by a white-controlled red and adjudicated effects.

2.3 USMC Next Generation Wargame Adjudication

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Dr. William J. Lademan is a retired Marine Infantry officer. After service, he spent over a decade in academia and the chemical industry before joining a consulting firm as a wargame designer. Currently, he is the Technical Director of the Wargaming Division, Marine Corps Warfighting Laboratory, charged with the execution of the Wargaming Program in support of examining Service concepts, combat development, and operational plans. He is a life-long player of baseball, historical miniatures, and a wargaming enthusiast.

> *"What can be explained by fewer principles is explained needlessly by more."*
> *William of Ockham's "Razor"*

The driving mechanic of a wargame is to force human decision making, synthesize the cumulative effects of many decisions, and then represent the resulting consequences so that subsequent decisions are required. A comprehensive portrayal of diverse and contending wargame consequences does not lucidly arise as an ordered whole from even a deliberate assembly of arrangements, decisions, intents, and resources. In order to arrive at that ordered whole, which then acts as a substrate for continued game play and subsequent decisions, a wargame must provide for an appropriate adjudication process.

If wargaming is a narrative containing a dilemma, then adjudication is an act of recurring resolution of that dilemma which advances the narrative. Adjudication entails the gathering of diverse, opposing, divergent, and complimentary decisions and actions, subjecting them to a process which considers timing, intent, movement, and weight, and then presenting a coherent picture of results which drives the subsequent conduct of the wargame. Adjudication is nothing less than the means by which the uncertainty of an initial state is transformed into a coherent understanding of a subsequent state which is then subject to a continued trajectory based upon ensuing player decisions and interactions. Of all the requirements for a successful wargame design, the selection of the proper adjudication method is the most crucial.

The Marine Corps has decided to construct a purpose-built wargaming center providing the institution and its senior leadership with a venue in which to wargame in proposed future operating environments and to consider complex problems at appropriate classification levels.

The problem driving this requirement is that of a rapidly evolving operational environment which is outpacing the ability of the Service to consider implications, imperatives, and enact material and non-material solutions. Why use a wargame to address this problem? Because wargaming is an alternative to computational analysis whose sophistication and complexity are both restrictive and no guarantee of correctness or certainty. Law-like regularities and persistent, predictable dynamics are fleeting occurrences in warfare. This is a characteristic that will only be amplified in the future hybrid operating environment. Thus, the purpose of this center will be to consider and propose the basis for the Service's success in a future naval campaign marked by the complexity of multi-domain, information centric, time constrained, distributed, and reflexive warfare by identifying and understanding the prevailing governing factors in such a campaign. As such, the wargaming center's method will be one of exploration and discovery.

While the means – the establishment of an enabled, advanced wargaming center – and the end - to identify the governing factors that pertain to and examine the capabilities and operations required for a successful naval campaign - are understood, the way – how a wargame is to accomplish this- is evolving in the form of a human centric, technology enabled style of wargaming art and method. For all the utility of form expected in the wargaming center, with facilities, capabilities, and library holdings far exceeding current Marine Corps capacities, it is the substance of what transpires and is produced in the center that gives meaning and measure to its construction. Thus … the Next Generation Wargame (NGW).

The NGW is intended to seamlessly represent an evolving operational environment and accommodate the agility, imagination, and disruptive thought of the engaged participants. The NGW is designed to exploit this nexus between human efficiency and wargaming effectiveness. There are two pillars, supported by a number of associated principles and technical characteristics, which comprise the NGW.

The first pillar is the requirement to wargame at the speed of thought. This entails informed deliberations that embrace risk and consider alternatives and thereby produce convergent and divergent thought amongst the players. The key here is the creation of a rapid and fluid environment of creative abrasion in which ideas are generated, interact, are modified, and are

either incorporated or are discarded in part or whole as a collaborative result emerges. This dynamic of a rapidly emerging collaborative result will be supported by visualization and planning tools capable of portraying alternatives, consequences, and opportunities.

The second pillar is the necessity to maneuver knowledge … not manage, but maneuver. This entails the deliberate and timely movement of knowledge to a concerned agent for the purpose of achieving a reinforcing outcome. At first glance, this seems little more than the development of effective IT methodologies for the movement, display, and manipulation of ideas at the pace of generation. It is that, but is much more than the narrow search for a technical improvement.

Among other advantages, this pillar will be a vital component in the NGW as it is a proposed means of combating the emerging theory of reflexive warfare. Reflexive warfare involves conveying to a target information and impressions designed to induce a voluntary decision which is contrary to the target's interests (Thomas 2004). It is a method dependent upon a very sophisticated application of deception theory and entails the construct of a false image through a calculated distortion of reality (Ettinger and Jehiel 2010). However, it is more than simply the manipulation and reinforcement of perception to maintain an induced belief. It is actually an attempt to transition belief from one state to another and manage the resulting decisions by creating a behavior model in the target that can be controlled.

By using an integrated, multi-domain information warfare strategy, an opponent encourages the development of confidence in the target so that he believes that he correctly perceives the true nature and implication of what is being presented. Thus, the target is convinced that he is responding in an appropriate manner. This is an illusion that will be fed, the results of which will be exploited at a later stage. The opponent's intent is to inflict a loss of intellectual and organizational cohesion on the target that impedes a correct response to a situation and so reduces that response to irrelevance. Simply, an opponent intends to establish certain beliefs in the mind of his target, encourage certain actions, and conceal the deleterious outcomes all to the end of inducing a fatal loss of cohesion.

That said, every deception has at least one weakness in that, finally, it's not real. The maneuver of knowledge is expected to take advantage of this by exploiting the impossibility of maintaining the deception across a multi-domain battle space subject to continuous probing, interrogation, reporting, and countermeasures. The maneuver of knowledge will allow situational inferences and ascertainments of ways, means, and ends to be examined from various perspectives and will subject the emerging interpretation of a situation to a comprehensive and collaborative investigation for operational anomalies….all in an enhanced, dynamic, and distributed intellectual environment. The result is expected to be an organization's enhanced ability to fragment and penetrate a deception's image and to change, formulate, and initiate responses without the loss of cohesion. Failing that, an organization should at least be better able to tolerate a level of approximation and uncertainty if it fails to penetrate a deception. The measure of this outcome will be found in the results of in-stride adjudication.

What is in-stride adjudication and how will the NGW achieve it? A seminal white paper by Wiggins (NWC) lists four types of wargaming adjudication methodologies (Wiggins 2014):

1. Rigid Adjudication relies on strict rules and systems from which products emerge that provide the results of player interaction.

2. Free Adjudication is an interpretation of player interaction in light of experience, expertise, and history.

3. Semi-Rigid Adjudication is a combination of the previous two which mixes system results with expert interpretation to arrive at interaction results.

4. Open Adjudication relies upon the players themselves to consider the governing factors of a situation and produce an agreed upon resolution.

In fact, in-stride adjudication is the synthesis of all these methodologies in a hybrid form which permits the combined application of human judgment with MMT techniques driven by the specific requirements of a continuous, evolving, and dynamic wargame operating environment. In-stride adjudication is the resolution of the initial state-subsequent state problem based upon continuous, asynchronous decision cycles instead of simultaneous move submissions or a strict application of a particular methodology. Continuous implies that no discrete move limits the number or extent of actions possible; asynchronous implies that a

team advances its action at will until an opposing action denies a purpose or seizes the initiative thus forcing a reaction. In a word, in-stride adjudication resolves player interaction as it occurs, as many times as it occurs using a fluid combination of rigid, free, semi-rigid, and open adjudication methodologies.

Understanding this, the very act of in-stride adjudication becomes a means for considering the principles, methodologies, and implications of reflexive warfare. The measure of effectiveness of a reflexive warfare operation is the decision it induces. In a word, does the target do what the opponent intended? Reflexive warfare is not simply the action of establishing and reinforcing a false image, but, instead, it is a process which progresses incrementally and manages the evolution and migration of this image to induce a calculated end. Thus, in-stride adjudication's continuous and asynchronous resolution of a changing situation will provide a control team with the ability to know ground truth, understand, let's say, Red's reflexive strategy, observe Blue's developing interpretation, and monitor Blue's ensuing decision and its result. The effectiveness of the reflexive action and the target's susceptibility for or resistance to a loss of cohesion can thus be gauged by measuring the difference between what Red intended and what Blue did. This will permit a wargame to identify and explore the principles and methodologies of and the effective protocols to counter, reverse, employ, or exploit a reflexive warfare operation.

The NGW architecture supports this in-stride adjudication style and facilitates the maneuver of knowledge through a distributed and interactive visualization, collaboration, and information merging and manipulation capability. The NGW will achieve this hybrid methodology of adjudication by establishing a collaborative environment consisting of four elements (Fig. 1).

Fig. 1 Elements of the NGW Collaborative Environment

The Collaborative Gaming Engine is an assembly of touch tables designed to act as the stimulant for idea generation as participants consider propositions and creatively interact. This touch table arrangement is capable of generating and receiving organizational, COA, adjudication, fires, ISR, and logistics information. The Enabled Participant is the entity which either individually or as a member of a team will contribute thought and reinforcing outcomes to the problem through tablet connectivity. The Communication Hub enables the visualization, manipulation, and distribution of ideas in a fashion which permits both internal and external collaboration in the formulation of deliverables and outputs. The Wargaming Arena is a facility with an interactive projection system that permits control to present decisive points in the wargame's execution, conduct plenary sessions, explore excursions, and facilitate open adjudication. Finally, the entire Collaborative Environment architecture acts as a point of synthesis supported by a library of methods, models, and tools (MMT) which can be tailored to the specific requirements of a wargame. It is this arrangement which can permit the selection of MMT (maneuver, intelligence, fires, logistics, ISR, C2, etc.) needed to construct a customized

in-stride adjudication methodology and enables wargaming at the speed of thought and the maneuver of knowledge.

Key to in-stride adjudication is the Collaborative Gaming Engine augmented by the Wargaming Arena (Fig. 2).
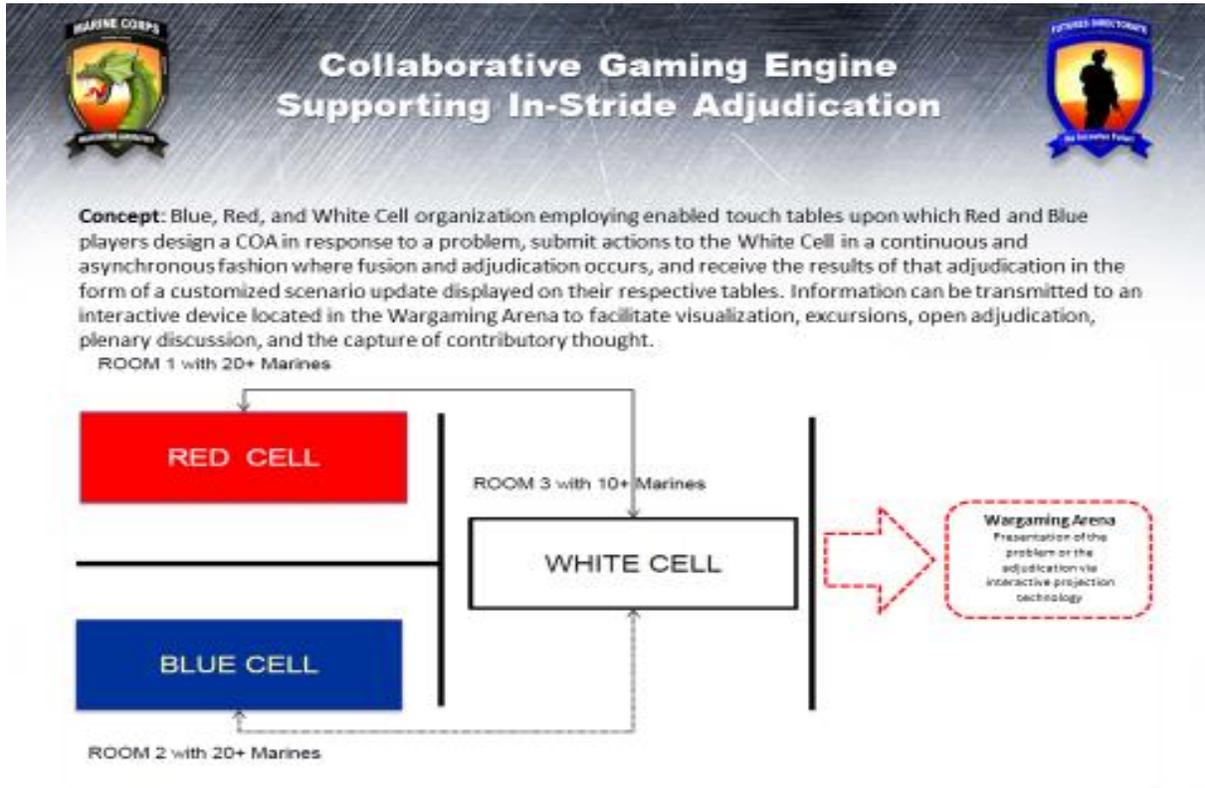
Fig. 2 Achieving In-Stride Adjudication

This arrangement of connected and White Cell monitored, managed, and controlled touch tables supported by appropriate MMT will permit the in-stride resolution of interaction and the customization of the results relayed to each team. These continuous, asynchronous decision cycles involving blended action-reaction-counter-action phases experienced by the players will encourage the making of estimates, assumptions, the calculation of risk, and action under the simulated pressure of operational tempo. Governing of this operational tempo is exercised through MMT designed to influence the pace of a wargame through the quality, quantity, completeness, and availability of information and resources provided. Game time can be actively modulated according to the phase, intensity, and duration of an operation. The Downes-Martin paper supporting the experimental development of the NGW provides a

perspective way forward in realizing this aspirational approach by suggesting a "monitor and intervene method" (Downes-Martin 2018b). This method permits an adjudication team to guide the flow of a game through the collection of information, the assessment of probabilities of occurrence and success, and the nonintrusive observation of evolving work in player cells. Subjecting player submissions to the adjudication process both resolves an action and permits control to customize its response in light of deception, ISR, logistics, fires, technical and communication denial, cyber-attacks, and combat results.

The Collaboration Environment's ability to host and facilitate in-stride adjudication addresses another theoretical concern buried deep in any adjudication process. Downes-Martin in an influential paper dealing with the "devil in the machine" identified two significant risks in adjudication (Downes-Martin 2013). Adjudicators' beliefs and determinations are usually not the subject of collection or analysis; these determinations and the player decisions they influence will provide the data for analysis despite evidence that the correlation is weak between decisions made in a game and those made in the real world. This problem is accentuated by the fact that assessments and resulting reports do not generally concern themselves with why decisions were made or not made and "what messages the players intended to send by their decisions and what messages were received, what behaviors they wanted to elicit from the other players by their decisions and what behaviors they instead obtained." (Downes-Martin 2013 p.75) These issues have a base origin in the beliefs that players and staff bring to a game, beliefs that shape the interpretation of information and subsequently inform estimates and decisions.

As real as these problems are, mitigation exists within the play of the game. To begin with, the time and manner in which players are immersed in the novel situation a game usually presents is not sufficient for a clear, persistent, and active distinction to emerge between what a player believes and what he decides. This is important because in a wargame players and adjudicators act as part of respective teams and the psychology of a team is different from an assembly of independent individuals. In fact, a team is far more capable than an individual in addressing the exigencies of a novel situation. A functioning team thrives not on conformity or in the harboring of individual interpretations, but on the debate and exchange which generates

alternatives and supporting rationale. Finally, a team will operate and arrive at decisions through the action of a process either provided by the design of a game or adopted from the deliberate planning routines that staffs invariable possess. These processes are forcing functions which will tend to aggregate individual judgement, decentralize but coordinate action, and ensure the consideration of relevant and actionable information. A sound process will illuminate more than it obscures and while what emerges is probably not the perfect action, it will likely be good enough. To the point, a process will insure that individual beliefs, prejudices, agendas, and inferences are subject to the crucible of scrutiny, creative abrasion, collaboration, and, through the NGW, collection.

This is not to discount the problem of the "devil in the machine", but to suggest that the dynamic of game play is a natural mitigation that can actually reduce the degrading effect on game results of individual beliefs, biases, and the ease of decisions made in the absence of real risk and consequences.

But, in acknowledging the "devil in the machine" potential, the NGW methodology of in-stride adjudication also acts as a mitigating factor precisely because it fashions a comprehensive and multi-faceted approach to adjudication which is dependent upon the collection, display, manipulation, and assessment of information and the visualization of collaboration. All of this exposes team lines of thought, estimates, alternatives, and rationale. It will be difficult for individual beliefs or adjudicator behaviors to escape collection and assessment.

The NGW is an attempt to generate momentum in game play. It posits continuous, asynchronous play at the speed of thought producing the maneuver of knowledge in order to promote intellectual exchange, creative abrasion, and collaboration among players and the teams they constitute. In-stride adjudication sustains this process by forging a union amongst the different methodologies of adjudication so as to act as a means of measuring how player participation changes the state of the game and how teams reconcile the encounter of situation and task. This synthesis of methodology, action, contributory thought, alternatives, and resolution aspired to in the NGW's Collaborative Environment will permit the study and assessment of the anatomy and the autopsy of game decisions … anatomy being the elements

of purpose, method, expectations, and desired end state that influence and comprise a decision; autopsy being the resulting outcomes, consequences, and responses to the evolving situation that define the force of a decision. NGW then becomes a point of synthesis combining the informed participant, the collaborative environment, in-stride adjudication, and an MMT substrate into a human centric, technology enabled gaming architecture and design configuration that offers a potential evolutionary path for the art and science of wargaming.

Thus does Ockham's Razor, a 13th Century principle of problem solving (Spade 2015), inform 21st Century wargaming.

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2.4 Challenges of In-Stride Adjudication

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Introduction

When we discuss games we always need to start by playing an obligatory round of "what game am I talking about?" Well I'm talking about free-Kriegsspiel, role-playing, conflict simulation games. I call these "professional games" to reflect the fact that most involve a bunch of professionals standing around talking to each other. This is a subset of the much broader field of "serious" games.

In professional games players pretend they are in charge of something, get together and discuss the situation, make decisions, tell control, something happens (occasionally conflict), and control has to decide about outcomes. They can be open or closed (double blind or not), may involve a lot of kinetic activity (blowing stuff up and killing people), and usually involve between 5 and 100 "professional" players who have experience in the subject being gamed.

And, yes, everyone's darling, the matrix game, falls into this category.

In professional games designers, controllers, and players need three things from game adjudication: speed, accuracy, and flexibility[3]. Game adjudication inevitably plays those three off against each other. The viewing public (sponsors, observers, etc.) demands accuracy[4]. Players want speed. And controllers need to be flexible enough to account for any number of

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[3] Players also want fairness but that is more a function of game control and facilitation than adjudication and we won't discuss it here.

[4] Different people bring different expectations regarding accuracy. That, and what might actually be achievable, is a completely different paper.

player ideas and shenanigans[5]. The more rigid and detailed the adjudication process is, the longer it takes[a] and the less flexible it is, but often it is perceived as more accurate. Fast, flexible, adjudication can be a significant challenge to execute fairly, in real time, in front of skeptical players, and it demands that controllers have a lot of knowledge and skill.

So how do you get speed, accuracy, and flexibility during in-stride adjudication? You do it by defining systems, controlling time, parsing shenanigans, and representing the environment. I'll explain what I mean by each of these, and how adjudicators deal with the challenges they present.

Defining a few more terms

Unfortunately we need to play a second round of the definition game.

Throughout this paper I refer to game control and adjudication. In my way of practice game control is the individual or individuals who work directly for the sponsor of the game and attempt to execute the vision of both the game designer and the sponsor. They are in charge of all aspects of the game, from game flow to adjudication. The specific act of adjudication is exclusive to linking actions to outcomes. But sometimes this blurs. The farther away from physical effects you get the worse this blur becomes.

For strategic policy games adjudication may include how organizations not played in the game act, react, or feel about player actions. Sometimes it means that the adjudicator is determining whether an action is even going to be allowed, much less adjudicated. This blur between control and adjudication is worse in games with in-stride adjudication because everything happens fast in the game.

In the real world the adjudicator can take on many forms. It could be a group of experts, a model system supported by multiple adjudicators, or it might just be part of control: in some cases it may be the game controller. In my way of thinking the adjudicator is someone or some

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[5] Here I use the term "shenanigans" to mean oddball ideas that the players come up with during the course of the game. "I put a couple of Osprey's on a freighter and go steal their primary encryption device to allow me to read their communications." is an example of a shenanigan. It does not include deliberate attempts to corrupt or derail the game due to player or other's agenda

process that knows enough about what is going on to link actions to outcomes. And it does this in a way that most of the participants, observers, sponsors, and controllers will believe.

I should also mention how I understand the idea of "in-stride adjudication" vs. "off-line adjudication." In-stride adjudication, in my view, is simply defined as "not off-line adjudication."

In off-line adjudication the adjudicator stops game progress, retires to some location and determines the results of player actions. Results are then presented to the players and the game resumes. The results are determined by any number of arcane activities including models, argument, or scripts, depending on the game design. The action, or what I call agency, moves from the players to the adjudicators, and the players neither participate in nor observe the actual adjudication.[b]

The important point is that the adjudication process transfers game agency from the players to the adjudicators/controllers. This does not mean the players are not doing something useful: they could be planning, worrying about the outcome, preparing the outbrief, or any number of other tasks. However they are not engaged in the play of the game, they lose agency, while the controllers take the sole agency in the game. If the adjudication were done in front of the players, or by the players themselves as occurs in a rigid game, then the players would still be participating in the game. However the loss of agency by the players removes them from game play, leaving them subject to a whole lot of concerns and problems (such as whether they are being treated fairly).

While off-line adjudication is quite common in professional games, there are not a lot of hobby examples where this occurs.

For in-stride adjudication there is a relatively short and mostly continuous time period between player decisions and the presentation of the results of those decisions. What "relatively short" and "mostly continuous" means for you will depend on what games you assign into which camp. I draw the line at off-line adjudication because I think that off-line adjudication takes forever, bores the players, slows down the game, and is generally bad.[c]

In this definition of in-stride adjudication players never completely lose agency, because even spectators to an adjudication can at least throw stuff and cause trouble. They also get to assess first hand whether the adjudication is going well or not.

This is a key point: if in our definition of in-stride we focus on time then there is a continuous spectrum of adjudication techniques almost all of which cause some pause in player actions while player actions are resolved. Even in the most "in-stride" sounding game possible, a live action role-playing game (LARP), the action has to pause while someone sorts out who is dead and who is still alive. It may simply be for a card play or die roll, but you're not playing while you're rolling. You're adjudicating.

What distinguishes in-stride from off-line is the loss of agency for the players. For off-line players stop the actual play and engage in other activities related to the problem, and the pause creates a discontinuity in player agency in the game. Otherwise why would any game that has a period of adjudication that pauses player actions be in-stride? In that case the only games that would be in-stride would be those where play continued (somehow) while results of player actions were determined.

Because I have taken a very inclusive definition of in-stride adjudication, one that focuses on the relationship of where and how adjudication is done relative to the players, and the factor of player agency in determining what constitutes in-stride, there are other characteristics that I associate with in-stride adjudication:[6]

- The players get to observe the adjudication, and, in some types of games participate in the adjudication (for example, matrix games).

- In-stride professional games can include player and observer expertise in the adjudication process (again, matrix games).

- The overwhelming emphasis is on speed and transparency in adjudication, in order to keep the players interested in the game (i.e. playability).

These characteristics are seldom found in games using off-line adjudication.

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[6] And in these characteristics I have the game pausing for adjudication and the players helping. Isn't that the same as off-line adjudication? Again, I argue that off-line adjudication has a location component where adjudication occurs away from the players and the players engage in other activities while adjudication occurs. This is why I believe that the characteristics I list here are so important to a comprehensive understanding of in-stride adjudication. It is also why I draw the line at off-line adjudication when I define what in-stride means.

The attached graphic illustrates this continuum.[d]

Off-line

Adjudicators deliberating somewhere else

Players doing stuff other than playing the game

I draw the line here

Turn based rigid — Play alternates between planning/decisions and action

Turn based Free — Play alternates between planning/decisions but players watch or participate in adjudication

Role playing game — Play still alternates but adjudication is event driven

Continuous game — Play is continuous, adjudication fits in

Degree of discontinuity in play

Where do you draw the line between in-line and other forms of adjudication?

If it sounds like my vision of in-stride adjudication has a hapless controller standing up in front of tens of battle-hardened experts who are heavily invested in their roles, the game, and the outcome; and presuming to tell them what happens while at the same time keeping everyone from physically ejecting said adjudicator from the room: you are correct.

So how do in-stride adjudicators define systems, integrate with time, parse shenanigans, and represent the environment? I'll discuss each one in turn.

Systems

"Systems" refers to things that obey the laws of physics, or have a sufficient complexity below the resolution of the game that they effectively act like physical objects, including social systems. You usually know they will be part of the game when you design it. So, for example, designers of a modern naval game would know that missile salvos would be exchanged in a complex electro-magnetic (EM) environment and they would need to have some way to account for those effects.

Unfortunately for the adjudicator there are lots of different kinds of systems. This can make the problem of in-stride adjudication complex, as the adjudicator is trying to get the job done as quickly as possible, while the complexity and proliferation of systems creates friction that slows the process down. Since the less well defined the system is, the "messier" it is, can increase the complexity of adjudication we can divide systems up according to how easily outcomes are connected to actions.

Clean systems

Clean systems are basically anything where we have some sort of believable[7] data on how they affect whatever it is they are fired at. You can build a table or spreadsheet of possible outcomes. Examples of clean systems would be things like missiles, torpedoes, rockets, bombs, or artillery. We have a pretty good idea how they work, and we may even have some test data.

These systems are pretty easy to handle. Look up the single shot probability of kill (SSPk), do some math, apply the results. Even better, make up a spreadsheet ahead of time with the numbers on it, then wave the spreadsheet around as you make your calls. Players respect spreadsheets.[e]

They key question on clean systems is how to implement adjudication given the need for models and data. There are several options:

- My favorite option is to off-load it on an expert in the system. I routinely do this for stuff I'm not very smart in, for example anti-submarine warfare or space. I get someone with vast experience in ASW, and have them adjudicate the ASW piece using whatever sorcery appeals to them. Presto! Problem solved! Of course they use any of the other techniques I'm going to talk about, I just don't have to bother with it.

- Pre-load the data into reasonable look-up tables.[f] In general you know, based on the type of game, what's going to happen. Naval games will probably involve someone shooting missiles at a ship at some point. Air games will involve similar shots at aircraft. And so on. Pre-calculate what you need, say number of missiles inbound vs. probability distribution of hits, and that means you can just look it up when the time comes. If you are really hurting for time you can just pretend to look it up and it will look all official

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[7] Some analysts confuse "believable" with "true." All I care about here is that the data or sources are believable enough that the critics will shut up, at least temporarily. Most of the data that we have from test ranges is "less than adequate" when applied to real world use of weapons. However since a lot of people believe that test data is "accurate" I'll use it until someone actually shoots the missile in anger.

anyway. This is great for the cleanest of examples, missile shots, but quickly gets messy the more variables that become involved.[8] The key here is to manage the number of variables you pre-calculate so that you don't get lost in the tables when it comes time to use them.

- Abstract fixed probabilities. This is helpful when you don't much care about the details, or when you're dealing with new or future systems. You make some assumptions, set a probability based on the data you have, and go with that.

In all of the above there is a universal solvent that can be applied to make your life easier: let the players have input. Also known as matrix-style adjudication: or adjudication using matrix game techniques. This gives the players agency in the game, even while adjudication is occurring. This means that the players are continuously playing the game, it's just that they drop down a level when adjudication occurs. Obviously there are many subtleties and techniques associated with this style of adjudication, which I can't get into here. But it is a very powerful technique in the right hands.

So how does this match with our three key variables: speed, accuracy, and flexibility? Pre-loading data gets you both accuracy and speed, and engaging the players requires you, and the players, to be flexible. Engaging the players also can increase the perception of accuracy in the game, and the players' sense of fairness. By having more inputs accuracy in adjudication can also be improved. Especially when some inputs are from experts. Of course clean systems are the easiest to make accurate adjudications about; it only gets worse as you go along.

Aggregation of systems

Then there are aggregations of systems. Aggregate systems are clusters or groups of systems where the outcome of an event is not clear or far more difficult to predict in a range of circumstances than it is for clean systems.

A brigade combat team is an example of an aggregation of systems that we often have to deal with. While we may understand how an individual tank or rifle works, and may even have

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[8] I contend that the unknowns and error bars on much of what we try and "simulate" with math are so big that there is little difference between guessing and using "data".

an SSPk, we need to understand how 100 rifles work together to achieve an effect in urban terrain. SSPk's won't help much here[9].

The most common way to deal with aggregate systems is to develop some sort of parameterization of the units offensive and defensive capabilities, then compare these between systems when predicting outcome. The cleanest example is the combat results table (CRT). Parameterize the unit's offensive capability, whether through firepower or the 3:1 attack to defense ratio required for success in a hasty attack against a prepared defense, and build a table or spreadsheet that determines both side's losses (or other results). However if you conceive of these systems as inflexible oracles, then modifications, changing tactics, or player arguments can greatly complicate your life as an adjudicator.

But if you treat these systems as flexible suggestions for adjudication you can use them as creative springboards. If you suddenly need the outcome for a weird fortification you can see what the CRT says, you know how its modified for a fortification, so modifying it for a hasty fortification in the middle of an adjudication is a lot easier than making everything up from scratch.

Again, in-stride adjudication requires that you give the players a sense of consistency (accuracy) in your decisions, and tables, charts, or other such pre-calculated values will give them that perception. Pre-calculated values also speed things up compared to some sort of detailed resolution or model that will take way too long to input the information each move.

Mystery systems

Finally, there are "mystery systems". These systems don't have a clearly understood set of operational data, or, they are so complex or specialized that the controller does not have enough knowledge to clearly adjudicate them. Even if knowledge were available the "experts" would probably disagree about any particular outcome based on their individual expertise and experience.

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[9] You can easily argue that SSPk is not the best way to characterize clean systems either, but it's more believable and until someone gives me something that is as fast and acceptable I'll use them.

I include in this category systems that are clearly understood but that the adjudicator does not understand very well. This could be from an actual lack of understanding, because of classification reasons, or because the data is not available in time for the game. An example of this for me this would be space. I don't have an intuitive or detailed enough understanding of orbital mechanics, space TTP, or space systems to be able to do in-stride adjudication of space issues. For other controllers this may be a different set of technologies or operating environments.[10]

We can divide mystery systems into those where if enough expertise was brought to bear you could move them into the clean or aggregate category (for example, space, classified systems, communications systems[11], or anything else that is a mystery for some reason) and those where there is simply not enough data or models in the world to be able to solve the problem (SOF blowing up bridges, future weapons concepts).

Defined systems are relatively easy: get an expert, or become an expert. Do not rely on rules an expert creates, professional players are much too clever to not find ways to go beyond any fixed rules sets. And in the middle of in-stride adjudicating the last thing you want is to suddenly fall off the rules map.

I'll add that from the perspective of the controller standing in front of a bunch of irritated players, the defined and undefined mysteries don't look very different.

Lets take my favorite example of an undefined mystery: SOF blowing up bridges, and use it to understand mystery systems. Blowing up bridges is a lot more complicated than it would normally appear. "I send my ten SOF teams in to blow up the bridges" is a simple order for a player to give but complex to adjudicate. I have added the additional complexity that this is an

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[10] The biggest problem occurs when an adjudicator thinks they know something but they really don't. Being honest about your capabilities, and gaps, is an important part of being able to do in-stride adjudication. For example, I know just enough about space to get myself in trouble when a real expert is in the room. So, I'd prefer to offload that whole problem if I could.

[11] In fact, I'm talking about two kinds of things in the "defined" category. Those things that are a mystery to the adjudicator, and things that are a mystery to everyone. Space is not a mystery to lots of people, but it is to me. Future systems are pretty much a mystery to everyone unless they have reached initial operational capability (IOC). And even then...

aggregate move, there are ten bridges as targets, which may not allow the controller to adjudicate each one individually due to time constraints.

Breaking the effort down into elements will show that there are a lot of different components to this problem, from infil to bypassing guards, to enemy actions, to exfil. That is a lot of stuff you have to figure out. I'd contend that some elements are extremely difficult to figure out without a dedicated game, and then they will have a wide variance in outcomes due to the specific circumstances surrounding each bridge. Expand this across a theater and it becomes extremely unwieldy.

So how do you handle mysteries? You have to estimate. My preference is to have a set of pre-scripted probabilities associated with common characteristics. For example I label things as: impossible, hard, difficult, normal, easier, very easy, simple. The adjudicator, working with the players, decides how hard it is for the unit to execute the task. Blowing up bridges might be difficult under normal circumstances, but harder if guards were present. Difficult might mean a 30% chance of success, reduced to 20% if guards were present. Or even 10% if an entire BCT command post were parked next to it.[12]

And, yes, this is very similar to what happens in a matrix game. That's one reason everyone loves matrix games so much.

I also never say something will never, or always, happen: stuff happens in war. There is always a small chance of success, or a small chance of epic failure.[g]

Time

Time refers to how the controller manages the relationship between real time and game time. This is not normally considered part of adjudication, rather being part of game design and control. However, in games with in-stride adjudication time becomes another tool that the controller can use to facilitate game adjudication. They can slow it down, speed it up, or stop it

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[12] I would not argue if the players suggested the presence of the BCT command post increased the probability of success by 10% …

in order to examine important, fast moving, situations that require particular care. In some cases, they can even reverse it.

I'll divide the issue of time into

- Game time.
- Real time.
- Rhythm and flow.

Game time

The way time is managed in the game can have a significant effect on adjudication requirements. In modern warfare things move at a huge range of speeds. From space (super fast) to missiles (very fast) to aircraft (fast) to ships (moving) to ground units (slow) in a combined arms game there will be a wide range of speeds to consider. There is also the speed of command and control. Just because radios work at the speed of light does not mean that the Joint Forces Air Component Commander (JFACC) plans at the speed of light.

Managing adjudication at the different speeds of warfare can become a significant challenge. And in-stride adjudicators lack the "strategic pause" in game play where they can figure stuff out in great detail. In-stride adjudication has the added time pressure of real-time adjudication. While air units will resolve quickly in game time, ground units will essentially be standing still. However the outcome of the air battle will determine the success of the ground units. And more air could get pushed in despite losses.

In order to keep from going crazy the game design usually specifies a move time length where all the units involved can have something significant happen. If you don't do that either the ground players will have to wait many turns before they get to do something, or the air players will have to cram dozens of actions into a turn.

If you go for longer turns, say 3 days turns, you will lose perceived accuracy in the air battle as it is quite difficult to figure out how to resolve modern air combat across multiple sorties, theater wide, with detailed logistics, electro-magnetic maneuver warfare (EMMW), and kinetic effects. If you go for shorter times, some players will be bored. You can't win.

There are no good answers to this effect of turn length on adjudication. In terms of in-stride adjudication it puts pressure on the adjudicator to either be very fast for many quick turns, or

deal with the complex realities of longer turns that integrate across multiple tactical events. It is possible to integrate across tactical events: you can abstract with combat strengths, you can set out a typical sequence of events, or you can simply set a results table that tells you if Blue does "a" and Red does "b" then here are the casualties. The challenge with any of these integration techniques is that clever players can come up with things that break the system, pushing you back down the curve on perceived accuracy.

Real time

In the previous section I discussed the problem of game time and how it affects decisions that the adjudicator will make. The other challenge is dividing the real time of the game up into segments. There three basic ways that games can manage real time. Game designers can either run a turn-based game, event driven game, or a continuous time game (rare).

In-line turn based games tend to have the adjudication done in front of the players, either by the players themselves (rigid) or by the adjudicator (free). The adjudicator in a free-Kriegsspiel game collects the player plans, and then works through the consequences with the players.

In a turn-based game the adjudicator has the chance to figure out what the players may do by listening into their plans during the planning phase. In fact by listening in the controller can fix some basic adjudication issues early ("no, you can't launch the tankers, they are still in the recovery phase of their cycle"), which can make the in-line adjudication more streamlined.

The biggest challenge for the adjudicator in an in-line, turn-based, game is that they are literally playing a theater in the round. There is no place to hide from anyone, decisions need to be made on the spot, and challenges are public. You need a lot of fortitude to be able to stand up to questions from the players (and others) regarding your adjudication. You also need considerable knowledge and understanding of the systems and events involved. But I never said adjudication was easy.

Event driven

In this form of game design time is managed by events, the players don't get together and brief each other, and information is passed between players or player groups through control

or other player actions (for example, media players). Adjudication occurs along with everything else—as decisions are made the adjudicator is brought in and works with the players to build the outcome to their decisions. The results then become part of the game world. This kind of game format is most common in policy or political games.

In a small game the controller will also be the adjudicator, and they will simply walk around keeping everything on track and adjudicating as necessary. As the number of players grows this can become unwieldy, and a command organization for game control may be established. This can cause innumerable headaches for adjudication as different adjudicators may decide different things, and coordination amongst the adjudicators becomes increasingly important.

The separation of player groups removes the "theater in the round" effect as players only rarely congregate, and in most cases adjudication does not occur during those collective meetings. Instead players hold conferences amongst themselves or get updates on game play.

But this does create the "tiny bubbles" effect. Because adjudication is spread across player groups, locations, and possibly different controllers/adjudicators, different "pocket games" suddenly emerge. Reality in these sections of the game can diverge, resulting in some player groups working on "incorrect" information about the game world. The way to manage this problem is to have a strict chain of command in decision-making, a lead controller who is constantly monitoring the game, and adjudicators who are committed to keeping each other on a consistent storyline.

Multiple worlds may work in comics but it can collapse a game.

Continuous

This is a rare form of time management where the game runs continuously with a "fast clock" that relates real time to game time. This is the extreme case of in-stride adjudication as there is no interruption in game play during adjudication.

Here the big challenge is speed for the adjudicator, as well as dissemination of results quickly so that the adjudication can keep up to the movement in the game. Clear timelines, tables, and other adjudication tools are critical to keep everyone moving on the same timeline.

A big challenge in these games is for the adjudicator to simply keep up with the speed of the game. Adjudication needs to occur very quickly in order for players to understand and react to what is going on. Slowing the game down actually can screw up play, so adjudication becomes all about speed. The risk is that as the speed or number of player decisions gets faster and faster the adjudicator becomes like Lucy in the candy factory: they can't keep up and the game becomes unmanageable.[h]

There's a reason why we use turns in most games.[i]

Rhythm and flow

In the previous sections we dealt with how the schedules of the game and players affect adjudication. But control considerations can also come into game play, as is the case when the sponsor wants certain sections of the game to go fast. They almost never want anything to go slower.

In considering rhythm the controller/adjudicator has to balance:

- Game requirements: how far into game time do you need to get.
- Complexity of player actions and their satisfaction that their actions are taken seriously.
- Fatigue of everyone involved, but particularly players. This is a big consideration in long (week or more) games.
- Game objectives. If objectives are not being met, or an in-stride redesign must occur, how do you manage that?

The controller has to think about all of these considerations when deciding to speed up or slow down the game. In some cases it is important for the players to have a long discussion because they are directly addressing game objectives, need the time to develop a complex argument, and simply cannot be pressed to go fast. At other times the players are done and things need to move along. Flexibility in control provides the ability to have variable turns, even though the plan calls for 2 hours per turn.

How does this relate to adjudication? Well adjudication can also be sped up or slowed down for many of the same reasons. There are two ways to speed up adjudication: make the

adjudicator go faster, or take bigger steps in game time. Either way the adjudicator is trying to cram more adjudication into a smaller bag of time.

Going faster requires that the adjudicator:

- Know the subject cold. You can't speed up if you don't know what you are doing. Sounds easy? Well that depends. If you are simply doing weapons effects, then, yes it might be easy. But if anything comes up that is demanding then it can get very difficult to juggle. You have to make decisions, but you don't have time to consider all the "yes, buts..." and cunning plans that may come up. Accuracy will suffer.
- Aggregate decisions. This is the easiest way to speed up, but aggregating results means that things players expected to be resolved in detail, like missile shots, now become an aggregation of shots that are generalized.

Bigger steps in game time will mean that more and more things will become aggregated. At the limit what happens is that the players will give the controller/adjudicator a general idea of what they want to do (say over the next few months of game time) and it will be up to the adjudicator to fill in the blanks of what happens during that time.

As the time steps become bigger the agency of the adjudicator overtakes that of the players in the game as the adjudicator begins interpolating between bigger and bigger time jumps. At the limit there is zero player agency and the adjudicator simply becomes a storyteller.

The act of adjudicating involves interpolating what happens at lower levels of detail between player actions and game time jumps. We just interpret it as models, and events, and resolution while in reality the adjudicator is playing a different, more detailed, and finely resolved game while the players stay at a higher level.[j]

This dovetails with Stephen Downes-Martin's concept of game control as a player in the game (Downes-Martin 2013). Stephen views Control as a player in the game due to the type of decisions that control makes regarding sequence, resolution, and information (see the Environment section below).

Here I'm extending Stephen's concept to say that any sort of adjudication is play because the adjudication is simply filling in game play between the time steps of player decisions. Agency in game play is being transferred between the players and the adjudicators throughout

the course of the game. How much agency the players retain relative to the adjudicator is a key element, for me, in defining in-stride adjudication.

Shenanigans

Shenanigans refers to anything that either goes outside of what the designer predicted, or simply cannot be modeled given the resolution of the game, the physics involved, or the complexity of the situation[13]. This may sound a lot like a "mystery system" and it is. The difference between a mystery system and a shenanigan is that for a shenanigan the adjudicator has to determine whether the action should even be allowed as opposed to determining the results of the action.

So SOF blowing up bridges is perfectly feasible, and, if the player has command of a SOF unit capable of blowing up bridges, fall within what you would normally expect as an adjudicator. The player trying to launch the space shuttle in the middle of a wargame devoted to operations in the Middle East would fall into the category of a shenanigan.

I have found that shenanigans often begin with one of several statements by the players:
- "I'm putting my SOF on an airplane/submarine/ship/merchant ship/kite/etc."
- "Come with me, I need to tell you something..."
- "I'm blowing up..."
- "I'm dispersing my..."

The player shenanigan is within the scope of their possible actions. However the action drifts towards the implausible: as in "no normal person would do this, only a gamer would do this." The general intent with a shenanigan is to "get something for nothing" where the player has determined a way to get around whatever practical problem they face through setting up some sort of stratagem that relies on cunning, timing, or deception. While it's important to note these decisions, the question of whether to include them in the game can be complicated. To include them often means that game objectives will be disrupted. To not include them

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[13] Note that I am not talking about something that comes in from outside of the game world and is designed to disrupt or skew the game. For example, if one of the organizations in the game did not want a particular system to look good, and thus did not use it in the game, or used it badly. I would see that as disruptive behavior that would be on the designer or controller to deal with, but is not inherently part of adjudication.

means the players will be frustrated and disappointed. The controllers and adjudicators will need to be careful in how they consider them.

The most common example of a shenanigan is some sort of covert action that reminds you more of James Bond than current operations. SOF covertly infiltrating an area and launching rockets at enemy airplanes on the ground. Destroyers using deceptive tactics so they can sneak up on the enemy. Blowing the locks on the Panama Canal (a classic). Getting hold of an alternative to the current threat government and using them to make a claim to legitimacy. Breaking communications encryption. And the list goes on.

Shenanigans often have the unfortunate attribute of being low probability, high impact game events. If you let the threat get away with blowing the locks on the Panama Canal, there will be no reinforcements for three months. And Blue might lose. This can significantly alter the overall structure and impact of the game and needs to be considered carefully.

Thus shenanigans add the question "should you?" to the typical adjudication question of "what happens"?[14] I believe there are a series of tests that the adjudicator/controller has to go through when considering a shenanigan.

First, there is the question of why the players are doing it.

If the action is designed to disrupt, trivialize, or lighten up the game the controller/adjudicator has to be extremely careful in how they deal with it. It is often an indicator that the game is not under their control anymore, and the players are beginning to rebel against whatever is going on. This is often indicated by actions that are silly, humorous, or just plan stupid.

The controller has a bigger problem here than just adjudication, and this shades over to facilitation. In general the controller has to address whatever the underlying problem is, and

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[14] And it is this question that leads Stephen to consider adjudicators as players instead of blind arbitrators. I disagree. I believe this is a simple question of relating player actions to game and sponsor objectives, and can be handled objectively by responsible controllers. It is the other factors, adjudication of lower echelon actions and control of the environment, which, in my opinion, puts adjudicators and controllers in the player category.

how they adjudicate, or whether they allow, the particular action is simply a part of the overall process of fixing the bigger problem in the game.

Still, adjudication has something important to contribute. Using adjudication to put the game back on track is one of the best ways to deal with a derailed game. Picking the outcome, the facts surrounding or leading up to the outcome, and the way the outcome is packaged and presented can do a lot to deal with player problems. Referring to in-game adult leadership as in "the President won't let you do that, they don't want to risk escalation" says there is adult leadership, and the game takes it seriously. The best way to do this is for the adjudicator to work closely with the facilitator and controller to integrate all aspects of game control.

Assuming that the shenanigan is not simply an indicator of the game going sideways, then the adjudicator has to figure out what it will do to the game. Shenanigans often are designed for "instant victory." You probably did not bring together 100 people for three days to have the whole thing be over in the first few hours.

On the other hand players don't always come up with shenanigans simply to see if they can get away with something. Most of the time they are seriously trying to think through the situation and gain an advantage. In dealing with these sorts of problem the adjudicator is a long way from the systems-based, rigid adjudication we discussed in the beginning.

In general the adjudicator can figure out a reason to deny the action, let it execute but dilute the results (the locks are only partially damaged), or figure out a way to have it believably fail. Assigning a probability to the action can do this. Or for the controller or adjudicator to simply decide whether the action advances the game objectives. Though this can be risky in in-stride adjudication because the adjudicator may not have time to carefully consider the action's implications, and if it is done transparently an arbitrary decision can seem...arbitrary.

If shenanigans are not an indicator of something bigger, then the best way to answer the "should you" question is within the context of the game. Low probabilities, watered-down outcomes, or unexpected difficulties can be used to limit the overall impact of shenanigans but also give the players a sense that their ideas matter and are being accounted for in the game.

This allows the player action to be noted (might want to think about guarding those locks!), have an impact (no fuel for two weeks!), but not derail the game (Blue wins again!).

Environment

As I went through this I began to realize that "adjudication" in most games means more than just telling people what happens after they pull the trigger. Adjudicators have to deal with a lot of stuff that goes beyond systems. This includes how organizations, individuals, and random groups might react to player actions. There are no tables, models, or ways to assess this that don't involve simply making stuff up. But they are still a part of adjudication, and seem to occur a lot more during in-stride adjudication than in other types of adjudication.

One of the most dangerous elements of in-stride adjudication is giving players results that will substantially change the course of the game. These kinds of questions generally come up in terms of permissions, authorities, and resources, or in special types of games that involve all-or-nothing actions.

In the first case players will often ask, and sometimes need, information on permissions, authorities, or resources in order to know how to proceed. At the extreme example is nuclear release—if you give NCA permission for nuclear release then the game will take a substantially different turn. This is a gray area where adjudication intersects game control. Is the decision relating player actions to results? Or is it simply a question about the scenario? For in-stride adjudication it really is a little of both.

In-stride adjudication requires that the adjudicator consider the game control and facilitation when making decisions about the game environment. NATO, for example. Assuming you don't have the usual former ambassador playing NATO then control has to adjudicate NATO's position regarding any number of things. Will NATO intervene? What does the North Atlantic Council (NAC) think? Do individual countries support the overall decision, or did they just vote yes to appease the United States and will pretty much do nothing more?

Dealing with policy adjudication, such as NATO, depends both on the perceived reality of the NATO policy and decision-making process as well as the underlying objectives for the game. If NATO, for example Turkey, does not grant basing access to the United States the operation

may be challenged to support itself, launch enough sorties to matter, or even get access to the airspace in question. This could, again, make for a short game, even if it might be realistic.

The problem for in-stride adjudication is that these questions can come up quickly, and are easily dismissed by a quick answer. Unfortunately quick answers are exactly what some players want from control, because they are asking leading questions that will drive the game in one direction or the other. In most cases players are simply trying to gain a competitive advantage, which can be good if it means the players are engaged in the game. So the adjudicator needs to balance several different factors: speed of adjudication, getting it right and not being rolled by the players, and keeping the players happy and engaged.

The ability to manage time becomes useful for the adjudicator when confronting the quick question. In real time there are no requirements that questions have to be answered immediately. Adjudicators can think the problem through, or consult with experts. This also has the advantage of letting the players know the adjudicator is taking their action seriously. Dismissing something after some consideration is different than a quick, off the cuff, dismissal.

In game time the question does not necessarily deserve a quick answer either. In most organizations it can take a long time to make an important decision. It could be several days to make a policy decision, as the question is brought up, staffed, and briefed out. It could take even longer for NATO to make a decision. An adjudicator can use that time delay to push decisions forward, or even out of the game, so that the game can address the issues it was designed to address.

Is this manipulation of the game results? Well, yes, yes it is. There is a difference between realism, honesty, and effectiveness. For a game to be effective, sometimes the adjudication has to sacrifice accuracy and realism in order to get to the game objectives. Not in terms of physics, but in terms of the human decisions that occur in the game context. For example, if we simply left it up to the players (or politicians), we'd almost never have a great powers war. Great powers in the current period just don't want to go to kinetics indiscriminately. You have to push them together. Unrealistic? Yes. Effective? Yes, if you want to have a wargame.[k]

So why does all this matter?

If "in-stride" adjudication simply means that the results of player actions are dealt with quickly and in the vicinity of the players then most games, from Dungeons and Dragons to War in the East, fall into the "in-stride" category. It's not so much whether you use in-stride adjudication, it's what you do with it. In the previous sections I've given some ideas of the ways you can deal with adjudication challenges in a fast-paced, real-time professional adjudication environment. The overall goal is to keep the game moving, but not be so inaccurate or slapdash in the adjudication that no one believes the results.

You can do this by:

- *Preparing ahead of time.* Whether that means an experienced, and knowledgeable, adjudicator/designer/controller or quick-read cheat sheets, preparation helps, a lot.

- *Involving the players.* This has the benefit of getting knowledge from many different people, some of whom may be expert in the subject matter. But more importantly it gives everyone in the room buy in as to the adjudication results. This keeps the game moving, increases player (and adjudicator) satisfaction, and engages the players.

- *Abstracting when necessary.* Some things are just not very easily known. Things like SOF operations. For those you have to "roll up" the adjudication and make a reasonable estimate on probabilities of success.

- *Simulate the environment.* Adjudication is not all probabilities of kill and kinetic fun. Sometimes politics is important in a game. Knowing how to adjudicate things like rules of engagement, foreign entity actions and policies, and third party actions is also integral to adjudicating professional games. You need more than a spreadsheet; you need to understand motives, objectives, and tools of power available to your actors.

References

Downes-Martin. S. (2013). Adjudication: The Diabolus in Machina of War Gaming. *Naval War College Review* 66:3. http://digital-commons.usnwc.edu/nwc-review/vol66/iss3/6/

Discussion

[a]   Peter Pellegrino
Maybe yes, maybe no. I think it depends on the adjudication team. A group of gaming professionals with a rehearsed process may be able to use CRTs faster than a group of pick-up SMEs who spend a protracted amount of time arguing over the answer.

[b]   **Peter Pellegrino**

This is a better description than my vague sense of "play" vs. "not play."

Ed McGrady

I do think our ideas are very convergent here. I also think this idea of agency in the game – as it's passed around between players, the system, and control – is something worth thinking about a bit more.

[c]   **Peter Pellegrino**

This is why we generally try to do off-line over lunch or at night. Of course, this essentially limits us to only two 'moves' per day.

[d]   **Peter Pellegrino**

Where does a running time (continuous?) game with off-site adjudication fit? Is that still covered by your Continuous Game where "adjudication fit in" even if it is out of sight?

Ed McGrady

It would be off the left side of the diagram, worse than on-site off-line adjudication. The players would have no chance of interacting with control directly (mediated interactions pose their own set of issues). But I'm less concerned about where it happens than I am the degree of agency retained by the players and how long they lose it. The key issue for off-site would be that whatever limited agency the players had would be further degraded by mediated communications.

[e]   **Peter Pellegrino**

I'm currently in the process of making several 'generic' spreadsheets that handle common types of interactions with a user friendly interface that can be populated with whatever data you have.

[f]   **Peter Pellegrino**

You either spend the time before the game to build tables/process, or you spend the time during the game to figure out the answer, but you're going to spend the time.

[g]   **Peter Pellegrino**

One of things I've been trying to formalize of late is the process of "goal posting" which is similar in aim to much of your systems discussion. Broadly speaking, it starts by setting a "most likely" probability that a system will "work." Then identifying all the "factors" that influence that outcome, dividing them to the left and right of the center probability, for negative and positive influences respectively. Then we divide the factors in terms of whether or not the player has any ability to direct manipulate or influence the factor, given their role in the game. Those are the "above the line" factors, with the rest going "below the line" and more or less aggregated. Based on this we determine what the left most goal post is in terms of how badly the system might perform, and the right most post for how well in might do, with the center being what you should probably expect most of the time. We then list the modifiers which could drive the answer to the left or

right, but not necessarily by how much (depends on how well the system is understood). We then provide these goal posts to both players and adjudicators.

We held a workshop for the expressed purpose of making the goal posts ahead of a large game we held in 2012. Worked well, so of course we stopped doing it.

Ed McGrady

I'm obviously borrowing from RPGs where there is a critical hit (or failure or running out of ammo or similar). My thinking is that there are factors that occur in any real situation that are completely out of left field for the people participating in the event, and we don't do a great job of simulating that. An example might be Desert One/Eagle Claw where the planes collided in the desert. Or the pilots captured in the Balkans, or the warlord not being home that night, or whatever. Capturing these high impact but low probability events in games is both tricky (you don't' want to derail the whole game) and difficult (exactly what is the event?). I believe most of them are very situational dependent, so if the die roll is epic (good/bad) then the adjudicator applies it to the current situation (hey, the magazine blows up!)

[h] Peter Pellegrino

We did this (barely) for a game where info (moves) were coming into adjudication on digital forms that could be sorted and routed by a team of department faculty via large network-connected touch screens, like meal orders coming into a kitchen, where they were continuously sequenced, adjudicated and routed back to the players. Absolutely NOT something you could pull off with a pick-up team of SMEs.

Ed McGrady

We did it by carefully using timelines - something that in itself is not used a lot in games - and having dynamic control. Eventually we still went back to (really short) turns because it was driving me nuts.

[i] Peter Pellegrino

We've experimented a bit with the equivalent of timed chess for games where speed of decision and OODA looping is important. Classic simultaneous move step does not reward the more nimble player in terms of decisions - everyone's moves are due at noon, sending them in at 10am doesn't get you anything since the clock is essentially stopped. This also goes to player cell organization; the large Blue cell is almost always behind the often smaller Red cell, and needs more time to get through their internal battle rhythm.

But it's back to objectives. IGOUGO, simultaneous...what timing and sequencing of player actions best fits the objective?

[j] Peter Pellegrino

This is the value of a "white cell" between the players and adjudication. In a recent game, we had PACFLEET level players writing orders (moves) for their 7th Fleet subordinates -

who were represented in white/adjudication by real 7th fleet folks. They had the task of adding the detail to the player moves, and then, guided by war gaming faculty, adjudicate those same moves. This effectively squashed arguments from the players that adjudication had made unrealistic interpretations of their orders, i.e. the real 7th Fleet wouldn't have done that, when in fact, they did. Of course, you don't always get to have the 'real' people in adjudication.

Ed McGrady

An interesting topic to discuss in another panel might be the differences in style between the War College, a place like CNA, or a regular contractor putting on games. You have the advantage of being an actual command which can get you stuff that is harder for a place like CNA to get.

[k]   **Peter Pellegrino**

We actually had peace break out two moves into a strategic game a few years ago. We knew the reason was due to a piece of information one side did not have regarding the other's deployment of forces, which was an adjudication result. So the sponsor had us rewind, and now rule that the Blue side did indeed detect the movement of Red forces, and the war was back on. We captured both outcomes in the report.

2.5 The Impact of Rules, Information and Time on In-stride Adjudication

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> *You have to learn the rules of the game.*
> *And then you have to play better than anyone else.*
> *- Unknown*

> *Smokey, this is not 'Nam, this is bowling. There are rules.*
> *- Walter Sobchak, The Big Lebowski*

War gaming is fundamentally the interaction of opposing decisions, the tension between competing forces attempting to impose the will of one upon the other. To quote Frank McHugh:

> *A war game is a simulation of selected aspects of a conflict situation in accordance with predetermined rules, data and procedures to provide decision-making experience/decision-making information that is applicable to real-world situations. (McHugh 1966)*

Adjudication is the mechanism by which the outcomes of those interactions, 'the moves' are determined. Adjudication is, at its core, simply the application of rules and the management of information – i.e., what happened and who knows it – that serves as the input to the next series of player decisions and moves.

These rules are either *explicit*, embodied in written instructions, checklists, combat result tables, or encoded in formula and computer algorithms; or *implicit*, based on the personal experience and knowledge of warfare practitioners or subject matter experts (SME). Adjudication which employs the former is typically referred to as rigid adjudication, while that which employs the latter is free adjudication. Semi-rigid adjudication attempts to blend the

two, with explicit rules which can be overruled or modified by SMEs as appropriate (McHugh 1966).

Free or SME-based adjudication – *free kriegsspiel* – is historically presented as resulting from the desire to improve the playability of *kriegsspiel* when complex, cumbersome written rules slowed the pace of play. Through much of the 19th century, *kriegsspiel* steadily accumulated rules, tables, and 'computations' which increasingly made the game impenetrable to junior and inexperienced officers. In 1876 Colonel Jules von Verdy made the case to replace the tedious measurements, numerous cross references and multiple die throws with a sage umpire who would decide outcomes "according to his own views" (Perla 1990). And *free kriegsspiel* was born.

In-stride adjudication could be seen as another attempt to improve war gaming. In-stride or running time adjudication is perhaps easiest defined by what it is not – move step adjudication. In-stride, i.e. without breaking stride, without stopping, implies that the player clock keeps running. In-stride represents a continuous movement of time during which decisions are made and feedback received without the notable start-stop-resume, or act-pause/adjudicate-repeat pattern of move step.

But before looking at in-stride further, adjudication should not be viewed as either in-stride or move step, or for that matter disconnected from the rest of the war game. Adjudication does not exist in isolation; like every other part of a game, it exists to support the game's objective. While in-stride is often associated with open adjudication with the players witnessing or actively participating in the determination of outcomes,[a] it can be used 'behind closed doors,' i.e. in closed adjudication, out of sight of the players.[15] Likewise, in-stride can be used with simultaneous or alternating player moves.[b]

What drives the choice? Why opt for one form of move/adjudication over another? It's about rules, information, and time.

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[15] The Naval War College's Indo-Pakistan Game used this format, with adjudication acting as an information clearing house, sequencing player moves as they were received and either immediately adjudicating them and routing information back to the appropriate players, or scheduling them for future evaluation, depending upon the timeline.

Rules: Explicit vs. Implicit

Generally speaking, war game rules tend to be divided into two types: operational rules and implementation rules. The former describes how aspects of the real-world are represented in the game, while the later addresses the methods and procedures to be used in the game-world. For adjudication, operational rules are referred to as evaluation rules. Put another way, the first explain what you can do, the second explain how to do it (McHugh 1966). Here we are primarily, though not exclusively, concerned with operational/evaluation rules.[c]

How well understood are the interactions which will be the subject of the evaluation rules? If those interactions are well established and widely understood, and there is sufficient information available to both sides regarding their opponent's move to allow the application of this prevailing *implicit* wisdom, the players should be able to self-determine the outcome. The role of an umpire in these cases is to quickly resolve combat when the participants cannot agree.[d]

This is matrix gaming (Curry and Price 2014) in its simplest form, where the weight of an argument and the likelihood of success are grounded in a *common understanding* amongst the participants of the relevant factors and their relative impact.[16]

What if the interplay of the likely factors impacting combat outcomes are fairly understood (even if only by a few experts), but not necessarily widely known, or only poorly understood outside of those few experts? Before jumping to the conclusion that this situation calls for SME-based adjudication, consider that for any game – war game or board game – to work, the players must *collectively* understand the rules, and those rules must be applied in a consistent manner. What better way to ensure that collective understanding than to have those SMEs develop *explicit* rule sets based on their expertise, and distribute those rules to the players?

For the first seven decades of war gaming's history at the war college, look up tables and combat result charts were the dominant form of adjudication; computer-aided gaming was introduced in 1957 (McHugh 1966). As part of then President RADM Stansfield Turner's

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[16] It would be hard to imagine a group of infantry officers having a meaningful matrix game about anti-submarine warfare

overhaul of the Naval War College's curriculum in 1974, he ordered modifications to the computer gaming system in order to make the probability calculations visible to the students, rather than happening out of sight in the 'black box,' as he believed it was important for the students to play the war games fully cognizant of the factors and probabilities that shaped the outcomes, which was diminished in the move away from manual gaming (Hattendorf, Simpson, and Wadleigh 1984).[17]

Increasingly the college is conducting workshops ahead of major games to develop explicit rule sets that both players and adjudicators reference during the game.[18] Frequently these rules are incorporated into easy-to-use Microsoft Excel spreadsheet "mini-models" which are often nothing more than digital dice rolling routines with selectable modifiers tailored to the scenario. Examples include casualty tables, sensor detection probabilities, air-to-air engagement models, and anti-ship cruise missile salvos. Key to developing these rules is separating the dominant factors which influence the likely success or failure of an event and are *within the player's decision space*, called "above the line factors," from the myriad of other factors "below the line" which can be rolled up and abstracted. Models, after all, whether mental, manual or machine, are meant to simplify otherwise complex interactions:

> *Models should be simple enough to give the maximum of understanding with the minimum of the spurious detail which obscures insights and fosters a deceptive sense of realism* (Reed 1961)*.*

> *Yet simulations and wargames attempt to incorporate more detail then can ever by known about past or future battles. The alternative is to seek artful simplicity that is not pretentious but describes the circumstances clearly and understandably…* (Hughes 2000)*.*

Rules: Subject Matter Experts

The alternative to explicit evaluation rules is to rely solely on implicit rules, i.e. SMEs, to apply their best judgment during the game. SME based adjudication is still rule-based; however

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[17] Rather than increasing the complexity of games, Turner stressed simplified tabletop war games "that gave as many students as possible an opportunity to play decision-making roles." (Hattendorf, Simpson, and Wadleigh 1984)

[18] This is not new. McHugh discusses at length in Chapter 3 of *Fundamentals of War Gaming*, first published in 1966, pregame procedures for the development of game rules, procedures and data (McHugh 1966).

the rule set is an internal one constructed from personal experience; though like poorly constructed explicit rules, SMEs can be fraught with peril. Their actual expertise and experience can vary dramatically, and like all people, they are affected by cognitive biases and logical fallacies, especially when dealing with unfamiliar situations. Dr. Stephen Downes-Martin more fully explores the potential problems with SMEs in the case of 'discovery' war games in *Adjudication: The Diabolus in Machina of War Gaming* (Downes- Martin 2013).

While SME or umpire based *free kreigsspeil* was originally intended to speed the pace of play, SMEs are not guaranteed to quicken adjudication. Anyone who has watched a group of experts with differing opinions arguing their way through a complex military interaction in an attempt to come to a combat resolution knows better.[19] Intellectual capital must be invested in evaluation rules – either that time and energy is spent up front in the development of explicit rules before the game, or that time is spent wrestling with implicit rules during the game's limited adjudication period.

Explicit rules are not inherently better or worse than SMEs, but rules can be recorded, communicated, applied, reviewed and updated in a consistent, transparent manner.

It is worth digressing here for a moment on the subject of realism in rules and war gaming. Recall McHugh's definition of a war game, specifically that its purpose is to provide *decision-making experience/decision-making information that is applicable* (or relevant) *to real-world situations.* McHugh goes on to state, "Ideally, there should be few enough rules to make a game playable, sufficient to provide realism" (McHugh 1966). Realism, in this case, is an environment which elicits from the player a decision similar to that which would be made under a corresponding real-world situation (Thomas 1957).[e] The extent to which this is achievable in a war game is debatable and depends a great deal on the type of game. A game designed around classical warfare using current technology played by experienced military personnel in roles similar to that which they would occupy in an actual conflict comes closer to a 'realistic' decision environment as described by Thomas, than a game played a decade in the future with novel concepts played by personnel with little or no practical experience.

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[19] More than once I have resolved this type deadlock situation in adjudication by reaching for dice!

While in both cases above it is true that players are unlikely to forget that they are playing a game, their immersion and psychological engagement in a game is quite real from a neurological perspective. Modern neuroscience has revealed that just thinking about imagined situations activates the same brain regions as the actual experience. Dr. Don Vaughn of Semel Institute for Neuroscience and Human Behavior at UCLA notes, "neurally, it's never 'just a game'." (Spector 2017).[f]

Realism in this context benefits the *decision-making experience*, but of late, the interest in realism appears to have less to do with the relevancy of the player decision environment than it does with the understandable but impractical desire for games to *predict* the outcome of conflicts (a misapplication of *decision-making information*).[g]

Game play does not have to be predictive to be of value in terms of decision-making. FADM Chester Nimitz's oft quoted statement that "nothing was a surprise" in respect to the unfolding of events in the Pacific during WW2 has been repeatedly misinterpreted as an endorsement of the inter-war period gaming's predictive value. This comment was made in October 1960 during an address before the Naval War College student body. Just prior to this statement, Nimitz was reflecting on the value of a professional military education, and how his experiences as a war college student in 1923 benefited him during the war (Nimitz 1960). Consider the following: nearly 20 years had elapsed between Nimitz's war gaming experience with dreadnoughts and biplanes on the floor of Luce Hall until the start of the war that ushered in jets and the nuclear age; in other words, the navy he gamed with was not an accurate representation of the navy he fought with. There were events that occurred in the '23 games that didn't occur in the Pacific war, and vice versa.

Given all this, of which Nimitz was surely aware, he still felt prepared, i.e. not surprised. Why? Because the more than one dozen games Nimitz played as a student, and the attendant decision-making practice, gave Nimitz, and the hundreds of other officers who played those same games, a collective understanding of the problem and the 'habits of mind' that enabled

them to deal with the expected – and unexpected – events. It was not necessarily *what* they had studied, but *how* they had studied it, that was of value (Smith 2002).[20]

If using in-stride/running time adjudication without explicit rules, but rather SMEs, then provide guidance templates to encourage a consistent *approach*, if not result. I have used these types of templates for both closed and open SME-based adjudication. When used in open adjudication by a small group of adjudicators, it can inform an assessment process similar to that described by Major Tom Mouat under "Argument Assessment" in his *Practical Advice on Matrix Games* (Mouat 2017).

Information Environment: Open or Closed Intelligence

Why withdraw for closed adjudication? Why isn't the player either capable or desired to be involved in the adjudication in some direct, open manner? The most common reason has to do with intelligence or the 'information environment.' Does the player have *enough information* to apply the rules?

If the game's information environment is open, that is all relevant information is available to both sides, then in-stride adjudication using either explicit or commonly understood implicit rules as described in the previous section, or as a matrix-style game, is fairly straightforward.

More often, war games are played such that each side has only limited information about their opponent, i.e. the information environment is closed, and to adjudicate, complete knowledge of both sides' force disposition and actions is typically required.

Closed intelligence, though, does not have to mean move step and completely closed adjudication. The Naval War College's Leyte Gulf Game is played as part of the Joint Maritime Operations curriculum, and is a closed intelligence game, but uses relatively open, in-stride

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[20] It just occurred to me that there's a relationship (?) between the number of variables (and the degree to which they are understood) and where we fall along the training vs. education continuum. Early navy war gaming (pre 1922) at the college put a premium on the maneuver variable as THE dominant factor in determining the outcome of an engagement as evidenced by the use of detailed movement templates and measurement devices, yet gun fire used a deterministic range wand, with no consideration for differences in armor within classes, target aspect or speed, etc. As a result, students were expected to learn the "right" maneuvers for various situations (which sounds like training). After 1922 the number of variables increased (some would argue unnecessarily so in some cases) and given the increasing complexity, there were fewer "school house answers" and more generalized "appreciations" of the problems (which sounds more like education).

adjudication (though some events are determined by die roll behind the adjudicator's screen). Each side has their own map board, with player teams separated by partitioning panels. The adjudication team is positioned to see both boards on either side of the partition. Moves are indicated on small laminated versions of the map and passed to adjudication, which is able to immediately inform players of contact with the adversary. When combat occurs, players immediately transfer engaged units to a common Battle Table, where explicit rules sets determine the outcome, and the survivors return to their own private map boards at the conclusion of the battle.

A different problem arises when the player's decisions or moves are not directly adjudicated. This occurs when the evaluation rules require additional detail at a lower level of war that the player, at a higher level of war, did not provide. This is the case of tactical rules for an operational game.

For example, a player at the operational level, say as the Joint Force Maritime Component Commander (JFMCC), is giving orders to his subordinate task group commanders, one of which is Task Group Anti-Submarine Warfare (TG ASW). TG ASW may have destroyers, patrol aircraft and submarines assigned. If there are no other players between JFMCC and adjudication, those orders go directly to White, who may need to first translate the task group order into individual unit level orders before Adjudication can apply the combat evaluation rules.[21]

As the breadth and depth (or scale and scope) of a war game increases, so does the evaluation process complexity, along with the time and expertise required to provide feedback.[h] The more process steps between the players' moves and adjudication's feedback, the less practical in-stride adjudication becomes. However, when opting for closed adjudication out of sight of the players, the players must trust that the adjudication team is consistently

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[21] This is a good example of where the terms "Control," "White" and "Adjudication" are not synonymous, though they are often used that way. Strictly speaking, Control is responsible for execution of the game as a whole, and is headed by the Game Director. White Cell is populated by quasi-players who interact with the Red and Blue Cells representing higher headquarters, subordinate units, or "rest of world," though are actually agents of Control and Adjudication. Finally, Adjudication is strictly concerned with determining "who knows what" and "what happened to whom" and reporting that back either directly to the players, or via White Cell as appropriate. Due to manning considerations, it is not uncommon, though not optimal, for White and Adjudication to be one in the same.

applying the rules, and their success or failure is a result of their adversary's actions, and not a meddling adjudication cell. As soon as the players think they are playing against adjudication instead of the adversary, the game in the broadest sense is lost.[22]

Time Management: Move Step or Running Time

There is an inclination to consider in-stride adjudication as suitable for running time games, less so for move step. However, as the move steps become shorter and shorter, the distinction between running time and move step diminishes.

The smallest unit of time is not always well thought out, but needs to be defined. How much time should a move cover? How much can happen in that unit of time? How much time should elapse between player decisions? Within that unit of time, there is no sequencing, i.e. within that smallest unit, one thing cannot occur before another, as that implies that the unit of time can be further divided into at least two smaller periods, and therefore, by definition, is not the smallest, indivisible, unit of time. Within the smallest unit of time, everything happens simultaneously.

Therefore in-stride adjudication either evaluates events one-at-a-time as they arise in a more or less sequential manner, or 'queues' events to be adjudicated simultaneously, which begins to look like move-step with relatively short intervals. It is possible to construct a running time, in-stride closed adjudication with move steps (which sounds like an incompatible combination of elements).

Consider a running time game with 1 real hour = 1 game day. Orders received by adjudication from the players issued between 00 to 29 minutes past the hour (designated the "A" time segment) are queued and adjudicated from 30 to 59 (the "B" time segment), with results reported as soon as available. Orders received during the B time segment are queued and adjudicated during the A time segment for the following hour in a similar manner. Orders for future actions or those with longer execution timelines are placed in the proper 'future

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[22] I once adjudicated a multi-sided game where two of the principle player cells stated during post-game debrief that "white must have been injecting stuff into the game" to cause them difficulties, when it was actually two of the adversary cells who had taken actions against them.

queue' depending on which Game Day they would occur. A separate adjudication team is dedicated to each segment.

For example, a game starts at 0800 RT (real time) equaling Game Day 1. An order from the Blue Team for a submarine to transit to a position 1,800 miles away and launch cruise missiles is submitted at 0810. It will take 3 days (3 hours RT) to transit that distance, so the sub would arrive at 1100 RT/Day 4. From 0830 to 0859 RT, the first leg of the sub's transit is adjudicated, along with a Red Team's order received at 0825 RT to deploy maritime patrol aircraft to search for the submarine over the same period of time. At 0900 RT/Day 2 the Red Team is informed that the maritime patrols hold no contacts. As the sub's transit and the patrols continue, they are evaluated again in the next 30 minute queue, and at 0930 RT/Day 2 another feedback report is given to both teams. Assuming that the Blue sub reaches its launch point at 1100 RT/Day 4, the cruise missile order is now in the queue to be evaluated at 1100, and the results reported back by 1130.

This type of running timeline can be a challenge to manage, and is facilitated by a robust adjudication team, simple rules to quickly evaluate outcomes, and standardized formats for both orders and feedback with well-rehearsed processes and workflow.[i]

Many of the Global Games of the 1980s and 1990s used real time/running time during the day with the players, and time jumps at night. Several games at the US Naval War College of late have used a matrix/open/in-stride format. GLOBAL 2015-1, GLOBAL 2017-6 and NORTHWESTPAC 2017 used variants of open adjudication. CNE/C6F COA GAME 2018 and GLOBAL 2018-9 will use an open, matrix style format.

Adjudication in these cases is supported by the use of a standardized move form informally referred to as a "Mad Lib" as it resembles the popular fill-in-the-blank story construct. Essentially this is a return to the origin matrix of matrix gaming; players articulate moves in terms of Who (units), What (task), Where (location), When (timing) and Why (purpose), then justify the likely success of those actions in terms of operational functional sufficiency (or superiority in relationship to the adversary). As appropriate, the enemy may make a similarly

structured counter-argument, undermining the performance or effectiveness of the proposed action.

This open exchange is moderated by the lead adjudicator, who terminates the arguments once he believes sufficient detail has been generated in order to render a decision. The lead adjudicator then turns to his small cadre of SMEs (8-12 people) nicknamed the 'Greek Chorus' for very brief consultation. Like the players, they, too, use a standardized adjudication note sheet on which to capture the salient points from the players' move/arguments. The lead quickly polls the chorus members and either (1) immediately makes the decision as to combat outcomes, (2) has the chorus vote on an outcome with simple majority winning, or (3) uses the ratio of the chorus members for and against to generate odds and casts a die (for example if two chorus members believe Blue would prevail, and four believe that Red would prevail, then the odds of Blue success are two out of six, or 1/3.) Tom Mouat outlines a similar process in his booklet (Mouat 2017).[j]

Typically, the more detailed the adjudication, the more time is needed. Therefore, adjudication's goal in the above case is to simply and quickly determine the degree to which action is delayed, forces are dislocated or disrupted, and whether or not the desired effect is achieved and at what cost. If more elaborate, and therefore lengthy, adjudication is required, the situation becomes less suitable for in-stride adjudication.

Ultimately adjudication must support the game objectives and analytic agenda, and facilitate play in such a way that it does not 'pull focus' from the player decisions or interactions. The machinations of adjudication, whether open or closed, in-stride or move step, should not be a mystery to the players – having players divine the rules through trial-and-error game play is neither a useful activity nor a "player insight."[23]

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[23] A story is told within NWC War Gaming Department of a game which employed the then new Tomahawk Land Attack Missile (TLAM). At the time performance data for the missile was scarce, so adjudication settled on a Probability of Hit of 0.7. At the conclusion of the game, a player remarked that the game had "validated" the performance of TLAM, showing that it worked about 70% of the time.

...wargames are by their very nature participatory devices in which users need to have a certain understanding of the mechanics in order to benefit from the model at all. - Phil Sabin

If war games were baseball games, and you're watching the umpire instead of the batter, you're missing the point.[k]

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Discussion

[a] Stephen Downes-Martin

If the players "participate in determining the outcomes", does not that mean they have stopped playing and therefore the adjudication is not in-stride? Unless one expands the definition of play to include active participation in determining the outcomes?

Later you point out the value of being prepared to make decisions (FADM Nimitz) due to gaming. Perhaps actively participating in adjudication is a fundamental part of gaming to become prepared, and thus should automatically considered to be "play"? In which case the alternative becomes an attempt to simulate the command/decision environment for some reason, not "play to prepare to be a decision maker"?

Perhaps it's all about the game objectives ... as you state earlier!

Peter Pellegrino

I tend to have a broad definition of play, which is heavily influenced by my board gaming experience. Short of stopping the game and going to lunch or at end of day, all activities "associated" with the game environment that include the players I tend to think of as "play," just as I would argue that you don't stop "playing" just because it is not your turn in a board game.

Stephen Downes-Martin

I suggest it is worth inserting your broad definition into this paper at this point. Others in the group are distinguishing between "play" and "other activities associated with the game", even though some of those activities are related to the move decision(s). I think such distinctions are worth making explicit so one can explore variations on them.

[b] Ed McGrady

I believe that Stephen has opened up a can of worms when he brought up "in stride" adjudication, not because of the adjudication bit but because of the definition of "in stride". I have come to the conclusion that what we really want is for players to retain a sense of agency within the game, in other words they continue to affect, and be affected by, the game. That is about the best we can do for in-stride unless we go to the maddening and difficult real-time game. Thus, your contention that in-stride can be used "behind closed doors" is the only thing that, for me, dumps us out of in stride and into what I'm calling off-line. It breaks the agency for the players because for that period they are not participating in the main storytelling effort of the game. At least that is what I mean when I distinguish between the "play" of the game and "other activities". Stephen is poking at this general problem by constantly asking about what constitutes in-stride, to the point that I even drew a picture in my paper to define what I was talking about.

[c] Ed McGrady

We are really interested in the implementation rules. The operational/evaluative rules simply tell me whether I hit, not when to figure out when I hit.

Peter Pellegrino

Yes and no. As it relates to the adjudication process, you're right, it's implementation. But in this section I'm focused on the shared rule set between adjudication and the players, which are the operational rules. This highlights the problem with my meandering between the specific topic of in-stride adjudication, vs. my thoughts on adjudication more generally.

[d] Peter Perla

The distinction between adjudication required from Control and things players could agree to among themselves without Control's getting involved is interesting and something that more matrix games should consider. Perhaps such games would no longer be "true" matrix games but something of a hybrid. My worst personal performance came when I tried to impose too much matrix structure in a situation that would have been better served by such a hybrid approach.

[e] Ed McGrady

I also think there is an element of what players will believe to be realistic in determining realism. Within the world of the game perceived realism keeps the players within the magic circle (along with fairness but that is another topic). Exterior to the game there is the perception of realism by those observing it, which can be either objective (does the stuff work like this?) or subjective (are the effects sufficiently similar within the game to the real world for it not to matter whether things really work like this?)

Peter Pellegrino

Agreed. Somewhere (Rules of Play, perhaps) talks about the need to maintain "internal consistency or logic" within the magic circle, i.e. once you define the rules under which your world functions, you better stick to them lest the player cry foul. A challenge with the external viewer is just that - they were outside of the experience. Reporting has to provide enough of the context to understand why the players did what they did and got the results that they got. It's the "You had to be There" problem and the issue of the generalizability of game results to other situations.

[f] Stephen Downes-Martin

But also modern psychological research indicates the poor correlation between decisions someone says they would make (i.e. in a game … "if this was real, the decision I would make is … and therefore this is the decision I am making in this game") and the one they do make later in a corresponding situation. It seems that the reasons behind the decisions remain robust but not the decisions. Frankly I have no idea how to resolve this! But it is an interesting area to explore!

Ed McGrady

There is ample evidence for prediction of decisions by others being better in a role-playing environment, that similar areas of the brain light up under narrative or suspended conditions as real experiences, and that people respond to games both emotionally and kinesthetically in the same way neurologically as they do to real world events. I'm unclear how someone could do better in predicting what others would do based on a role playing situation and do worse in predicting what they would do using the same techniques. Perhaps there is some sort of observer bias where they can't see their own forest for others trees, but in general what you (Stephen) say completely disagrees with what neuroscience says. And there has been considerable study of narrative and this sort of thing, not as much with games, and mainly video games. But it applies.

Stephen Downes-Martin

"Better in a role-playing environment" than what? The fact that "similar areas of the brain light up under narrative or suspended conditions as real experiences" etc. while true does not imply that the decisions that come out of the two situations are similar. The psychology experiments in this area indicate that they are not, that the correlation between what people say they will do (i.e. the decisions they make in what they know is a game with no real costs for failure) and the decisions they actually make in a similar but real situation (with costs imposed for failure) is poor. It's not me saying it, it's the established psychology research saying it, and what is being said neither agrees with nor disagrees with what neuroscience says.

[g] Stephen Downes-Martin

I argue (Downes-Martin 2013) that research indicates that games can't even predict the decisions the same people would make in a similar conflict situation.

Peter Pellegrino

I think your argument re: predictably of personal decisions underpins the broader "non-predictability" of war in general. If warfare is a combination of human decisions and mechanical outcomes (i.e. the results of war machinery interacting at the direction of humans), and there is uncertainty in both the machinery performance and the human decision, the whole affair is chaotic!

Gaming - not just war gaming – provides an opportunity to practice the process of making A decision, and not training to make THE decision.

This is the heart of debate around games and education – are the skills gained in games relevant/ transferable to "the real world?"

Ed McGrady

Prediction in games is a completely separate topic. In general outside observers want prediction, in-game participants want a perceived realism and actual fairness. Much depends on what you mean by "prediction" and what it is you are trying to predict. I firmly

believe that the process of constructing and executing a game gives you a better understanding of the drivers for a situation than almost anything else. This helps enormously with prediction. Likewise putting people, a lot of people, into the roles does a better job at prediction than just sitting around speculating. Can games predict details? Probably not. Can games predict the general shape of the competition and conflict? Likely. Can games pass the ultimate prediction test, Wall Street? Not sure, but possible.

Peter Pellegrino
Tom Mouat, or was in John Curry, makes a similar point in terms of role players in matrix games and the similarities between the outcomes of those games compared to the results of similar real-world scenarios.

Stephen Downes-Martin
Which is why I argue (Downes-Martin 2013) for the drivers behind the players' decisions being more important than the players' decisions. I am interested in wargames that inform decision-makers about the real decisions they must make now to deal with future events, that is the "prediction" I am taking about. The fact that "putting a lot of people into the roles does a better job at prediction than just sitting around speculating" while true is only relevant if wargames are nothing more than "people just sitting around speculating".

[h] Ed McGrady
Do you mean "complexity" because as the actual scale increases to army groups, wings, and fleets it makes my adjudication life a lot easier. (I'm using the standard miniatures definition of scale.)

Peter Pellegrino
I could have used "breadth and depth" here, as that's the way we tend to think about it at NWC. Or "how big is the fight - series of naval engagements in the SCS vs. general war across the western Pacific" and "how much detail - how many layers of command is being represented."

[i] Ed McGrady
I'd add a "huge" challenge to manage. However, this also is more or less a turn-based game, just with unusually shaped turns. A real-time game can be constructed where the adjudicator is literally resolving acts as they occur, but it is always on the edge of chaos and requires massive organization to pull off.

[j] Ed McGrady
This still has elements of UGOIGO, for me the only really in stride game by your construct is a continuous time, real time game. Thats why I fell back on my definition to "not offline" as the definition of in stride as that allows virtually everything but off line to be in stride.

Peter Pellegrino

There's probably some clever visualization that depicts the flow of information and the related flow of decisions over time that would help distinguish where a game lies along the move-step vs. running time vs. closed adjudication vs. open adjudication vs. in-stride adjudication spectrum. The more "spikey" and condensed the peaks of info and decisions, the more "move-steppy?" and less running/in-stride which has perhaps lower but more peaks more distributed over time? I need to ponder this more.

[k] Stephen Downes-Martin

If the umpire is biased or is interpreting the rules and you are <u>not</u> watching him or her then you're missing half the game! In many professional DoD wargames, the adjudicators are not simply umpires ensuring the players follow rules, they are active decision-makers (Downes-Martin 2014)

2.6 Swarm Gaming Approach to Organizing In-Stride Games

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Abstract

A method of organizing wargames is proposed to implement the requirements and achieve the intent behind the demand signal for in-stride adjudication. The paper calls the proposed organizational principle "Swarm Gaming", it splits games that would normally be designed as a single seminar game into multiple small sub-games run many times. The counter-argument that this approach loses the advantages of the small group discussions that take place in seminar games is refuted by an examination of the failure modes of small group discussions and the advantages of focused repeated gaming that rotates players between roles.

Demand Signal for In-Stride Adjudication

The national security focused wargaming community has for years been exploring the use of continuous (which implies in-stride adjudication) and real-time gaming based on demands from sponsors (Perla and Markowitz 2009). In response game designers will often use the natural pauses that occur in a planning staff's battle rhythm to schedule closed adjudication as a form of in-stride adjudication. Adjudication used in commercial, hobby, and role-play games often involve pauses that are very short and allow the players to game almost continuously.

More specifically and recently the USMC has provided a clear demand signal for In-Stride Adjudication. In multiple briefings by the USMC about their "Next Generation Wargame (NGW) Concept" they list one of the "characteristics of Next Generation Wargaming" as "Real-time, in-stride adjudication", request Adjudication Tools that are "Capable of in-stride resolution of

conflict and the management of results", state that "Integrated suites of M&S tools, enabling continuous, in-stride game execution" is a requirement of NGW and that "in-stride adjudication capabilities" is an "area where industry can help" (Blasiol and Monta 2017, Lademan 2017, PM Wargaming Center 2017, Williford 2017). In-stride adjudication from the NGW perspective is described as "… based upon continuous, asynchronous decision cycles instead of common time frames, simultaneous move submissions, or a strict application of a particular methodology" (Lademan 2018).

Interpretation of "In-Stride"

This paper treats *in-stride adjudication as an ideal; which occurs when adjudication and game play is continuous, there are no pauses in play while the players wait for adjudication to occur and for the results to be delivered to the players*. Deviations from this ideal involving short pauses, for example by engaging the players in open adjudication, are of interest in their own right and because they indicate the possible existence of other types of deviation.

For this definition of in-stride to make sense it is necessary to define what *"pauses in play"* means. This is not an exercise in pedantry, discussions with wargame designers indicate disagreement about whether players are "playing" when they engage in activities such as assessing the risk of their most recent move, discussing why they did not select alternative decisions, or thinking through how the enemy is interpreting their decisions during periods in which closed adjudication is taking place, or when they actively engage in open-adjudication. *In these situations, I claim that play has paused*, the players are no longer planning or making game decisions. Others make the reasonable but opposite claim that such activities are "game related" and as such are part of play.

At one end of the spectrum are activities that are clearly non-play such as the end of day meals and sleep, or during day rest breaks. At the other end are activities (during closed adjudication for example) such as planning possible moves in response to the possible outcomes yet to be received from the adjudicators. I believe that open adjudication (for example during a matrix game) lies somewhere in the middle. A useful and widely used method of inquiry is to define an extreme and then examine useful deviations from that extreme; i.e.

how far one has to deviate before obtaining useful behavior and how far one can deviate before the behavior ceases to be useful.

The most widely used and accepted definition of wargaming is provided by Peter Perla (Perla 1990, p.274):

> ... a warfare model or simulation, not involving actual military forces, and in which the flow of events is affected by and in turn affects decisions made during the course of those events by players representing the opposing sides.

I use this definition to define play for the purposes of this paper as *actively planning and making decisions in response to the situation as presented by the adjudicators*. All other game related activities, no matter how useful to the analysts, sponsors and participants, are pauses in play. The shortness of those pauses and the value gained by the activities during them provide a qualitative metric of their usefulness in a trade-off with the value gained from the ideal in-stride adjudication.

Intent behind the Demand Signal

The key question to ask however is "Why do you want it?" The answer to this question will define the real requirements, which are not necessarily the stated ones. Given that we might not be able to achieve the ideal of absolutely no pause in game play while adjudication takes place, it is critical to understand why in-stride adjudication is desired, what advantages does it confer that perhaps can be achieved by something less than the ideal of a zero pause in-stride adjudication method. I propose the following two fundamental underlying reasons why in-stride adjudication might be useful as answers to this question: We want players to make more decisions, and we want players more fully engaged in playing the game.

We want players to make more decisions

Wargaming organizations "are constantly being pressured to extract as much gaming value as we can for the limited amount of time we can get our hands on qualified players" (Rubel 2012). Robert "Barney" Rubel was the Chair of the Wargaming Department and then the Dean of the Center for Naval Warfare Studies at the Naval War College for many years. As such his observations of intent behind DoD requests for wargames are highly credible. Since games are, by definition, about decisions made by the players, I propose it is reasonable to interpret this to

mean the desire to obtain more, and better quality, decisions – all else being equal – out of the players during the time they are available to play, to increase the decisions per unit time. Note that simply increasing the length of the game does not satisfy this requirement which is about increasing the amount and quality of player decisions with in the limited time available for gaming.

We want players to be more fully engaged in playing the game

In games using closed adjudication it is usual for players to spend the time when adjudication is taking place on game related activities. Examples include assessing the risk of their most recent move, discussing why they did not select alternative decisions, or thinking through how the enemy is interpreting their decisions. These discussions provide information critical to the game sponsor's objectives (which is why they are included in the game design) and perhaps useful to the players. However, these between-move discussions remove the players from the unrelenting competition with their enemy by moving them into creating information that is additional to what they need to play the game. In-stride adjudication has the potential of increasing the tempo and stress on the players by removing or limiting pauses that would not occur in the real world. A trade-off now exists between the value of full-engagement by players in decision-making and the value gained by extracting additional information from the players by game-related activities during pauses in play, and how one addresses this trade-off is game design issue based on the sponsor's objectives for the game.

Note that "engaged" in this context means actively and continuously playing the game as caveated above, A compelling scenario is, as the ludologists correctly insist, necessary but it is not sufficient and does not alone satisfy this requirement. Great literature one reads alone is compelling but not play, great theater one watches as part of a group is compelling but usually does not engage the audience in play. Similarly a compelling scenario played by email or as a solitaire game fails this requirement as engaged with other people is a core element of war and wargaming.

Swarm Gaming – An Approach

In a traditional DoD seminar wargame, a small number of large cells plus a large team of adjudicators play one game over a period of several days to a week or more. I propose

replacing this approach with a large number of small wargames (subgames) run in parallel where each subgame is repeated multiple times.

Each small wargame has one player per side, one adjudicator and one data recorder. Each subgame is played many times in the time available with players rotating between sides and the
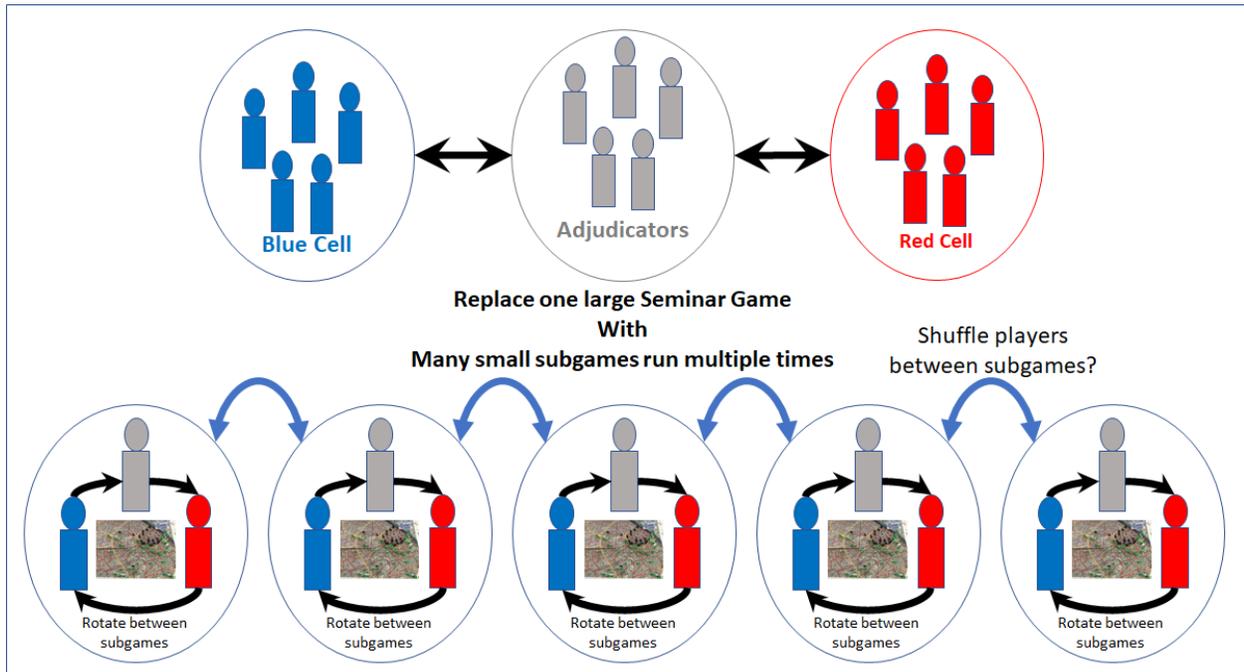
adjudication position. Whether players stay in the same groups for all the subgames or they are shuffled between subgames is an open question. For want of a better term I am calling this "Swarm Gaming".[24]

Rotating the same people between playing a side and adjudication is critical for inductive games or games that are meant to explore novel situations. Inductive games require the adjudicator to act in a way similar to that of a dungeon master in dungeons and dragons, to create a narrative that is both feasible (even if it has a low probability) and moves the game forward in a way that satisfies the sponsor's objectives. Exploring novel situations means by definition we do not have historical data and therefore we do not have statistically valid

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[24] Rex Brynen points out that although it was not "swarm gaming" because multiple iterations were not run, the Atlantic Council crisis simulation "Exploring US Engagement in the Middle East" run by him in 2016 (Brynen 2016a, Brynen 2016b) did involve simultaneous parallel games with many of the players in both games to aid in comparative analysis. Rex informs me this mitigated the idiosyncratic effects of player assignment.

combat result tables or non-kinetic outcome tables on which to base adjudication (Downes-Martin 2013). In these situations the adjudicators and the players are equally expert (or inexpert) and we get more gaming value by moving players between playing a side and adjudication.

This approach achieves the intent behind the demand signal for in-stride adjudication by organizing a game to satisfy the implied requirements of in-stride adjudication:

➢ Players make more decisions: We obviously get an order of magnitude more player decisions from the described approach than we get from the traditional seminar gaming. For example, a single Red versus Blue seminar game with ten-person cells is replaced with ten two-person games. These games are repeated with players rotated between sides and adjudication. The lack of group discussions during play means that play will be faster, multiple iterations of play can be scheduled, and more player decisions occur than in a single seminar game.

➢ Players are more engaged: Since every player is on the hook for making individual game decisions in their subgame (they are the only player on their side) and for being adjudicators in some of the games, then each players is clearly more fully engaged than if they are part of a large group responsible for advising the cell lead on the cell's decisions in a seminar game.

Not every individual will be an expert in every facet needed to play all parts of the game effectively. This is handled by multiple iterations of the game, by rotating players between sides and adjudication between games, and by scheduling a plenary session at the end of the event to share ideas and reasons for moves (and moves not taken). Rotating players between roles (Red, Blue, Adjudication) brings more diversity of thinking and experience to each of those roles and increases player engagement. The plenary (and other pre- and post- game activities) creates a normative process that mitigates the downsides of group discussions described in the next section.

The Failure Modes of Group Discussions

An obvious counter argument to the above approach is that it removes group discussions during play and therefore is less valuable than a single seminar game. This counter argument can be dismissed for the following very good reasons. First, group productivity is a proven illusion (Nijstad and Lodesijkx 2006). Furthermore, most group processes I have observed within the DoD are badly chosen for what is needed and are unproductive compared to proven

normative methods, and in most cases even the productive group processes attempted by the DoD are incorrectly executed in that the requirements for those group processes to be productive are ignored.

A further, and weak, counter argument to the proposed wargaming approach is that real staffs on the battlefield, planning strategy or producing courses of action for higher command do in groups using group discussion. Surely wargaming that is intended to inform such activities should also use group discussions? The answer is "No". Unless the wargame is supposed to be a simulation of the process designed to train the players in the processes they would use for real. If the purpose of the wargame is to explore the situation or come up with normative advice, then the wargame process must not deliberately incorporate provably inferior group processes and must not emulate poor execution of good processes.

It is tempting to draw on the Good Judgment Project (GJP) and the creation of Super Forecasters as a counter to the research about the failure modes of group discussions (Tetlock 2005, Tetlock and Gardner 2015, ODNI 2017). Although valid concerning forecasting, the conclusions of the GJP are not relevant to wargaming as currently carried out by most DoD games. The Good Judgment Project approach identifies superforecasters and has developed techniques for training those identified superforecasters. It does not deal with decision making by (near randomly selected) groups of people from a community, which is what we deal with in wargaming *as currently carried out by wargames that support the DoD*. It deals with forecasting rather than decision making, the individuals in the group engage in a normative process of making their forecasts as individuals and then discussing, and the process takes significantly longer than that available for wargaming. This is a very different participant selection and activity process to wargaming. Even if we could select the "right" participants for the wargame we don't have time to train them and they are unlikely to be trained superforecasters.

The GJP does raise the questions of wargaming by forecasting, wargaming using scenarios based on forecasts by superforecasters, and researching how to obtain "super decisionmakers" using similar techniques to the GJP. Currently these questions are unanswered and beyond the scope of this paper.

The Illusion of Group Productivity

Research has consistently indicated that working in a group produces fewer ideas and of lower quality than the same people working independently *and then combining their ideas*. The research does not compare the quality of ideas created by a *group* with the quality of ideas created by any *single individual* in the group *working alone*, it compares the quality of ideas of the group working together with the quality of the combined ideas created by all individuals of the group working alone. In addition, individuals tend to believe they are more productive in a group brainstorm than when working alone and are also more satisfied with their individual performance in a group even though they produce fewer ideas. Research also indicates the reason for the illusion being that when working in a group each individual is less aware of when they themselves do not come up with an idea than when working alone, they get to hide behind the group (Nijstad and Lodesijkx 2006).[a]

It is certainly worth exploring wargame designs where every player, presumably expert, is forced to make decisions, to personally own those decisions, to be responsible for the effects of those decisions in the game and for how to deal with them.

The (Dis)honesty Shift

Research indicates "that there is a stronger inclination to behave immorally in groups than individually", resulting in group decisions that are less honest than the individuals would tolerate on their own. "Dishonest" means the group decisions break or skirt the ethical rules of the organization and societal norms, involve cheating and lying. Furthermore, the group discussions tend to shift the individuals' post-discussion norms of honest behavior towards dishonest. First the discussion tends to challenge the honesty norm, then inattention to one's own moral standards (during the actual discussion) and categorization malleability (the range in which dishonesty can occur without triggering self-assessment and self-examination) create the effect that "people can cheat, but their behaviors, which they would usually consider dishonest do not bear negatively on their self-concept (they are not forced to update their self-concept)". The research indicates that it is the small group communication that causes the shift towards dishonesty that enables group members to coordinate on dishonest actions and change their beliefs about honest behavior". The group members "establish a new norm regarding

(dis)honest behavior". Appeals to ethics standards seem to be effective in the short term but there is little evidence for long term effectiveness (Mazar, Amir and Ariely 2008, Kocher, Schudy and Spantig 2016).

The research has not been done on military officers (to the best of my knowledge) so at worst there is only a reasonable suspicion that it would apply during wargames involving military officers. Although the systematic and unremitting focus of the military on ethics means that the level of honor within the military is probably higher than in the civilian community, note that the research implies subtle and sometime subconscious shifts in honesty. Experience however is less charitable, and the behaviors of Flag and General Officers and O6s leading player cells in wargames has been observed to go beyond "vigorously advocating for their positions". As H. G. Wells observed over a century ago (Wells 1913)

> *"... it is remarkable how elastic the measurements of quite honest and honourable men can become."*

The Risky Shift

Research into risky or cautious shifts during group discussion looks at whether and when a group decision shifts to be riskier or more cautious than the decision that the individuals would have made on their own (Batteux, Ferguson and Tunney 2017, Dodoiu, Leenders and Dijk 2017). One element driving the shift appears to be who bears the consequences of the decision – the group members, people the group members know (colleagues, friends, family), or people the group members do not know. There is evidence that individuals tend to be myopically risk averse when making decisions for themselves (Thaler, Tversky, Kahneman and Schwartz 1997). Research indicates however that "risk preferences are attenuated when making decisions for other people: risk-averse participants take more risk for others whereas risk seeking participants take less." Whether the group shows a risky shift or a cautious shift depends on the culture from which the group is drawn and the size of the shift seems to depend on the degree of empathy the group feels for those who will bear the consequences and risks of the decision.

Again, the research has not been done on military officers (to the best of my knowledge) so at worst there is only a reasonable suspicion that it would apply during wargames involving military officers. It does however raise four research questions:

1. Are military officers as a group culturally risk averse (they understand better than anyone the consequences of warfare) or risk seeking (their job is to go into and lead others into harm's way)?

2. How can we measure the risk averseness or otherwise of the officers recruited to lead player cells in a wargame?

3. What are the differences in the riskiness of group decisions or cell leader decisions in a research wargame (where the participants know it is a game and no one is at risk) and a planning wargame (where subordinates will bear the consequences of implementing the plan)?

4. Can we use Swarm Gaming as a tool for profiling the risk tolerance or aversion of the officers who play the wargames?

Brainstorming and BOGSATs

Immediately following its introduction in the 1950s brainstorming has routinely been debunked as an effective mechanism, so much so that the demonstration of its inferiority compared to easily implemented normative processes is a routine experiment carried out by first-year undergraduate social science students (for a popular description of the problem see Lehrer 2012). This is quite separate from observation that most brainstorms in the DoD do not even follow the primary rule that Brainstorming claims must be followed for the process to be effective, which is "no analysis during the process". My own observation over the last few decades is that within 90 seconds of the start of a brainstorm a senior officer has grunted approval or disapproval of some junior officer's idea – and the brainstorm is over. It has long been proven that a disciplined normative approach using Language Processing, Silent Clustering and Formal Debate give superior results than those obtained from ill-disciplined methods such as brainstorming (*even when run properly*) or BOGSATS.

The normative approach consists of three phases; first experts think about the problem on their own and construct arguments for and against, and proposed solutions individually (this corresponds to the single player per side wargaming described in this paper). Second, they meet in a group and discuss (this corresponds to the plenary session at the end of the game

event). Finally, they think again as individuals and mail in any additional ideas to the event organizers (this should be added to the wargame design). This normative method has been routinely proven by experiment to generate better results both at the first meeting (second stage) and at the final stage than any group process. Goal/QPC provides a very detailed description of one method of implementing a normative process (Goal/QPC 1996).

Wisdom of Crowds, or Madness of Mobs?

The claim that giving up group discussions during wargaming means that we would lose the wisdom of crowds needs to be debunked. While it is possible to get the wisdom of crowds, my own observations over many decades is that more often than not we get the madness of mobs due to poor implementation.[25]

There are two requirements that must be present for "the wisdom of crowds" not to be "the madness of mobs". (1) The crowd must be a crowd of experts. It is a comfortable and popular myth that a random collection of people does better on average than any individual in the crowd. As discussed above, the Good Judgment Project results deal with groups of trained superforecasters, not simply random collections of people (who might or might not be expert). Simply bringing a group together does not guarantee the wisdom of crowds nor a good judgment project like outcome. (2) What is in fact true is that the average of a collection of experts faced with assessing an objective numeric measure will produce an average which is more accurate than that given by most of the experts but only if each expert's decision is independent with no influence by any expert on another (Lorenz, Rauhut, Schweitzer and Helbing 2011). In my observations these two characteristics are routinely violated by groups claiming to use the wisdom of crowds -- including working groups within the DoD. First, the group is often not made up of true experts, instead they are often made up of people who were once experts in the past, or by people in command of expert subordinates but who are not themselves experts, or by random officers with the name of the subject under discussion in their job titles but who are not themselves experts. They believe that past expertise or discussions with expert subordinates or having a job title and rank makes them expert. Second,

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[25] My thanks to Paul Vebber for the phrase "Madness of Mobs". It describes the situation perfectly.

I have observed that the group process often involves discussion and exploration about what each believes followed by a voting mechanism. This allows individuals to observe how others think and vote, so the independence of assessment rule is violated. A consequence of not meeting the two requirements is that consensus drifts further from the accurate answer and the participants are more confident in that wrong answer, resulting in senior officers who are highly confident in a wrong or inaccurate answer.

Conclusions

The intent behind the demand signal for in-stride adjudication implies two requirements. First to increase the gaming value of games within the limited time available to wargame by increasing the number and quality of game decisions per unit time. Second to increase the level of engagement by players by making every player responsible for game decisions. Swarm Gaming is a method of organizing how a game is implemented so that these intent-driven requirements of in-stride adjudication are satisfied. There is always a desire in any activity to improve quality. The combination of individual work and group discussion imposed by Swarm Gaming increases the number and quality of the game decisions made by the players, incorporates and uses the full range of expertise available within the entire group of players, and removes the known downsides of group discussion.

Advantages
- ➢ Swarm gaming produces more decisions within the time allocated to wargaming and more fully engages all players.
- ➢ It mitigates the risky shift, the dishonesty shift and other pathologies of group discussion from wargame play while retaining the benefits of group discussion by use of post-play plenary discussions.
- ➢ The approach is a fast way of gaming and researching a novel topic for which there is sparse or no historical data or case studies and adjudicators and players are equally (in)expert.

Disadvantages
- ➢ A larger data collection effort is required in that all subgames need data collectors if the players are to be released from collecting that data themselves.
- ➢ Individual player reasons for moves are likely opaque since the player is unlikely to verbalise the reasons.
- ➢ The approach clearly does not apply to games meant to research, train or educate staff processes.

Recommendations

➢ Replace the seminar game with many parallel and repeated smaller subgames.

➢ Rotate players between player sides and adjudication for inductive games.

➢ Rotate players between player sides for deductive games, not for deductive games.

➢ Shuffle players between subgames.

➢ Explicitly create a normative process to improve the quality of game decisions:
  o Recruit participants and require preparation before they turn up
  o Schedule an end of play plenary discussion.
  o Issue players a formal request for post-game insights.

Further research is needed into:

➢ how to combine several Swarm Games (each made up of several small subgames) to provide insights into large multi-variable environments.

➢ whether military officers as a group are culturally risk averse (they understand better than anyone the consequences of warfare) or risk seeking (their job is to go into and lead others into harm's way),

➢ how to measure the risk averseness or otherwise of the officers recruited to lead player cells in a wargame,

➢ the differences in the riskiness of group decisions or cell leader decisions in a research wargame (where the participants know it is a game and no one is at risk) and a planning wargame (where subordinates will bear the consequences of implementing the plan), and

➢ using Swarm Gaming as a tool for profiling the risk tolerance or aversion of the officers who play the wargames.

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Discussion

[a] Rex Brynen
The Good Judgment Project, based on the largest and most rigorous experimental and quasi-experimental test of this, comes down quite heavily in favour of the "wisdom of crowds," showing that aggregate group forecasts (and probably decisions too, although that's not what they look at) are much better than individual ones. Perhaps we need to break this down more, to examine how different types of group production by different kinds of groups affects the quality of different types of outputs?

Stephen Downes-Martin
The Good Judgment Project approach requires careful selection and training of the group members before you get good results. Even if we could select the "right" people for the wargame we don't have time to train them and they are unlikely to be trained superforecasters.

My argument is that DoD groups rarely apply procedures to satisfy the requirements for Wisdom of Crowds and are rarely (if ever) trained to be the superforecasters that the Good Judgment Project requires to produce good judgments.

Research indicates that a group brought together and using BOGSAT and Brainstorming consistently underperforms the same group using normative methods.

I do not deny that superforecasters would do better than a normative process using random people at forecasting. We just don't get superforecasters at our wargames while we try (but often fail) to get properly qualified players, and wargaming is not about superforcasting.

2.7 Peeking Behind the Curtain: In-Stride Adjudication from a Player Perspective

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Jason Li is a recent graduate of and research assistant at McGill University, where he earned his B.A. in political science. Specializing in East Asian geopolitics and international development, he eagerly entered the wargaming community as a student in a seminar taught by Rex Brynen, in which he designed a game simulating the economic, military, and diplomatic ramifications of China's Belt and Road Initiative. Jason hopes to apply the newfound analytical skills wargaming has granted him to better frame, understand, and build foreign policy within the American diplomatic and intelligence communities. His full CV can be found at https://www.linkedin.com/in/jason-li-mir/.

From a player's perspective, participating in a game based on in-stride adjudication may resemble being dropped into the middle of Munchkinland: immersed in a completely unfamiliar world and determined to achieve a lofty objective. Just like Dorothy in Oz, players almost entirely trust an omnipotent and omniscient being behind a curtain that apparently controls all the strings in the world, only to discover that the being is not so powerful after all. As Perla and McGrady stress, continuous or quasi-continuous games have the advantage of deep player engagement; by creating a synthetic experience that is immersive and narratively focused, game designers can use continuous game methods, such as in-stride adjudication, to strengthen the game narrative, suspend player disbelief, and heighten player engagement (Perla and McGrady 2011).

As a student of game design and participant in games that have employed in-stride adjudication, I can safely say that considering the player point of view of in-stride adjudication and the factors that weigh heavily on players' experiences within the game are essential to improving the quality of a game. This paper is the collective effort of game design students[26] who have learned from in-stride games such as Brynania (Brynen 2018a), in which "Control" adjudicates as participants confront difficult real-life peacebuilding issues in a fictional country

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[26] This paper is the collective effort of the students of Professor Rex Brynen's seminar on Conflict Simulation and Game Design at McGill University. Special thanks go out to Harrison Brewer, Alix Egoroff, Keiko Ivinson, Kia Kouyoumjian, Juliette Le Ménahèze, Alex Smith, and Caroline Wesley for contributing insights and participating in this discussion on a player's perspective on in-stride adjudication.

ravaged by civil war, and Dire Straits (Brynen 2018b), in which Control adjudicates as divergent state interests clash and interstate crises arise in Asia-Pacific. These player-perspective experiences provide important lessons on how adjudicators can expertly cater their game choices to maximize not only the player experience but also their own.

The spontaneous nature of in-stride adjudication lends particular difficulties to the dynamic between the player and adjudicator. Inherent within free kriegspiel game design, the free-flowing and seemingly off-the-cuff decisions made by the adjudicator may fall under intense scrutiny by players. In contrast with seminar game organizers, in-stride adjudicators make decisions on the fly, relying on their understanding of the scenario to guide the flow of the game; this time constraint and freedom of choice for the adjudicator can breed skepticism, doubt, and anger directed not only at the game but also toward the adjudicator. Players may see the adjudicator's decisions as impartial or may think the adjudicator simply "likes to see players suffer."[27] Minimizing these possibly game-breaking emotions and misperceptions of in-stride adjudication is essential to maintaining game integrity. In this paper, I would like to outline two seemingly contradictory lessons for game designers that can be drawn from considering the player perspective on in-stride adjudication: a) maximize transparency by building adjudicator-player trust and b) maintain opacity by not fully communicating the in-stride adjudication process. Each of these two lessons can be applied to address different difficulties of game integrity that arise from player-adjudicator interaction within in-stride adjudication. At times, it is best to allow players to peer behind the curtain; other times, knowing the mechanics behind the curtain hurts the game's objectives.

Maximize transparency: Build adjudicator-player trust and share information

To prevent game-breaking feelings that stem from players' lack of trust in the in-stride adjudication, trust-building between the player and adjudicator is often necessary. Trust-building may entail reassuring skeptical players that in-stride decisions are never based on favoritism or partiality by being transparent about the process by which decisions are made. Within Brynania, for example, continual explanation by Professor Brynen that he as Control was

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[27] A quote from a player of Brynania 2017. According to them, blame and anger toward the adjudicator are extremely prevalent within in-stride games like Brynania and Dire Straits.

simply serving as a medium by which players interact—as opposed to being a decision-maker and player himself—helped reassure players that gameplay was largely in the players' hands instead of his. In an informal Facebook debriefing poll of student participants after Brynania, 12 of 24 respondents agreed that they "felt like [Brynen] was—more often than not—impartial."[28] Upon further discussion with these players, the most mentioned reason for their response was that they trusted that Control was indeed simply a "processor" of information that "spat out" reasonable judgments to questions and moves sent to him. In explaining why they so openly gave into the gameplay, these players particularly cited the repetitive reminders from Control of his hands-off role within the simulation.[b] It is important to note that pre-game relationships between adjudicator and player can influence the perceived validity of an adjudicator's claimed impartiality. In Brynania, for example, the pre-existing relationship of trust between Control (professor) and player (student) and the hierarchical classroom environment which Brynania took place in undoubtedly allowed for easier absorption of Control's claim to impartiality. Players knew and trusted the adjudicator beforehand, thus easing the adjudicator's attempt at transparency. In this way, mechanisms that translate the impartiality of the in-stride adjudicator to the players and pre-existing relationships can improve adjudicator-player trust and, therefore, ensure player immersion.

Trust between the adjudicator is particularly important within open-ended, high-engagement simulations that have many opportunities for cheating like Brynania. For example, one player explained her use of private messages without including Control—an action which violates the rules and which, in serious cases, threatens game integrity— writing, "I definitely didn't want him to see some of the things I was doing so that he wouldn't take advantage of me

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[28] Polling options and corresponding number of responses, as conducted in a Facebook group:
- "I constantly thought about how Rex [Brynen] would react to the moves I made and changed what I said accordingly" (15)
- "I felt like Rex was—more often than not—impartial" (12)
- "I felt like Rex was often steering my decisions" (2)
- "I felt like Rex was trying to deliberately create chaos" (1)
- "Often times, for state-to-state coordination, because "CONTROL" was not present or watching, he could not influence all parts of the game" (1)
- "The fact that I knew Rex was doing it all took me out of the game" (0)
- "I often forgot about Rex (as a human) entirely" (0)

trying to work out some of my thoughts before I had made decisions so I used backchannels for almost everyone."[c] In direct response, another player wrote, "[personally] I wouldn't have minded him hearing everything I said, because I trusted that he wouldn't do something shitty for the heck of it ... I think [Brynen's] reputation might make students overly worried that he's out to play evil tricks on them. And yet all the dirty tricks are played by students, rather than Control!"[d] These contrasting opinions illustrate the central role trust plays in in-stride adjudication: without player-adjudicator trust, players may resort to game-breaking alternatives such as private communication channels;[e] with trust, however, players automatically see in-stride games for what they are: free-flowing, player-driven interactions. It is up to in-stride adjudicators to sufficiently stress to players the impartiality of their ad hoc decisions.

Along the same lines, an essential part of building player-adjudicator trust is to ensure the "world" the adjudicator is creating in his/her head is effectively transferred to the players. Without attention to ensuring equal understandings of the game universe, players may misattribute issues arising from their misunderstandings as malicious acts of partiality or meddling on the part of the adjudicator. One extremely useful tool to minimize the gap between the player and adjudicator's understandings of the game universe is analogy. Within Brynania, analogies, such as descriptions of a fictional border as similar to the Yemeni-Saudi border, were used to clarify the adjudicator's view of Brynania and allowed for a point of mutual understanding between the player and adjudicator in an otherwise chaotic informational environment. Players greatly appreciated this "grounding" of the game in reality.[29] Allowing players to operate under the same assumptions as the adjudicator increases

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[29] For players, the analogies most appropriate may be dependent on the players' educational background; for political science students, for example, analogies to historical cases can ground both the player's understanding of the game in reality. Citing the similarities between Boer War-style concentration camps and the imaginary Brynanian camps 7 and 9 helped externalize the world as envisioned by the adjudicator. Of course, within in-stride adjudication, these types of decisions must come spontaneously as a result of a constant evaluation of how players are taking up information. A recalibration through the use of analogy may be a valuable necessity to correct misunderstandings within gameplay.

However, an issue arises when the image projection has to overcome differing cultural understandings and value judgments. Adjudicators who assume players can quickly "pick up what they're putting down" may face issues. Therefore, mechanisms to break down these barriers, such as analogies and narrative framing, should go hand-in-

players' immersion in the game by granting players a greater feeling of agency over and understanding of the game, instead of greater feelings of animosity and blame directed toward the adjudicator.

Maintain opacity: Don't pull back the curtain

In contrast, players may also benefit from not fully seeing the rapid and ad hoc process by which decisions are made in in-stride adjudication. Not allowing players to "peek behind the curtain" could be beneficial in two cases. First, in the case where the in-stride adjudicator has made a minor game error, transparency can, in fact, hurt the adjudicator's goal of fully immersing players in the game. If a minor error results in player confusion or frustration, the adjudicator faces an important dilemma: admit wrongdoing and possibly hamper players' confidence in the game, or lie and save the game's illusion of seamlessness? From a player's perspective, maintaining the illusion of perfection within the in-stride adjudication is often a more important consideration than complete honesty, at least during gameplay itself.[30] If the adjudicator were to admit during the game to having made a mistake, player confidence in the adjudicator to make proper decisions may diminish. This could lead to possible frustration with the game, instead of a systematic analysis of player decisions, which is so integral to a player's learning-by-doing in games. Players may come to dismiss negative outcomes as flaws in adjudication instead of as the direct product of their own actions. Here, once again, the issue of adjudicator-player confidence arises: when players metaphorically peek behind the curtain and discover the mechanisms by which in-stride adjudication occurs, narrative immersion and the authenticity of players' future actions may be jeopardized.

Second, in settings where professional or cultural hierarchies exist between the adjudicator and players, the simple fact that players know all decisions and game mechanics are at the discretion of the adjudicator may undermine their trust in the game as a whole and bring about angry and argumentative attitudes. Opacity may be a key tool to deflect blame and prevent

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hand with other game design mechanisms. Careful attention should be paid to ensuring and re-ensuring that what the adjudicator is putting out is being picked up—both intellectually and emotionally.

[30] Being fully transparent about any mistakes made by the in-stride adjudicator could be useful during a game debrief. From personal experience, this has proven to not only teach the complexities and difficulties of in-stride adjudication but also illuminates how important correct information is in both games and the real world.

hierarchical issues from breaking games, as such might be the case when an outsider adjudicator is contracted to run a game for senior military officials. Along the lines of Downes-Martin's concept of the "three witches" within national-security wargaming that, partially due to their senior status, have the power to make or break a game, authority and expertise imbalances have a direct impact on a game's need for opacity versus transparency (Downes-Martin 2014). As a university student having participated in Brynania as part of a course, I felt the opposite situation to the civilian adjudicator, namely of inferior knowledge and expertise in comparison to the adjudicator.[f] While feeling hierarchically less-than may itself negatively alter gameplay by minimizing the candidness players maintain during the game, it is not nearly as dangerous as having the adjudicator's decisions constantly undermined by players who do not trust their judgment. As opposed to the innate authority granted to a professor acting as an adjudicator for his/her students, games with hierarchical challenges like military rank may benefit from greater opacity in the explanation of how decisions are made. In situations where their decisions are questioned to the point where players are not fully immersed in the game, adjudicators may benefit from deflecting blame away from themselves onto something that some uncooperative players may not as vehemently question, e.g. lines of computer code.[g] While deflection onto computer code may not work for all scenarios, tactics to mystify the adjudication process and prevent players from seeing how the sausage is made constitute an important part of easing gameplay. These tools to deflect player doubt using vagueness or ambiguity allow the adjudicator to "hide behind the curtain" and maintain the mystery behind game decisions in order to protect the adjudicator from game-breaking ad hominem attacks.[h]

These two situations outline the importance of staying engaged in the game, particularly as it relates to how players decide whether games are credible enough to warrant total immersion. As Perla and McGrady argue, a player's engagement with the game narrative is an essential part of the internalization of lessons from the game (Perla and McGrady 2011, pp 111-113). Without the semblance of reality created by narrative-building and players' active participation in the constructed world, the integrity and authenticity of players' actions are compromised. In this way, any and all measures to minimize reminders to players of the rather

lax rules and the omnipotence of the in-stride adjudicator allow players to fully commit to the game and reap the benefits of full player immersion.

Conclusion

As with all game design, balance is essential. Balancing simplicity and accuracy, playability and realism, or enjoyability and seriousness is a hotly debated topic within game design evaluation (Sabin 2012, Perla 2012). Within in-stride games, an equally important balancing act is that of transparency and opacity in the in-stride adjudicator's relationship with the players. From a player's perspective, transparency can build trust and prevent game-breaking attitudes; opacity can increase player immersion and also prevent game-breaking attitudes. It is extremely important to cater game decisions to the environment they are applied in.[i] If in-stride adjudication is to be used in a setting where the authority of the adjudicator's decisions may be questioned or when the adjudicator makes a minor error, opacity may be more beneficial in maintaining player engagement. In cases where these are not issues, transparency is a welcomed addition to assuage player fears of game manipulation. Either way, trust in the game design is of tantamount importance. It is essential for game designers to recognize the situations when player trust would benefit from telling players to "pay no attention to that man behind the curtain" and when it would not.[j]

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Discussion

[a] Stephen Downes-Martin
Contradictory trade-offs are good, they force one to consider a (qualitative?) spectrum with different advantages and disadvantages at different locations on the spectrum. Questions arise such as:
Are there different clusters of advantages and disadvantages on the spectrum?
What should the response be to them?
Is there ever an advantage in having players be skeptical of the adjudicator's impartiality?

[b] Stephen Downes-Martin
Wouldn't a partial adjudicator also make the same repetitive claim of impartiality? What evidence or transparency method other than the adjudicator's claim could there be that the adjudicator is impartial?

Jason Li
There are multiple factors that certainly influence the absorption of claims to impartiality: existing relationships of trust between the adjudicator and player, game environments that breed trust (e.g. a classroom environment where players are more likely to throw skepticism to the wind, perpetuating the "suspension of disbelief"), and others. I added three sentences here to quickly discuss how those attempts can be influenced by exogenous factors.

[c] Stephen Downes-Martin
I have seen this behavior and claimed reason many times in Wargames by players who were senior military officers, diplomats and professors. Not only students!

[d] Stephen Downes-Martin
One of the informal "laws of wargaming" is "Players cheat!" They use their cell phones, meet in the toilets or dark corners, concoct codes for communicating on monitored channels, etc. They are very innovative in their cheating.

Jason Li
You're very right. I hadn't experienced this law firsthand until I played megagames—feeling the urge to cheat myself!

[e] Stephen Downes-Martin
This is an important distinction – between game-breaking cheating and rule-breaking cheating where the latter might provide information about flaws in the game design or information about the world being gamed. Having a mechanism for spotting and monitoring the cheating so the game controller can decide whether to allow it to continue or to softly block it is a serious challenge since the rule-breakers try to avoid being monitored!

Jason Li

There's both the rule-breakers' tendency toward secrecy, as you mention, but also the difficulties of distinguishing between rule-breaking and game-breaking cheating: where is the line? What sum of rule-breaking results in game-breaking? Who decides how big a deviation from the rules is a natural process of the game? And then, if an adjudicator is able to. This point raises many great questions.

[f] Stephen Downes-Martin

The distribution of expertise and power/authority between player and adjudicator cells is an interesting part of game design that might be worth exploring. For example, does the best balance of transparency versus opacity change with the distribution of expertise and power? How does the balance change if the adjudicators are civilian and the players military? Or both from the military but from different Services?

Jason Li

This is a really important point that we've all probably seen throughout game design. As a rule of thumb, I believe the balance should lean towards opacity when the adjudicator is looked down upon by players (either because of expertise or hierarchy) and I think this would apply in situations where a civilian adjudicates for military folk. Opacity allows the adjudicator to maintain authority by preventing questioning of his/her judgment (e.g. pointing at an algorithm and saying that decisions are out of his/her hands). Nevertheless, this balance most likely falls on a sliding scale. It's ultimately the job of the adjudicator to assess the level of opacity based on a number of factors: civilian versus military, senior versus junior, Navy versus Army, etc.

Merle Robinson

Personally I favor transparency as much as possible – but you can't explain to players how everything works if only due to time constraints.

Jason Li

Time constraints truly are an issue with trying to build in as much transparency as possible to increase player trust and, thus, immersion. In an ideal world, players would already know a game's integrity and would not question the validity of the claims of impartiality or the trust-worthiness of the adjudicator's judgments. However, time constraints, in addition to general player skepticism, prevent the full relaying of transparency during gameplay. This, once again, might be why debriefs are particularly valuable: they allow for full transparency without the time constraints of being in the middle of a game or pressures to personally win the game.

[g] Stephen Downes-Martin

Computer code is almost always challenged by military players who do not like the adjudication outcome! The half-life of an adjudicator who attempts to explain an outcome as "that's what the code said, sir", is really short. That said, your point about not letting the players see the adjudication sausage being made is an excellent one. The players will try

early on to game Control by making -- if you let them -- ever more detailed requests for information and will try to argue about adjudication. The latter takes them out of their game immersion.

Merle Robinson

Stephen makes a great point about those that will try to manipulate the adjudication process. Another way they do that is trying to monopolize the control staff's attention, so others' time is minimized.

[h] Stephen Downes-Martin

Never lie to the players. Once they catch you in one lie (no matter how white) you are doomed. They will use that one lie to challenge every decision they do not like no matter how honest you are from that point on. Be vague, or tell them "that's none of your business", "this is a game with objectives we have already described", "there obviously are deviations from reality", etc. Also make sure there is a possible (no matter how unlikely) narrative trajectory that results in the adjudication decision ... "yes, the outcome is terrible and not very likely but not impossible, and it happened this time, bad luck, now ... what are you going to do about it? Since it can happen, if it did in the real world what would you do? Your decision is due in x minutes!"

[i] Stephen Downes-Martin

The distribution of expertise and power/authority between player and adjudicator cells is a class of situations. It may be useful to suggest a research program to explore its effect on game design with reference to the balance between transparency and opacity. There may also be other classes of situation that affect the balance and it might be useful to suggest some.

[j] Stephen Downes-Martin

It may be useful to categorize such situations, or to suggest a research program for discovering them and their effect on the balance between transparency and opacity.

Merle Robinson

One thing to think about is whether we could build a chart with an 80% solution showing the hallmarks of varied situations, outlining situations and suggested approaches.

2.8 Dealing with Problem Wargame Participants

Merle Robinson, murno.robinson@gmail.com

Merle S. Robinson is a retired DoD Civilian Analyst and Wargamer. He has extensive experience with RPGs, military miniatures and board wargames. He has been the lead wargame designer for the National Security Decision-Making Game (NSDMG) since 2001, has led more than 450 PMESII Wargames and delivered over 200 seminars on related topics. He is a graduate of the Military Operations Research (MORS) Wargaming Certificate Class, a Lean Six Sigma Black Belt with extensive DoD experience in information technology, analysis and process improvement. He is the Outreach Director for the Connections US Wargaming Conference.

Introduction

As the pace of change in our world accelerates, service providers have been pressed to provide near-instant gratification for users of virtually any product. Wargames are no exception. In large multiplayer / multisided games,[31] where significant player social interaction exists, this trend has manifested in the increasing use of in-stride adjudication. Professionals in this area have had to develop new approaches to speedily deal with the challenges created by in-stride adjudication. These challenges include problem behaviors exhibited by players that are either enabled or amplified explicitly by using in-stride adjudication. This paper focuses on setting and using the Magic Circle[32] environment to provide early and rapid recognition, and to prevent or mitigate the consequences, of these problem behaviors by the constructive use of player behaviors, motivations, and archetypes.

I use a multi-disciplinary approach drawing on concepts developed in computer gaming, public commercial role-playing games, and over twenty years of experience with directing PMESII wargames held in public, academic, and DoD professional venues. I make two assumptions for the purposes of this paper:

> ➢ Serious wargames don't prove anything but can provide insights.
> ➢ Some player behaviors interfere with insight identification by negatively impacting the "noise to signal ratio" for observation and analysis.

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[31] Such as professional or public PMESII live action role playing wargames.

[32] For more about the Magic Circle in gaming see Appendix 1 and listed references.

Succeeding with Serious Wargames

Building the Magic Circle → Success

All wargames involve players making decisions in an artificial environment intended to focus thought on specific issues. Where multiplayer wargames involve significant player social interaction (generally direct or indirect dialogue), the critical element for success of the game is achieving player immersion within the "Magic Circle" created by the designer. The "magic circle" establishes the boundaries of play. Whatever methods used to socialize players (written rules, verbal narrative, visual presentations and use of play aids) the best wargames successfully appeal to the emotional, intellectual, and visceral background of the participants. This helps immerse them in the game by suspending disbelief of the assumptions, abstractions and compromises made to have a playable tool. This is the fundamental requirement to maximize insights for a PMESII wargame.

Breaking the "Magic Circle" → Failure

Any behavior or action that breaks the suspension of disbelief regarding your wargame's Magic Circle can lead to rapid failure. Although poor research/analysis by the designer, poor orientation, poor adjudication, player action/behaviors can all create failures- the rest of this paper will deal only with the impact of those issues and how to mitigate problems.

What is the National Security Decision Making Game?

A not-for-profit volunteer group operating since 1990 offering unclassified live action role-playing PMESII wargames (political, military, economic, social, infrastructure, & information systems) and related seminars at:

- ➢ Hobby Conventions
- ➢ Academic Institutions
- ➢ Professional venues

NSDM runs wargames covering Cold War, Contemporary and Near Future periods.

The focus of the game is on how individuals make decisions in systems with varied resources and structural, political, cultural, and information environments.

Created by two naval officers when serving at the Naval War College (NWC), the games are firmly based in that tradition but has evolved now including additional educational / hobby gaming techniques.

The group can be contacted via their Facebook page at: NSDM-The-National-Security-Decision-Making-Game.

Mitigating Player Problems 101: Pre-Game
(Preparation Prevents Problems)

Provide Compelling Guidance

Whenever possible provide visual, auditory, and kinesthetic introductory material (dynamic presentations also help). Tell players who to approach on the staff if they have issues.

Know the Players

In wargames no plan ever survives contact with your players. Although often unavailable, knowing player backgrounds (professions, interests, and play style) is absolutely the best defense against problem behaviors. Armed with knowledge allows you match players to types of roles they best fit.

Understand Archetypes[33]

If you have done well in the earlier steps, most players will roleplay based on your guidance. Those that understand and share the wargame's objectives will generally help with whatever the game director asks. Sometimes due to the complexity of human behavior and the limited information available, we rarely have full understanding of player motivations. Thankfully due the effort of other professionals examining game play, we now have guides (useful but imperfect tools) covering commonly observed player behaviors to assist us in game management.

Mitigation Techniques

Pre-Game
- ➢ Compelling Guidance
- ➢ Player Knowledge
- ➢ Understand Archetypes

Discovery
- ➢ Observe
- ➢ Orient/Assess

Intervention
- ➢ Decide/Evaluate
- ➢ Act

Post-Game
- ➢ Debrief
- ➢ Analyze

From https://www.seba.blog/2017/07/ooda-loop-method-for-dealing-with-uncertainty/

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[33] See Appendixes 2 & 3 for information on Archetypes.

Mitigating Player Problems 201: Discovery

(Early Detection Allows Adjustment)

Observe: Identify Problem Behavior

Most players will modify their behavior with improved guidance. Inappropriate game behaviors can either be trivial, significant, or critical. They come from:

1) Poor understanding player role/goals

2) Sensory stimulation (too much or too little)

3) Personal approach to gaming (archetypes)

4) Hidden motivations, or agendas

5) Failure to "buy-into" the game (state of disbelief)

Game directors need to maintain constant vigilance for behavior that will distort or derail game objectives. Such vigilance allows timely assessment and opportunity to intervene before adverse consequences accrue.

Orient/Assess: Understanding Options

Using the archetypes of observed player behaviors, game directors can assess likely causes through judicious dialogue. They can ask players what they are thinking. Wise staffers understand they won't always tell you the truth, but the process minimizes your risk of stereotyping a player just based on observed behavior.

There is no substitute for experience in developing the skill to assess human behavior. It is an activity fraught with risk of error. While being on guard against our personal prejudices (appearance, race, professions, etc.) – this is an essential task to ensure success.

All listed inappropriate behaviors deserve attention to maximize your games' success.[34] Act on each based on order of severity:

| Behavior issues & Common causes	Severity
Poor understanding player role/goals Gaps in information supplied or player attention lost at role assignment	Significant
Sensory stimulation (too much or too little) ● Bored (withdrawn or distracted) ● Over-stimulated (isolated or emotionally distressed) ● Frustration from failure to gain traction in the game	Variable Low to High
Personal approach to gaming (archetypes) ● Those that draw others out of play in significant ways ● Those that abandon their game role to act out	Variable Low to High
Hidden motivations, or agendas Those playing another game within the game ● Focus on ensuring victories or failures for things unrelated to their role (example: the new weapon system must fail) ● Focus on targeting specific individuals without reason (example: someone that is not a direct competitor must fail) ● Focus on acting out (example: someone playing a charity that is determined to be the terrorist in the game)	High
Failure to Buy-into the game (state of disbelief) ● Individuals disagree with game assumptions, approach or goals ● Experts who may be better/worse informed that the game designer ● Those with personal issues Special Notes - this also includes: Spontaneous disputes over staff adjudication (example: That action could NOT sink a carrier!)	Critical

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[34] Dysfunctional player types are shown in Appendix 4.

Mitigating Player Problems 301: Intervention
(Timely action saves the game)

Decide: Determining what to do

Determining remedies if and how to mitigate player problems is a judgement call based on staff experience and knowledge of the players. Also, it has to be balanced against the primary game constraints of staffing and time. Recognize that for minor issues the best answer can be doing nothing. Also, some players may need multiple different interventions. However, for times when action is required here are my most effective approaches:
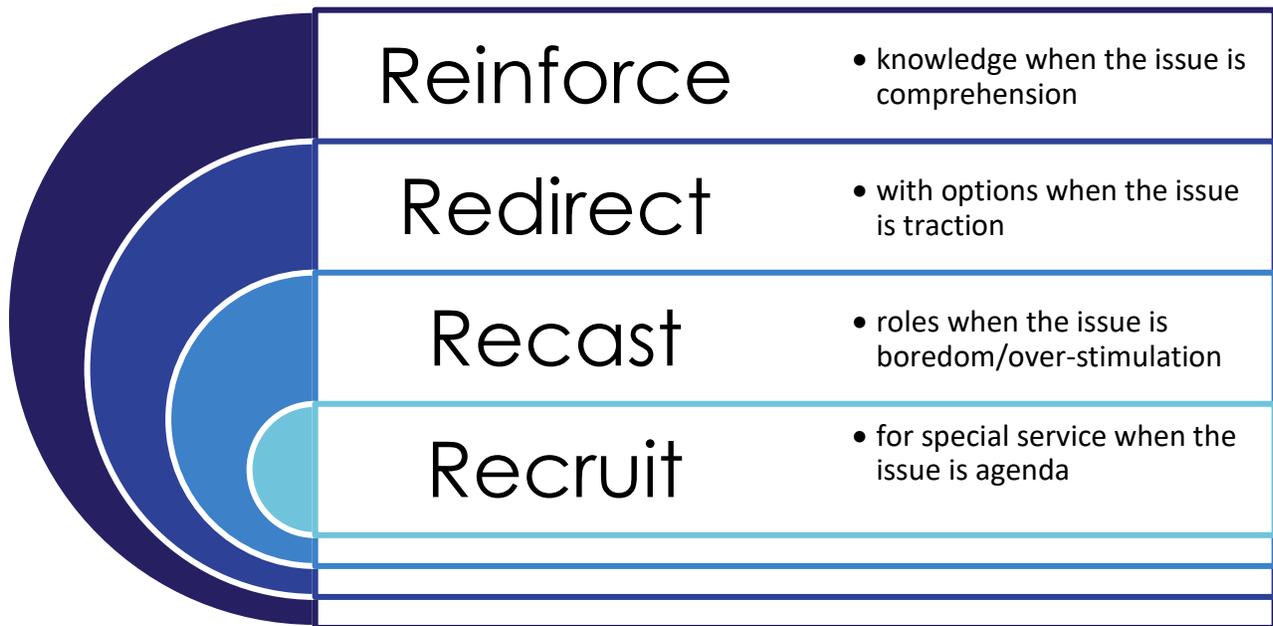
Reinforce	• knowledge when the issue is comprehension
Redirect	• with options when the issue is traction
Recast	• roles when the issue is boredom/over-stimulation
Recruit	• for special service when the issue is agenda

Merle's Mantra for Mitigating Player Problems

Reinforce – Many players struggle to understand the essence of a role, don't recall key data from the in-brief, or don't know information assumed in the design. The staff needs to reinforce the basic motivations/abilities of the role, explain key processes/terminology and answer questions.

Redirect – This is when the player seems to understand the basics but may not be acting in character or fails to get traction in the game. The staff needs to validate the player is relating to the role and see some play options. If they don't have all of these, they tend to get frustrated and that will force a recast.

Recast – Moving players to other in-game roles when they haven't embraced their place in the magic circle or have a personal/emotional response is a way to engage them. There are two ways this occurs:

1. Sometimes for a player to embrace a role requires a more challenge than their initial role (they're bored). Matching them with an activity/role that interests them provides a chance for engagement.

2. Sometimes intensity/pace of a game (due to intense social contacts or information overload) can initiate a player shut-down/meltdown. These players indeed placement where the flow of contacts or information is more controlled so they can effectively function.

How to recast? Some games make recasting more difficult due to rigid role structures but often creative redefinitions can improve the situation. Examples include:

➢ Move them from one player team to another.

➢ Have a senior competent players adopt/mentor them

➢ Splitting a current role that seems overloaded (two play one role with one as senior)

➢ Converting a non-player role to a player role where there are choices to be made (this requires on the fly verbal instruction on scope/play limitations)

Dealing with the player gap: Moving player can mean replacing them. Consider doubling up roles using competent or under-utilized players. Alternately, assign a staffer to simulate it. Even if the replacement is sub-optimal, playing a role poorly is often better than having it not played.

Recruit — Reserved for your most serious challenges. It is your last line of defense short of ejecting players from your game. The solution is to make the player part of the staff and responsible for a set of activities.

When to use this >	How to use it >
Can be used for struggling players: • **Not grasping roles** • **Who are bored** • **Overwhelmed by game intensity/pace** **when there is no-game position to recast them into**	Mentor is assigned to coach player. Player becomes a facilitator. In PMESII games they facilitate a specific nation, a terror group, the UN or become the announcer for game injects.
Can be used to sideline those exhibiting dysfunctional or severe archetypal behaviors: • **Cold blooded killers** • **Cheat** • **Spoilsports** • **Extreme socializers** **To be done with caution!**	Mentor is assigned to restrain behavior. Player becomes a highly focused facilitator. Experience suggests the more challenging need high activity tasks with structured constraints. For example, gathering game events for news updates with limits on how long they can spend with individuals so proper play can continue.
Can be used for those you have discerned have a hidden agenda that would invalidate the game <Sometimes these can be senior officials>	Ask them to change roles and be an official observer to take notes on what they think are anomalies or poor play for assessment in the After Action Report (AAR). Assign a staffer to solicit/document their opinions as play progresses
Real or imagined experts	If they know more than you OR they just disagree with your approach – make them an official observer taking notes & comments for examination in the AAR to improve the next one. Evaluate in your AAR.

Ejection (Some days you can't win) – Truly disruptive players cannot be tolerated. If they won't work with your guidelines at all – they have to go. This includes those engaging in inappropriate physical contact, threatening offensive language, or is solely disruptive to the game. Do not hesitate to report these issues to appropriate authorities.

Act: Implement your plan

There are several essentials in implementing any change in player roles:

1. Introducing the change

    a. Affirm how much you appreciate the player's participation.

    b. If they are having problems, share how you want them to enjoy, learn and contribute to the game. Then invite them to try a new role that will help the game and that you expect will give them a better time (In over 450 games no one has refused this offer).

    c. If they are "the" problem. Share how much you need them to take on a new and important role to help ensure success of the game.

2. The truth – and nothing but the truth

    a. Be professional during any recast or recruit action.

    b. Take extreme care with your language when conversing with those you are moving. Every argument you use needs to be factual. The points above are true based on your analysis. However, you don't have to tell your players all of your reasoning.

3. Remember - changes still need to be monitored

Mitigating Player Problems 401: Post-Game

After Action Reporting

Serious games aren't complete until player feedback is compiled, staff has been debriefed, gathered data is reviewed, and results analyzed (to determine what worked what didn't). If done properly this will includes assessment of your team's performance with player management.

Conclusions and Recommendations

Players have motivations and approaches to activity outside those assigned in the "magic circle" of our wargames. In the absence of detailed information about your players, there is no predictive tool that assesses whether they will experience trouble or "be" trouble in your game. Furthermore, in the resource constrained world of serious games, making timely quality decisions on interventions is difficult. However, using observations of behavior and archetypes seen across the broader spectrum of the gaming world can be a useful tool for use in player management.

Disclaimer

All opinions represented in this paper are my own and not necessarily those of any group or organization I have been a part of. All material used in this document is unclassified (I never handled something important anyway). Errors in fact or references are my own and making the manuscript error-free is left as an exercise for the reader.

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Appendix 1: Overview of "The Magic Circle" Concept

The Magic Circle becomes a special place in time and space created by a game …

Creating the freedom to …

4. Change
the World

3. Make a
Choice

2. Believe
Alternatives

1. Suspend
Disbelief
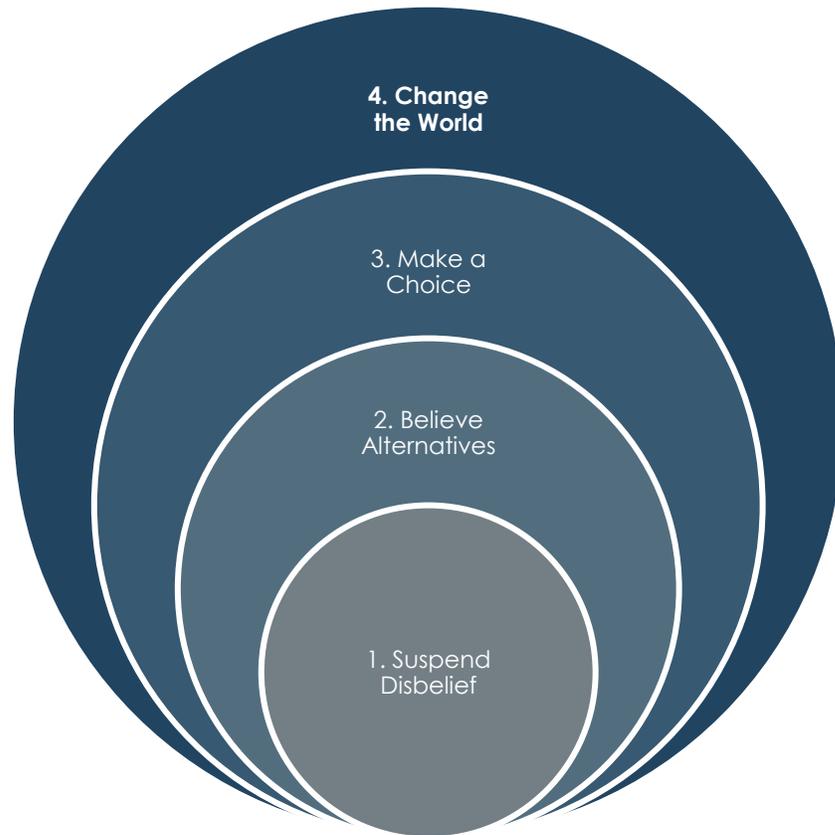
Appendix 2: Overview of Bartle's Taxonomy

Looking at motivation and Primary Model: Bartle Taxonomy of player types was originally to describe players in multiplayer online games and originally used a test online to classify them (Bartle 1996, Kumar, Herger and Dam).

This diagram is copied from (Kumar, Herger and Dam). The synthesis in the table below is derived from the same article.

Types	Description
Achievers	Single Player games: Loves games that can be "beaten" Drawn to games that offer special bonuses for good play Multi-player games: Love to show off their skill and hold elite status. Look to the Socializers to give them praise Subtypes: PLANNERS & OPPORTUNISTS
Explorers	Single Player games: Love winning by paying close attention to detail and solving puzzles, getting the game to do something its creators didn't intend for it to do Multiplayer games: Love to be surrounded by people who will benefit from their wisdom. They get bored when they feel the game has become a chore to play Subtypes: SCIENTISTS & HACKERS
Socializers	Single & Multiplayer games: Love to socialize with others (in and out of game) Subtypes: NETWORKERS & FRIENDS
Killers	Single & Multilayer games: Love mayhem. Revel in high in carnage, action, and destruction. May enjoy harming others or the thrill of the hunt (prey & loot). Often, they try to anticipate opponent's moves. Bored Killers can be a threat to the success of most games, Subtypes: POLITICIANS "Den Mothers" & GRIEFERS

Appendix 3: Playnomic Types
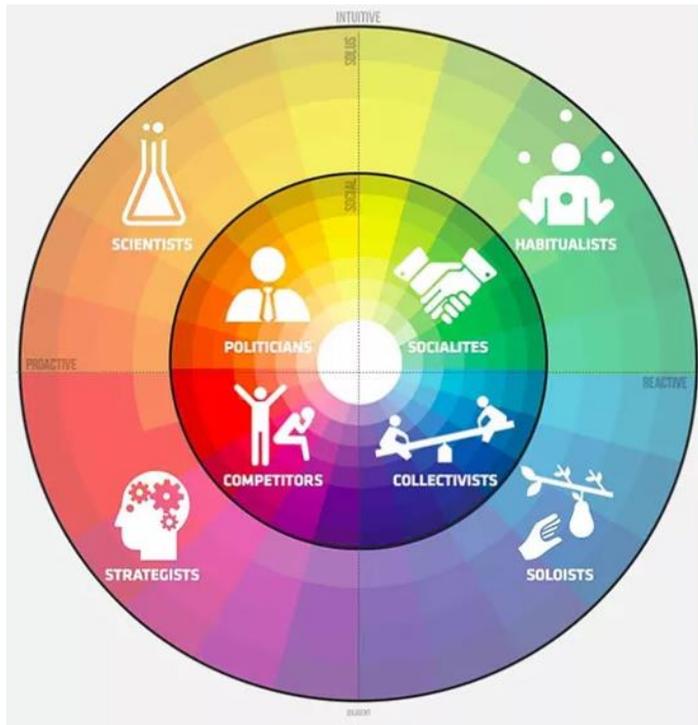
Playnomics
"Eight Fundamental Types"

These two diagrams are from (Fahey 2012)

SCIENTISTS
Try new things and apply learnings.
6% OF UK POPULATION

POLITICIANS
Getting ahead by adapting to people.
22% OF UK POPULATION

SOCIALITE
Connecting to others at all costs.
7% OF UK POPULATION

HABITUALISTS
Seeking repetitive pleasure feedback.
5% OF UK POPULATION

STRATEGISTS
Control environment to suit skills.
32% OF UK POPULATION

COMPETITORS
Gaining respect. Beating everybody.
11% OF UK POPULATION

COLLECTIVISTS
Follow social norms with badges.
11% OF UK POPULATION

SOLOIST
Security & controlled environments.
5% OF UK POPULATION

Appendix 4: Dysfunctional Modes

The tables below are derived from (Connolly 2013). See also (Suits 2014).

Dysfunctional Modes	
Approach	**Description**
Power Gamer	Focus on technical strategy. They want to "win". Often view the GM as their opponent. Sometimes an expert with better/worse information than staff.
Derailers	Focus on people. Not picky about what they talk about. Easily distracted from the task at hand. Frequently drop out of character.
GameJacker	Someone with lots of their own ideas. Dislike the lack of control that comes with being a player. Try to steer the story to fit their own ideas/preferences. May have extensive secret agenda.
The Joker	Roleplay in a wacky and silly manner. Jokers want to break the game mechanically or socially.

Comparison of Dysfunctional Styles to point of view		
Players	Recognize rules and goals.	
Trifliers	Recognize rules but not goals. Go through the motions or playing another game within a game.	
Cheats	Recognize goals not rules.	
Spoilsports	Recognize neither rules or goals.	
	Subtypes	
	Saboteurs	Willful disruption/diminishment of performance / achievements of others.
	Schadenfreude	Deriving pleasure in others losing or suffering.

2.9 View from the Hobby World

Peter Perla, peterperla@aol.com

Peter P. Perla earned a PhD in probability and statistics from Carnegie-Mellon University and joined the Center for Naval Analyses (CNA) in 1977 as a naval operations research analyst. He is currently semi-retired. In 1990, the U.S. Naval Institute published the first edition of his book, The Art of Wargaming. It was republished by the History of Wargaming Project in 2011. Dr. Perla has published articles and columns in both the professional and hobby wargaming press, and has designed or developed more than 20 games for the government and the commercial boardgame and computer game industry. His writing has received a Hugh Nott award from the Naval War College Review and a John K. Walker, Jr. award from the Military Operations Research Society (MORS). Dr. Perla is one of the instructors for the Wargaming Certificate course sponsored by MORS, beginning in 2016. In 2017 he received the first award for Lifetime Achievement in Wargaming by the Connections Wargaming conference.

I have heard it repeatedly. "Our wargames need in-stride adjudication!" These words are usually spoken by players of professional military game who want to give their orders to game Control and have the latter report back the results immediately. Well, at least pretty fast. Or at least as fast as possible. And to the players, what's possible is almost always faster than they seem to get. There can be many reasons that players want this. Some of them are even good and valid reasons. Mostly, though, players seem to be reacting instinctively, wanting immediate gratification for their decisions. To me, however, there is only one reason that game sponsors, designers and controllers should take these desires seriously enough to address the issue. That reason is to maximize the substantive involvement of the players in the central processes of the game. And those processes involve their coming to grips with the state of the game, making decisions to drive that state where they want it to go, and acting to implement those decisions efficiently and effectively. In other words, the OODA (observe, orient, decide, act) loop of John Boyd. It is the central role of this synthetic player experience of real-world decision processes that I focus on in this paper.

For our purposes, then, here is what we mean by in-stride adjudication:

> Our current interpretation of "in-stride adjudication" is that it is continuous, i.e. no move steps with a pause while the adjudicators do their stuff and the players do something else. Players plan and decide continuously as do adjudicators. By adjudication we mean the deciding the outcome when protagonists' decisions

clash. But we are flexible on the interpretation, indeed disagreement on the interpretation will probably create better insights into the topic.[35]

There are several perspectives on the theoretical and practical issues associated with in-stride adjudication. One perspective, pioneered by Stephen Downes-Martin, considers the adjudicators themselves as players in the game, and hence their decisions as important and worthy of study as those of the nominal players (Downes-Martin 2013). Another perspective, championed by my colleague Dr. Ed McGrady, focuses on the sort of games known as "free *kriegsspiel*" (McGrady 2018). The latter is a technique derived from Prussian practice in the late 19th century and one dominated by a human umpire (or controller in modern parlance) empowered to describe results flexibly, with minimal involvement of hard data or mathematical combat models (Perla 1990, Vego 2012).

I am going to take a different perspective, a hobbyist's perspective. I do so because I am a hobby wargamer and an amateur historian of wargaming. To a great extent, hobby wargames through the ages place even more emphasis on the player's experience than do professional games (games played by and for national-security or other "serious" professionals). And in-stride adjudication seems directed primarily at enhancing the player experience.[a]

When I first started working on this paper, I planned on taking an expansive and typically theoretical tack. But as I typed that approach started to make my head hurt. There is so much to this issue, so many threads to pull apart and weave back together. One of the threads that kept gnawing at me was my old friend H.G. Wells and his Little Wars book (Wells 2013). In many ways, Wells and his book were one of the midwives who helped with birthing the modern wargaming hobby. Many people today look at his game as a quaint antiquity. Shooting spring-loaded cannon at toy soldiers standing on hills made from stacks of books. What could he possibly have to say of any interest and value to wargaming today—and in-stride adjudication in particular?

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[35] This description is extracted from the invitation to participate in the panel discussion on this topic at the Connections 2018 Wargaming Conference.

What many who did not read the entire book, including its appendix, may not realize is just how much professional soldiers of his time, just before The Great War, saw of value in Little Wars. And the effort Wells took to suggest ways of adapting his toy game to more serious purposes. I'm not going to describe the details. Those really are not very relevant today. But I do want to recount some of the key words he used and suggest some general approaches to applying them to modern wargames.

I begin with some of the opening lines from the appendix, in which Wells describes how officers of the British Army tried to persuade him to adapt Little Wars to improve the use of wargaming beyond the then fashionable employment of Prussian/German-style free kriegsspiel:

> "They tell me—what I already a little suspected—that *Kriegspiel*, as it is played by the British Army, is a very dull and unsatisfactory exercise, lacking in realism, in stir and the unexpected, obsessed by the umpire at every turn, and of very doubtful value in waking up the imagination, which should be its chief function."

How many of us have sat through any recent DoD wargames that actually challenged players with the unexpected, and energized them with the intellectual and emotion conflict that drives the players into intense competition? How many of those games met Von Reisswitz's desiderata for his original kriegsspiel – that it should be "entertaining and fascinating" rather than "a merely painfully embarrassing business?"[36] Wells' diagnosis of our modern failures is clear (Wells 2013, Appendix). Too many games lack "stir and the unexpected." They are "obsessed by the umpire [or game Control!] at every turn." They fail "in waking up the imagination," which should be their "chief function".

Most surprisingly, perhaps, Wells's criticism of the highly professional games of his time – played by highly professional players – begins with damning their lack of realism. But how could that be? Was the kriegspiel not based on history and the professional judgment of men with first-hand experience of combat? Yes, but. By burying players in masses of statistics obtained by

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[36] I have relied on one of, if not the very first, English translations of the original Reisswitz *Kriegsspiel*, translated and published by wargaming hobbyist Bill Leeson. Kriegsspiel: Instructions for the Representation of Military Maneuvers with the Kriegsspiel Apparatus, by B. Von Reisswitz, 1st Lieutenant of the Prussian Army, 1824. Printed in England by Netherwood Dalton & Co., Ltd. Huddersfield, 1983. The "entertaining and fascinating" expression appears on p. 33, and the "merely painfully embarrassing business" expression on p. 34.

mixing hard data from a huge range of situations, or by relying on the limited experiences of one or a few subject matter experts who colored their judgment with their own prejudices, the games failed at a key goal. They did not give the players the sort of experience that a game environment could, in fact, represent realistically. Turn-of-the-century kriegspiel could not recreate the noise, the smoke, the fear of life-and-death combat any more than a modern first-person shooter can. But the technology of Wells's spring-loaded cannon and toy soldiers did a better job of recreating the elements of the decision-making environment that games were – and are – capable of representing. The stimulation of an active and creative enemy to our stir our imagination and creativity, the unexpected challenges generated by that opponent's maneuvers, and the uncertain outcomes resulting from the pegs flying from his toy cannon.

Wells's appendix does not claim to present a fully developed set of rules for an alternative professional kriegspiel. Instead, it presents a framework based on Little Wars for incorporating changes into the kriegspiel which would push it toward the goal. He summarizes his contribution in these words:

> "We place this rough sketch of a *Kriegspiel* entirely at the disposal of any military men whose needs and opportunities enable them to work it out and make it into an **exacter and more realistic game**. In doing so, we think they will find it advisable to do their utmost to **make the game work itself, and to keep the need for umpire's decisions at a minimum**. Whenever possible, death should be by actual gun- and rifle-fire and not by computation. **Things should happen, and not be decided.** We would also like to insist upon the absolute need of an official upon either side, simply to watch and measure the moves taken, and to collect and check the amounts of supply and ammunition given up. This is a game like real war, played against time, and played under circumstances of considerable excitement, and **it is remarkable how elastic the measurements of quite honest and honourable men can become."** (Emphasis added.)[37]

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[37] I am indebted to Stephen Downes-Martin for pointing out two very interesting academic papers (Mazar, Amir and Ariely 2008, Kocher, Schudy and Spantig 2017) related to this subject of dishonesty in group endeavors. I unreservedly agree with Stephen's cogent summary of the research (email communication 5/26/2018):

> "There is a stronger inclination to behave dishonestly in groups than individually", resulting in group decisions that are less honest than the individuals would tolerate on their own. Furthermore, the group discussions tend to shift the individuals' post-discussion norms of honest behavior towards dishonest. First the discussion tends to challenge the honesty norm, then inattention to one's own moral standards (during the actual discussion) and categorization malleability (the range in which dishonesty can occur without triggering self-assessment and self-examination) create the effect that "people can cheat, but

It was up to the professionals to make the game technically realistic and more exact in its representation of combat. But the guidance he gave emphasizes the game-playing dynamics that must be honored if that technical effort is not to be wasted. It is the interplay of these key elements which has driven the evolution of the modern hobby wargame and can help improve in-stride adjudication of professional games:

- Make the game work itself.
- Keep the need for umpire decisions to a minimum.
- Prevent even honorable players from twisting things in their favor, intentionally or unintentionally.
- Things should happen, not be decided.

Easily said, but how do you do it? Hobby games, particularly boardgames and computer games, tie together some or all of these elements almost as a matter of necessity, but their approaches differ fundamentally. Computer games let the machine work out the mechanics while the players make decisions and use their joystick or mouse to direct icons on the screen to do their bidding. Speed of adjudication is, in fact, almost instantaneous. The players quickly learn what happened but usually not all the reasons why. And when the results run counter to their own understanding, intuition, and experience they have little recourse but to complain – usually that the game is broken. It is as if there is an almighty umpire encased in the bowels of the computer.

Boardgames work themselves by integrating the players directly into adjudication—not by empowering the players to decide outcomes based on their own understanding, intuition, and experience but rather by working the mechanics of a pre-defined adjudication system, often by rolling dice, playing cards, or taking some other physical action. It may not be Well's toy cannon, but it is as close as we can get to enabling the players to take ownership of the risk their actions entail and giving them agency to act in accordance with their weighing of the risks and benefits.

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their behaviors, which they would usually consider dishonest do not bear negatively on their self-concept (they are not forced to update their self-concept)".

See also (Downes-Martin 2018a).

British professional wargamer Graham Longley-Brown tells an important story. At a particularly crucial point in a game he was facilitating for the British Army, the commanding general faced a decision. Graham took a big chance and handed him a large rubber six-sided die. I will allow Graham himself to take up the tale (Longley-Brown2012):

> "The success of the plan being wargamed was predicated on breaking through an enemy blocking position, and the HQ staff had applied sufficient combat power so that the supporting operational analyst assured them that the force equivalency ratio was 3:1 in their favour. Everyone breathed a sigh of relief and assumed the attack would, when the time came, succeed. We all 'know' that a 3:1 ratio ensures a brief fight then home for tea and medals. Or does it…?
>
> I asked the analyst what 3:1 *actually* meant. He told me that it gave an approximately 70% chance of success, based on historical analysis of planned attacks versus a hasty defence. I translated 'approximately 70%' to 66% for obvious reasons explained below.
>
> At this point (and knowing him quite well) I approached the General Officer Commanding (GOC). Armed with the analyst's figures I gave the GOC the self same large rubber die and asked him if he would be happy rolling it in front of his peers and commanders when his plan was executed. If he rolled 1-4 his plan worked, but a 5-6 meant his plan failed; the enemy would remain firm and the entire corps plan stall. With almost no hesitation he called his COS and the plan was revised; more combat power was applied to increase the chances of success.
>
> **So what?** The point of the story was to illustrate:
> - **Holding the die represents the owner of a plan holding the risk**.
> - **Considering rolling the die in front of peers and superiors makes the point that you only get one shot, and you will be judged on it**.
> - **This also emphasises the fact that the plan will be executed; it is not just a planning activity**.
> - **Understanding the numbers is what OA brings to the party."**

The general did not argue with a human umpire about why his plan should automatically succeed, but he took ownership of the risk and accepted the agency of holding the dice. Instead of complaining or arguing, he demanded better performance from the plan. That feels more realistic to me than clicking on the computer screen or even debating the merits of the plan with a human umpire subject to the danger than even an honorable man might find his judgment influenced by personal or sponsor agendas. And, incidentally, it highlights that the proper role of operations analysis (OA) is to help commanders understand what the numbers mean—and what they don't mean.

Today's sponsors, players and adjudicators are too often persuaded that technical accuracy in representing the performance of even physical and electronic systems is the necessary basis for realistic game play. Yet historical experience argues that predictions of performance – especially for "paper systems" and developmental concepts – are ephemeral; that conditions of actual use in conflict are seldom consistent with the assumptions used to estimate that performance. Instead, allow me to reword the four key desiderata of in-stride adjudication, based on Well's insights, which will help make today's wargames entertaining and fascinating, as well as educational and insightful:

- Players should take ownership of their decisions by taking a physical action that is analogous to or at least representative of the corresponding real-world activity.
- The outcome should flow quickly and seamlessly from the interaction of all player decisions and be illustrated to the players in a manner analogous to the way that they would learn about the real-world outcome and with a similar level of detail and precision.
- The players should be able to understand why and how the outcomes resulted from the interplay of actions in ways once again analogous to how they would understand those outcomes in the real world.
- **Things should happen and not be decided.** Players should be able to articulate their cases and accept their risks, but final outcomes should be beyond their agency, much less their control.

My instinct – not to be confused with reality or received wisdom – is that this final point is key. I only wish I had a better idea of how to do it! I do love the phrase; Wells was a great writer after all. I want to elaborate on it but I feel like translating pop guns into dice rolls or random number generation from a computer feels lame.

During roughly the same period of history, the early 20th Century, Fred T. Jane (of Jane's Fighting Ships fame) proposed a tabletop (or more likely a floor) game of naval combat in the era dominated by the naval gun. To resolve the fall of shot, he demanded the players estimate the range to their target. If they got that range close enough to score possible hits, he invented the use of a small frame across which was stretched a paper representation of the target. The firing player then struck at the image with a small paddle holding an off-center pin or nail point. The paddle made holes in the target image, determining whether and where the ship was struck. His detailed tables of armor and penetration of shells then determined the final result. This combination of something happening and something being decided by tables may hold

some lessons got resolving modern anti-ship missile combat. But no one will ever adapt it for a serious DOD game.

As a result, the best I can come up with at the moment is to suggest that results flow from something more than player argumentation and umpire decisions. The most promising approach I have seen is called the Open-Ended Machine (Blouin 2011). It is a variant of the newly faddish Matrix Game technique (Curry and Price 2014, Curry, Engle and Perla 2018). The essence of the approach is to allow players to argue about the nature of the action they are trying to undertake and the relative likelihood of results, but then to resolve the final outcome using the roll of dice based on those arguments, but not simply on the arguments themselves.

The problem, of course, is that players who have made good arguments and roll bad dice get very irritated about the dice. "I didn't know we were playing a dice game!" It's different in the real world--when you do all the right things but get a bad result, you may feel like you were unlucky, but you don't ask God to re-roll the dice! Hence, the more influence you give players over the result of a stochastic process, the more unhappy they are when the process comes out against them. As yet, I see no easy way around this.

How many boardgames have we played with fixed and known results tables that we complain about because we roll dice badly, though that is our only influence on the outcome? Other approaches completely eschew randomness, creating almost chess-like systems. For example, Professor Phil Sabin of King's College London created a game of the opening campaign in France and Belgium in 1914. Titled *Kriegsspiel 1914* the game system resolved combat merely on the basis of the number and status (fresh or spent) of the opposing units, relying for variations and uncertainty on the interaction of pre-programmed orders from both sides (Sabin 2014). Other systems explicitly give the players direct if uncertain influence over results through the use of tactics cards. Each side selects a card from their options and the cross-indexing of the cards on a results matrix determines the outcome (Herman 1993). One problem is that if you give the players the matrix, they can go for a minimax solution to the resultant mathematical game. If you do not give it them, then they complain or, if they are wise, they start collecting data to fill out the matrix. This latter is at least analogous to the real world,

where you may have an inkling of the likely range of outcomes but not until things start to happen do you begin to understand the actual distribution.

One of my favorite examples of innovative approaches to producing outcomes for boardgames is found in Joseph Miranda's "almost brilliant" chit-pull combat system for his game "The Franco-Prussian War" (Miranda 1992). Instead of a classic dice-based combat results table (CRT), he put the possible outcomes on cardboard counters held in a cup from which players drew blindly to resolve combats. If only he had gone one step farther and had some of the counters removed at random before the start of play! Then players would have had to develop their understanding of the CRT in play during their match by analyzing the nature of counters drawn rather than simply looking at the fixed distribution of the full set of them. Yes, astute players could calculate the compound probabilities before starting play, but the actual distribution in that particular match was not knowable until they had drawn all the counters at least once. Maybe this is the way to go for future DoD games, with the "happening" being the counter draw – not quite a die roll against a fixed table.

In the end, implementing some version of Wells's suggestions probably requires freeing adjudicators to facilitate players rather than to control them – by clearly describing the processes involved in defining decisions and their adjudication; by articulating the transfer of agency for outcomes from the players to the adjudicators, and even to the game system (or to dice!); by enabling players and adjudicators to work together to the predefined game systems to deal with unexpected situations and innovative actions. Ultimately, by focusing more on the player experience and less on technical speculations.

For the player, these are the aspects of game experience that are most valuable to real-world learning and experience:

- Accept your agency. Don't just talk about what you would do; do it physically using the game materials; move a piece, play a card, give a speech.
- Take ownership of your risks. Assess those risks and act on that assessment; roll the dice.
- Learn from experience to improve your assessments of risk. What dice roll do you really need, and what can you live with?
- Learn how your opponents think and how to outthink them. What games are you and they really playing, chess or Go?

And so, I conclude, as Wells did, with the following:

> We believe that the nearer that *Kriegspiel* approaches to an actual small model of war, not only in its appearance but in its emotional and intellectual tests, the better it will serve its purpose of trial and education.[b]

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Comments

[a] Merle Robinson

You may be on target for professional play. However, in my experience, working in other venues (conventions, business events, and sometimes academia) it is to maximize decision-making and play time. Why? Time with the participants is the primary constraint. Even if you are doing post-game analysis you have a short-fixed time-frame for play.

Peter Perla

I'm sorry but I don't follow your point. Yes, time with players is certainly key but what about my thoughts seems to dispute that? I suppose if I had to boil things down my attitude is that the adjudicators should help the players act and see the results of their actions; they should not themselves decide what those results are. Unless your analytical objective is so narrow that it requires certain outcomes to achieve it, then my suspicion is that gaming may not be the right tool for the job. Of course, it all depends …

Merle Robinson

Let me try again to convey my small point. I don't see us that far apart.

To support your argument....
Including the players in the adjudication process certainly has advantages. It seems to me the areas of greatest value for this is when you are using experts in a field and the adjudication discussion is documented because the discussion could provide critical insights. The second place it would be valuable is in a training exercise where the discussion can let participants solidify the points you want to emphasize in their thinking (because you are using it as training).

My primary concerns revolve around use of time and the potential impacts. In games where play is continuous when a significant number of players or staff are involved in a "discussion bubble" this can kill game momentum. This is most critical in shorter events because it

slows or can stop other play or key player interactions. My perspective is also heavily colored by my experience with public events where it is very rare to have multi-day connected events. We focus on two, four and eight-hour events (mostly four hours). In that universe, side discussions taking more than 5-10 minutes are deadly to maintaining momentum. To compensate for potential time impacts my team does lots of advance homework. We study professional thinking about items likely to arise and assess "summary on-the ground" results (not to say we always get it right). It also is useful to recognize my events generally do not have a research question. Our wargames are for entertainment (and education) and generally our insights focus on player interactions and their decision processes.

The real advantages of your approach is on tapping new player perspectives or triggering new insights by experts.

Peter Perla

It strikes me that your comments on my paper fall precisely in that difficult area of getting the balance right between time spent to improve player experience individually and the cost of that time spent paid by the progress of the game as a whole. And the size and nature of the game weighs heavily in defining the proper balance.

[b] Merle Robinson

It seems to me you are saying in-stride adjudication is not the panacea for player engagement. My reading is you want us to not forget other equally sound approaches to gain player "ownership".

Peter Perla

I certainly agree that it is not the panacea, but I am not disputing that a fast flow from decision to outcome is unimportant. Given your earlier comment as well I'm puzzled about why we seem to be in violent agreement on this point. I'm just opining that the in-stride adjudication should be in the hands of the player, almost literally with regard to dice, rather than the adjudicator. Unless, of course, you explicitly want to involve the adjudicator as a super player (Downes-Martin 2013).

2.10 From POL-MIL Gaming to Dungeons & Dragons

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Much of my professional wargaming has relied on in-stride adjudication (ISA), characterized by continuous play without game-turn breaks, and a great deal of deciding things on-the-fly. These games typically involved many social and political variables with fuzzy metrics that do not lend themselves well to rigid kriegsspiel. They often also involve a broad array of players, actor types, and possible choices – making it difficult (indeed, impossible) to anticipate everything that will come up in a game.

The week-long Brynania peacebuilding simulation at McGill University, which involves over one hundred participants in 8-12 hours of continuous play per day over a full week, is the most extreme version of this (Brynen 2010). Almost all political and military outcomes are determined through ISA by a single game controller, amounting to hundreds of on-the-spot decisions per day. While there is some scope for overnight adjudication while players sleep, over 95% of decisions are made while play is ongoing. Moreover, the only part of the game that relies on formal adjudication through preestablished rules is the humanitarian assistance component, where a "looks about right" algorithm calculates civilian deaths based on the quality and quantity of aid provided, access, destruction of infrastructure, and population displacement.

The kinds of serious negotiation and contingency planning games I design and facilitate— addressing subjects ranging from support to peace negotiations (Brynen 2016) through to humanitarian assistance (Brynen 2013) – are also continuous, with few or no preset rules. I have also run a large number of continuous-play megagames and matrix games. The former are deliberately "rules-lite" so as to encourage player creativity and facilitate emergent game play. Necessarily, many issues must therefore be addressed on the spur of the moment by members

of the Control team. In matrix games, players themselves provide open adjudication through structured discussion of the likelihood of outcomes and the effects of proposed actions. However, in many cases the game facilitator plays a subtle but important role in this by packaging the various arguments put forward by participants into discrete die roll modifiers or other variables – effectively adjudicating their relative causal weight. Since the adjudication phase of a matrix game still involves some continuing evolution of the game narrative (as players put forward arguments and counter-arguments), the result is a sort of stealth in-stride adjudication that – if done well – is largely invisible to the participants.

Finally – and to be frank about it – some of my most valuable experience with in-stride adjudication comes from more than forty years of playing *Dungeons & Dragons.* In such role-playing games the gamemaster is constantly called upon to balance the formal rules with near-instant situational judgments. Because role-playing games of this sort are designed to encourage ingenuity, it is inevitable that situations arise that the rules never anticipated – requiring that rules be invented or outcomes adjudicated on the spot, as gameplay is underway. This must be done, moreover, without disrupting the narrative flow, and in a way that players immediately find credible. Games like *Dungeons & Dragons* cannot have "map edges" to limit play, and gamemasters must thus learn the fine art of nudging players in a desired direction while at the same time refraining from excessively constraining their decisions – and, if necessary, expanding the scenario during the game to accommodate their curiosity. Indeed, as I've argued elsewhere (Brynen 2017a), RPGs probably provide better training in this aspect of professional wargaming facilitation than do traditional *grognard* hobby wargames.

This extended preamble is intended to set the stage for the observations which follow. These are based on my own experience, including discussion with my game design students, who offered interesting player perspectives on the issue (Li 2018). However, they are also based on ISA experience of particular kinds of games (crisis games, POL-MIL games, negotiation exercises) with particular audiences (academics, students, diplomats, politicians, non-governmental organizations, aid workers) and relatively little in the way of formal rules, models, and algorithms to determine outcomes. The experience of others, running other kinds of games with other kinds of participants, may vary.

The Dual Roles of the White Cell

The White Cell has two separate but equally important roles in any serious game. First, they serve as *technicians*, responsible for keeping the game running smoothly and focused on achieving game objectives. Second, they serve as *theatre directors*, responsible for keeping players cognitively engaged and immersed in the game narrative – sustaining the illusion of the fictitious world or possible future in which the players are playing. As Perla and McGrady (2011) point out this dramatological component is an essential part of "why wargaming works."

In many larger professional wargames the function of adjudication is separated from that of game facilitation and direction. That is almost never true in any of the games I have been involved in, however: the human resources simply are not available, nor in some cases is it advisable to create potential informational disjunctures by separating the roles. Moreover, it is unlikely in most cases that the players actually know or care: if the game is working poorly and adjudication decisions are generating player grievance, they are likely to blame everyone behind the scenes.

In the case of in-stride adjudication, players are likely to be in a more intensive and dynamic relationship with adjudicators (whether seen or unseen) than in a turn-based game. The immediacy of decisions and consequences can certainly contribute to the realism of a crisis scenario and contribute to much greater player engagement. However, it is also a tightrope of sorts: adjudication issues (or other problems in the player-White Cell interaction) can have a cascading effect, as dissatisfaction grows and players start to feel they are playing against the umpires or, worse yet, face hostile adjudication. Adjudication decisions thus have to be framed (as a *technician*) in a way that not only supports the validity of the game but also (as *theatre director*) enhance players' acceptance of the game narrative .

Validation and verification of in-stride adjudication

When adjudicators are being asked to make snap judgments largely on the basis of experience and their own mental models, validation and verification must take two forms: first, assuring that the White Cell has the expertise and experience to make these sorts of decisions before the game, and second, reviewing any key or contentious decisions after the game, both

to ascertain their plausibility and to determine whether they had a contentious impact on outcomes. Because in-stride decisions are often made on an ad hoc basis in response to unanticipated circumstances, there will be less opportunity to have pre-validated decision support available in advance.

Adjudicators can also be asked to record what factors shaped their decision at the time. To the extent that decisions are often taken by analogy – that is, the adjudicator mentally refers to prior comparable real-world cases to make a decision on a fictional event – it can be useful to record these too. That being said, it can be difficult to do this during a busy game with an overstretched White Cell. I rarely, if ever, do it in any systematic way given constraints on my time and resources.[a]

More broadly, as ED McGrady raised in comments, what does it even mean to validate or verify political decisions. Kinetic adjudication decisions can be compared with weapons tests or other operations research analysis (for example, historical combat data). In the political sphere, the best that can be done is to show that the decision falls broadly in line with either past behaviors or anticipated future ones. Some of the literature on expert political judgment gives little confidence that these calls will be accurate: pundits rarely achieve outcomes better than chance (Tetlock 2005). On the other hand, some of the literature on intelligence assessment suggests much better rates of political prediction, in excess of 90 percent (Mandel and Barnes 2014). The fact is, that we do not really know whether these sorts of decisions closely match likely real-world outcomes, beyond subject matter expert judgment at the time.

Do the players know? Do they care? And why do they care?

While players will know that outcomes are being adjudicated quickly, rather than with a lengthy break between "turns," they might not know how those decisions are being made, whether by free kriegsspiel best judgment, hurried reference to rules and modelling support, or a magical black box hidden with the White Cell that immediately spits out answers. Should they be told?

Interestingly, my own (student) players say they would rather not know (Li 2018). To continue with the theatre analogies, providing too much information on adjudication processes

threatens to "break the fourth wall" of what ought to be an immersive narrative process. If the fourth wall is broken, participants start to think about outcomes as a function of adjudication process, and less as a function of their own actions. They also start thinking about how to game the game, by manipulating information available to the White Cell so as to influence outcomes.

If players raise concerns about adjudication methods in the midst of a game, that might be a well-founded concern about game quality – or it might be an effort to fight the scenario rather than the opponent, or compensate for player failures by shifting blame to the game design and White Cell. The now legendary – or mythical – *Millennium Challenge 2002* wargame can be seen an example of both. Red commander LtGen (ret) Paul K. Van Riper was right to object to some aspects of game adjudication that artificially limited Red's ability to "win" (Zenko 2015). However, it also indicated a temptation to blame the White Cell rather than admit that some of the proposed tactics were impractical, and that others only appeared to work because of modelling anomalies and other technical errors (Kernan 2002).[b]

Interestingly, it may often be better to gloss over minor adjudication errors during a game rather than admit the ISA process is imperfect, and thereby tear down the "fourth wall" prematurely. Provided they do not have important implications for the game outcome that require resetting or other corrections, errors can be acknowledged in the debrief session (if at all – inconsequential errors should probably be seen as simply part of the fog and friction of wargame adjudication).

Foxes, hedgehogs, and problems of cognitive bias

Expertise is an essential part of effective in-stride adjudication. However, it comes at a risk: many subject matter experts may be narrowly focused on a particular domain, or wedded to a doctrine, approach, or technology. As such, they may tend to be cognitive "hedgehogs" (Tetlock 2005, Tetlock and Gardner 2015), with considerable mastery of a defined area of expertise but prone to confirmation bias or filtering, and resistant to Bayesian updating of their own mental models and assessments. They thus need to be paired with cognitive "foxes" who may have less subject expertise, but who are better able to make sense of dynamic circumstances and emergent conditions – characteristic features of games with in-stride adjudication.[c]

In addition to differences in cognitive approach, other kinds of diversity are also valuable. Diversity has been shown to yield significant benefits in group performance, strategic forecasting, and intelligence assessment (Brynen 2017b) – and there is every reason to believe there's also a pay-off in wargame adjudication too. To date, however, there has been little attention in the professional wargaming literature on how to get this mix right, and even less to how we might know whether (or not) we have the right mix.[d]

Problem cases

There will always be players who fight the scenario or disagree strongly with adjudication decisions. What makes this different during in-stride adjudication is the immediacy and potential interactivity of the process. Rather than a White Cell decision being made at a time separated from active game play, as is typical with many seminar games for example, it is taken immediately upon player action. Players may therefore object, or try to "game" the decision, in the hopes of changing outcomes – something that it is difficult to do when adjudication is taking place at the end of a discrete turn. In turn, this risks making the White Cell appear to be an active part of game play, even a de facto team opponent.[e]

Addressing this depends heavily on the situational context. Discussing it with players in advance might help to reduce the problem – or invite challenges while "breaking the fourth wall" of game adjudication. The relative experience and seniority of players and umpires is undoubtedly a major factor: what works for a full professor gaming with undergraduate students may not in cases where senior players have strong views that they seek to impose on civilian, outside, or even more junior White Cell members. At times it can be useful to explain the decision more broadly where such "teachable moments" are a desirable part of the game, but in other cases this might simply be to invite more debate. The issue can be postponed for post-game discussion, something we recommend doing in matrix games when players seem unwilling to stop debating a point (Brynen, Fisher and Mouat 2017)—but this requires that adequate time has been devoted to the hotwash or post-game debrief. In politically fraught contexts – for example, Israeli-Palestinian negotiation simulations with actual Israelis and Palestinians – one needs to be extra careful (as I know from experience) that adjudication or procedural issues do not escalate out of control into real life political disputes.[f]

Much as in the wargame itself, therefore, adjudicators need to mentally "game out" the possible second and third order consequences of the way they deliver adjudication and how they will deal with problematic participants.[g]

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Discussion

[a] Ed McGrady

It's interesting to ask what validation or verification would mean in a game involving political/military/diplomatic play. Weapons systems can at least be compared to real world outcomes, but in my nosing around political scientists have very little comparable theory upon which to compare decisions. I always ask how we "validate" what happens in reality. Is Abu Ghraib "valid"? What about Trumps policy toward Canada (no offense Canada)? Can we "verify" it - certainly, it happened. But how do I establish it comports with "reality" when it is one off, totally unpredictable, and not likely to ever happen again? Instead of thinking in terms of systems, where V&V dominates, we might want to think in terms of narrative. Does the story make sense? Is it well told? Is it effective within the game?

[b] Stephen Downes-Martin

See the discussion at:
https://warontherocks.com/2015/11/millennium-challenge-the-real-story-of-a-corrupted-military-exercise-and-its-legacy/
for additional ways in which this wargame went wrong.

Rex Brynen

I'm aware of the other issues, but it's also the case that some of the tactics he tried to use (transmitting orders by messenger and mosque) simply wouldn't work given the friction of operations in a third world Red.

Stephen Downes-Martin

I think the major point here is inappropriate "blaming the white cell" rather than the unrealism of the proposed tactics since some of what the white cell did in MC02 was appropriately blameworthy and some of Paul's complaints were unjustified.

Ed McGrady

I kind of agree with Stephen here. Van Riper went in to teach them something, and he was hell bent on breaking the "game." Except it wasn't a game, it was an exercise. Those are two different things. Exercises have real world forces involved, and so you can't just do stuff without concern for other objectives. I'd also say his tactics were unrealistic as opposed to just impractical, at least when compared to how the threat might actually behave. But this is a separate issue involving how intelligence is used in games and whether consensus projections of behaviors are "valid" and "verified". But don't get me wrong, it's a huge issue about how to play "red" in games. It's just the Van Riper example is kind of messed up because it wasn't a game, it was an exercise.

Rex Brynen

It's worth reading Kernan's comments (which I've added here) on the technical issues involved, quite apart from the exercise issue.

[c] Ed McGrady

SMEs need to be subordinated to the game adjudicator and control. They need to advise not decide. Or simply shut up and observe.

[d] Ed McGrady

The fundamental reason is that I get the players that I get, I often have very little influence on who shows up to a game. Sometimes players are ordered to appear, but that is often the worst case because game designers/control have little influence over the makeup. On the few occasions where you get to pick, you go for expertise and experience first, diversity is way second in terms of order of effect. Often the best you can hope for is someone with good operational and/or planning experience.

[e] Ed McGrady

There are many ways to game the system, but the most common in fast adjudication environments is where players ask leading questions that have second and third order consequences control/adjudication may not know about. Because the adjudicator has little time to ponder the implications of the decision they make the "obvious" decision and then get slammed with effects that disrupt the game. The solution is to be aware this can happen, and always take a beat and ask yourself if you are not being led through a door you don't want to open. Then just ask the player - "so what happens if I say yes" they usually tell you the truth.

[f] Ed McGrady

There is a whole protocol that you can develop for dealing with different types of problem players. The ones who challenge adjudication are just one phylum in a diverse and complex ecosystem of disruption.

[g] Ed McGrady

And they need to do it quickly while everyone is waiting without looking like they are uncertain.

2.11 White Cell Needs Bad Dungeon Masters

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Introduction

The challenges of in-stride adjudication varies depending on the type of gaming being executed; whether it is an exercise or experiment, whether the players are playing themselves or someone else, or whether the intent is to discover or to educate, will change how and why in-stride adjudication takes place. The timescale of the game, the expectations of the participants, and the reliance on adjudication to move the game forward will even affect what constitutes in-stride adjudication. All of the above will create or release constraints on in-stride adjudication, they will internalize or reject results of adjudication, and they will inform or obscure the results of adjudication.

What Constitutes In-Stride Adjudication?

There is no universally accepted definition of what constitutes in-stride adjudication. In his paper "The Challenges of In-Stride Adjudication", Dr. Ed McGrady uses an inclusive definition, excluding only those games where gaming explicitly ceased and the people running the game leave to do their adjudication (McGrady 2018):

> *In off-line adjudication the adjudicator stops game progress, retires to some location and determines the results of player actions. Results are then presented to the players and the game resumes.*

He goes on to say:

> *The important point is that the adjudication process transfers game agency from the players to the adjudicators/controllers.*

Precisely when that game agency transfers is subject to debate. As Dr. Peter Perla observed, the game takes place not on the game board but in the minds of the players and so when the players stop thinking they're playing the game is quite clearly a point at which they stop

actually playing the game. One might therefore argue that in-stride adjudication happens so long as the players do not stop actually playing the game.

But is that truly a useful way of looking at what constitutes in-stride adjudication? As a technical definition it fits, but if adjudication itself interferes with the game either in how it is played or in its immersion (outside the legitimate effects being adjudicated), is that not robbing the participants of some of their game agency? Or is it merely a failure of in-stride adjudication? Perhaps defining what constitutes in-stride adjudication goes hand-in-hand with the success of the adjudication - that success is a necessary but insufficient condition.

What is Successful In-Stride Adjudication

Successful in-stride adjudication has three properties: first, it does not remove game agency from the players; second, it does not cause the player to switch from thinking about the problem presented by the game to questioning the quality of the adjudication; and finally, the adjudication needs to comport with the goals of the exercise.

In the first point, the adjudication needs to allow the players to continue playing the game. They need to be able to continue to play the game without having to await the adjudication's completion. This does not mean the players have to be able to make additional decisions without the adjudication, but that, "their heads have to be in the game." The players need to remain engaged and considering their options. If adjudication takes long enough for the players to stop thinking about the game then it is no longer in-stride.

In the second point, even if the adjudication satisfies the first condition to be in-stride, if the adjudication raises questions of believability or "fairness" of the game, the players, while having agency returned to them, have nevertheless eschewed taking up the agency in favor of questioning the exercise itself. Thus, it is important that adjudication must not merely be timely in order to be successful, but fall within the players' expectation matrices.

In the third point, the adjudication should not serve a purpose extraneous to the exercise unless it can do so without interfering with the game's goals. Adjudicators need to be cognizant of the game's purpose and preferentially leverage adjudication to satisfying those goals.

How do Players Change Adjudication?

> *"The difference between an exercise and an experiment is that an exercise is good for you, an experiment is good for someone else."*   - Dr. Brian McCue

Some games are exercises in which the players are playing themselves in a current or reasonably expected future position. Other games are experiments where the players are playing someone other than themselves, people whose position they themselves are otherwise unlikely ever to hold. Still other games are exploratory in nature, where players may or may not be playing themselves and the controllers are trying to learn something themselves. The role of the players relative to themselves and to the goal of the game will have an impact on adjudication.

That brings us to the subject of this paper, an example of why adjudication is different based on the players and goals of the game. The paper title is a bit tongue-in-cheek and does not apply across the board. But for some cases, the behavior of an adjudicator which would likely be considered that of a bad dungeon master in a game of Dungeons & Dragons, it is entirely appropriate. For this example, I am choosing a military exercise like others I've analyzed, where the participants are playing themselves. They are exercises, and thus, good for the players themselves.

Bad Dungeon Masters in White Cells

In Dungeons and Dragons (D&D), it is the Dungeon Master's (DM) job to create the setting and plot the players experience as characters. Dungeons and Dragons is best understood as shared story-telling - only there's a hierarchy of authors with the Dungeon Master being the primary author (Sixier 2017, Castles and Cooks2012, Amirault 2015, Thompson 2015). The characters contribute to the story by providing inputs to the story through their characters' behaviors. This play-acting occurs in the minds of the individual players as well as the DM, and any miniatures, props, and story-telling by the DM and players serve to create a common mental image of the game.

The DM has the most complete and (most importantly) accurate mental picture of the game. The DM has the vast majority of information available to them in order to create the mental construct - theirs is the outline and it takes a lot for players to depart from that outline.

One of the differences between a good DM and a bad DM is how well they integrate the players' contributions to their own mental construct of the game and consequently the shared construct. A bad DM will reject any input that does not comport with the mental image they created while a good DM has an enormous amount of ability and willingness to prioritize player contributions above their own while maintaining an enjoyable shared story.

In-stride adjudication is how the Dungeon Master takes player contributions to the shared story and either incorporates or rejects them as a part of that story. Once the adjudication is made, the game in the players' minds grows to encompass the new information.

The goal of D&D is entertainment, and, thus, what the players want to see realized is part of that entertainment. Like watching a movie with friends, players want to have the story unfold in unexpected ways and enjoy that story with the others in attendance. The unexpected and unknown are therefore important aspects of the entertainment - much like how spoilers "ruin" a movie for many people. Moviemakers also understand that the audience wants to see the protagonists come out on top and they understand what audiences dislike, and they try to give the audience what it wants but not everything it wants, or it would become dull. Thus, the protagonists usually win, though not without sacrifice and difficulties. The same holds true for DMs. They want to provide the characters the shared story but not by caving on everything the characters want all the time. The DM has to balance player behavior with the limitations of the game, the setting, and the players themselves. A player has a hard time reliably role-playing an intelligent, wise, and charming person if they, themselves, are imbeciles, simpletons, or tactless. The DM has to find ways of uplifting the players to make their characters and the game enjoyable.

This is not true with the white cell for military exercises that are not research wargames. The goal of such an exercise or war game is for the participants to learn, not for them to be entertained, and one learns very little from having the people running the game validate most of one's decisions, regardless of how poor one's performance. The white cell needs to knock down bad ideas and punish poor decision-making, not find ways of turning those into an entertaining story. Participants cannot go in completely unrelated directions into unprepared territory because there is no lesson to be reliably learned there for them. Many of the

hallmarks of a good DM must be ignored when adjudicating an exercise, and thus, in-stride adjudication is not the same for the two endeavors.

When adjudicating outcomes in D&D, the ultimate question a good DM asks himself is, "what would be the most entertaining?" That question is the most important question because, if not entertaining, the players will quit playing. This means in-stride adjudication requires fudging dice rolls, holding off on character death, increasing the threats being faced, and increasing the rewards for success.

In an exercise or war game, those questions, if present at all, pale compared to the far more serious ones that must be asked. "What will they learn?" and "What bad outcomes can be a consequence of following-through with that decision?" A game master deciding to adjudicate a VLS launch without deconfliction by having the torpedo hit the helo above the target is primarily teaching something: he's punishing the players for failing to follow procedure to ensure the safety of their fellow servicemen. Despite it being a wildly unlikely outcome, the bizarre adjudication served a purpose. A DM who does something similar had better have a better reason than teaching a player proper deconfliction procedure.

Undoubtedly, there is entertainment value to be found in adjudicating exercises. I have gotten a fair share of amusement out of telling that story about the helo being shot down by a vertically-launched mk-46 torpedo. And, certainly, in a role-playing game there may be times when a similar friendly-fire outcome can be both entertaining and serve to caution players. But understanding that the motives and goals of adjudication are different is important when deciding how to adjudicate a war game.

In Millenium Challenge 2002, the adjudication of Lt. Gen. Paul Van Riper's plan served a useful purpose in teaching the Navy that it had vulnerabilities it had not considered. What is less well understood is that there were lessons to be learned from the more scripted exercises that were planned and that running those, which required forcing the events into predetermined opportunities for specific learning goals. The event was judged harshly for this because people wanted the players to have the freedom to take the game wherever they wanted and were able to. Van Riper thought he had a bad DM. But a bad DM was what was

required. This does not mean good DMs are not needed. The willingness to allow Van Riper to sink the US fleet as a result of his thinking outside the box has value and the Navy did not ignore the lesson.

This difference in goal changes not just the latitude given the participants when adjudicating their decisions and the events of the exercise, but can change the result even when conclusions about how much latitude to grant are identical. Because of the greater rigidity of exercises and exercise goals, rigid adjudication will more often be required than free adjudication. Adjudication of exercises will always be bounded by the question of what is being taught. Not every adjudication need be a learning experience, but every adjudication must not be pedagogically destructive.

In free adjudication, consequences of player decisions need not guide the players through the setting in such a way that the players ultimately return to the prepared paths. But players who truly wish to extract themselves from the adventure to opt for another can, with a good DM, be frequently given options that allow the players to have a seamless transition from one adventure to another. The consequences of player decisions are not bound by the need to keep the players in a specific area or make them make certain decisions.

In the first run of the controversial Millennium Challenge exercise, Van Riper was given a great deal of liberty in how he conducted the war, and free adjudication was used in order to maximize the value of learning from his decisions. When the wargame was run the second time, he was subjected to strict adjudication and the value of learning other lessons was prioritized over re-learning what was just taught.

Note that Van Riper objected to the strict adjudication, much like any player in D&D, and quit, much like any player might in a role-playing game. Strict adjudication is not well-received by players.

Conclusion

One of the factors that goes into whether one adjudicates strictly or freely is preparation. Preparation of the adventure in question allows for adjudication to take place to begin with, and it's important to understand in exercises what the goals of the exercise are in order to

inform adjudication. The greater the preparation, the greater the freedom of adjudication. In an exercise, the options game controllers have will always be bounded by the parameters of the exercise, but the most important one that constrains adjudication will always be what the wargame is supposed to teach the participants. Part of preparation is determining what those lessons are to be. The greater the preparation, the more lessons can be prepared, and the greater the flexibility in adjudication.

Not all games, of course, are about educating the players and grounding a destroyer's organic helo may interfere with the experiment and diminish the quantity or quality of the data required for the subsequent analysis. So the bottom-line is that the nature of the game will determine which approaches to adjudication are appropriate and which are unnecessary. There is no one-size-fits-all answer to in-stride adjudication.

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2.12 In-Stride Adjudication during Transnational Security Cooperation Wargames

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Abstract

In an environment of increased complexity, decision makers seek innovative, foresight tools that empower them to leverage emerging opportunities and minimize risks. Transnational security cooperation wargames (TSCW) are one such foresight tool, featuring a proven in-stride adjudication system that simulates a complex, asymmetric negotiation environment faced by senior security practitioners. Interviews with adjudicators of the TSCW Radicals reveal key insights into best practices for in-stride adjudication. These include: the importance of adjudicators having prior management and gaming experience; the importance of prioritizing adjudication on actions based on their complexity, urgency and relevance; and the importance of maintaining narrative coherence through adjudicator coordination and technological innovation.

Keywords: Serious games, wargames, decision-making, crisis management

Introduction

Disruption characterizes the 21st Century, which is replete with complexities of climate change, food security, scarcity conflicts, displaced populations, unbridled economic growth, erosion of traditional value systems and transnational security dilemmas. Societal policy-related problems are inherently different from those that are confronted and resolved by scientists and engineers. They are hard to define, have few obvious solutions and manifest the characteristics of complex adaptive systems. They are repeatedly addressed because they have a life of their own and constantly evolve in response to corrective action taken. Such 'wicked' problems were initially described by planners (Rittel and Webber 1973), and they are an integral, well-known part of all societies.

In response to complex adaptive systems, foresight methods allow decision makers to navigate between an uncertain future and the need for intelligence to shape this future. Strategic foresight is a concept that includes innovation, planning, policy formulation and solution design methods that focus on alternative futures. Foresight is "a systematic, participatory, future-intelligence-gathering and medium-to-long-term vision-building process aimed at enabling present-day decisions and mobilizing joint action" (Miles et al 2016). As such, foresight empowers decision makers to consider strategy that is compatible with a plausible future.

Futurists systematically explore numerous possible alternative scenarios to identify pathways to risks and opportunities. Among the best ways to conduct futures research is through the experience and analysis of serious games (Dator 2017). Repetition of a wargame with diverse participants can be very effective in revealing alternative futures. While this technique does not provide a prediction of the future, it permits a glimpse of what may occur, which aids decision makers in identifying the potential effects of policies in advance.

Transnational security cooperation wargames (TSCW) at the Daniel K. Inouye Asia-Pacific Center for Security Studies (DKI-APCSS) are 'serious' geopolitical games that integrate game mechanics into non-game activities and processes, such as multilateral negotiations on international security issues. They feature a hybrid design with elements of seminar games and

live-action role-play games that originate from U.S. Naval War College wargames used by government officials to explore geopolitical options.

In the past two iterations of the TSCW Radicals, 26 to 28 participants completed the wargame as part of DKI-APCSS's Transnational Security Cooperation (TSC) course for senior level security practitioners. About half of the participants were military flag officers (1 to 3 star Generals), about half came from government (directors, diplomats, ambassadors, ministers and secretaries), and a few were directors of international non-governmental organizations.

These wargames were considered 'serious' because participants were directly or indirectly informed, trained or educated in the process (Luo et al 2017). Players gained insight into issue complexity through the lens of security, diplomacy, and geopolitics. Learning objectives included:

- Experience a series of transnational security crises in real-time that possess the characteristics of complex adaptive systems – unpredictability, self-organization, constant change, and emergence
- Explore transnational security factors that shape effective crisis management
- Test strategies and approaches in adversarial conditions
- Deepen awareness of the variety of positive, negative and neutral roles played by stakeholders in government, industry and civil society
- Gain insight into capacity in critical thinking, strategy, planning, leadership, communication, creativity and negotiation in an environment where every decision has a rapid impact and the unexpected decisions of others create a complex environment

In TSCW Radicals, players are dropped into an asymmetric negotiation environment with competing interests and differing levels of power to pursue those interests. While some coercive means are available to players to push their agenda, most actions require the buy-in of other players to complete. Players use the resources they have available to negotiate and form coalitions of common interest to advance their strategy and gain influence within the game. As they act in a fast-paced and rapidly evolving situation, players observe how security situations might develop and how agencies, force structures, enemies and community factions might respond to their actions.

To simulate this complex negotiation environment where actors take simultaneous, competing actions, players must receive feedback on their actions in real time. Here, the TSCW's "in-stride" adjudication system is key. "In-stride" adjudication requires Controls (umpires) to rapidly render decisions on the success or failure of player actions that fit within the narrative of the game, without interrupting that narrative. This paper discusses TSCW Radicals, with special focus on three questions necessary for designing an effective in-stride adjudication system. First, what type of experience is required for in-stride adjudicators to effectively perform their role? Second, how do in-stride adjudicators make quick decisions that fit within the context of the wargame? Third, how do multiple in-stride adjudicators coordinate, align and sequence their decisions with each other to create and maintain a consistent narrative within the wargame?

Description of TSCW Radicals

Radicals is an executive, decision-making TSCW that explores crisis management in a framework of radical emergence and major power competition. The setting is a fictitious island nation, known as Paduana, in the southern part of the South China Sea, which has recently begun managing returning nationals, who fought for Islamic State (ISIS), and radicalized Rohingya migrants, who originated from refugee camps in Bangladesh following their departure from Myanmar. Paduana is a predominantly Sunni Islam country that marginalizes Shia. Over a thousand members of its Sunni population travelled overseas to support the Caliphate, and they are now returning as the Islamic State suffers increasing defeat in Iraq and Syria. Local rebel factions are looking to bolster their ranks with new skilled fighters. However, the government is quick to respond to dissent and imprison all known returnees and agitators. Social media is rapidly gaining popularity, which some see as undermining traditional authority structures, forcing emergent change and weakening cultural value systems. All agencies find themselves struggling to manage an internal political environment that threatens to destabilize, while they balance attention and intervention from China and the United States, as well as an international megacorporation.

The Sunni population concentrates in Paduana City, a large urbanized quadrant of the island, while Kanatopia Province, a smaller, sparsely populated area on agricultural land of poor

quality, supports the Shia population (Fig. 1). Helekau Province provides a rich, well-resourced, rural base for Sunni radicals with oil and mineral reserves, while Manatau Province, the largest portion of the island, is undeveloped and supports communist rebels. The prison housing returnee fighters is located on a small island off Kanatopia.
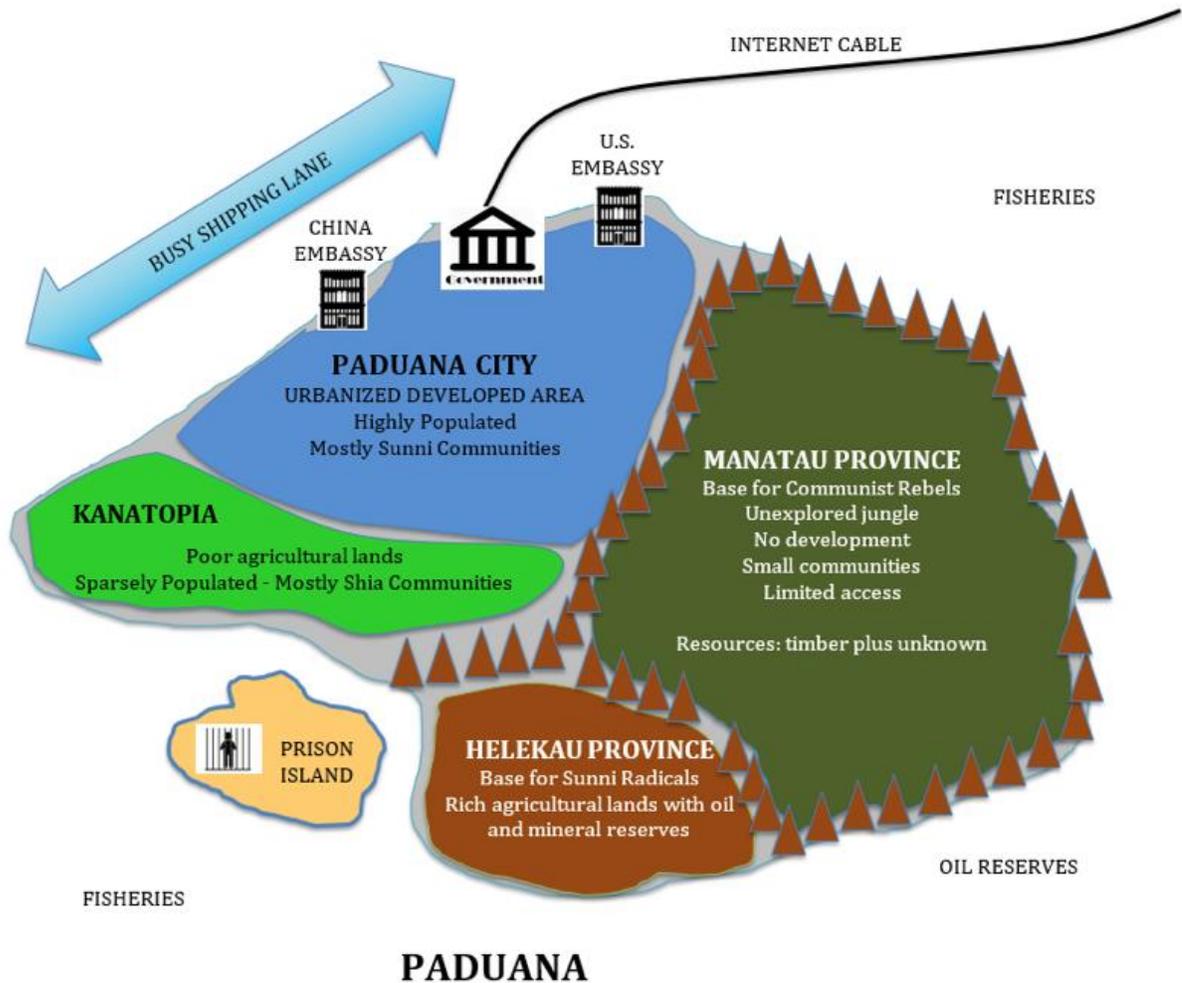

Figure 1. Map of Paduana.

Wargame staff

When Radicals is played with up to thirty-five players, the game runs best with a support team of a dozen people. The Pit Boss (wargame director) is supported by a Deputy, a Media Editor, a Photographer, an International Correspondent, a Team Performance Analyst, a Player Performance Analyst, and three Controls who regulate and manage activity by government, community and international groups of players. One Control adjudicates for Blue team

government players, the second adjudicates for Red and potentially Red teams, while the third adjudicates for international entities. A few additional staff provide useful supplementary support to media and analysis groups.

The three Controls act as the front line for in-stride adjudication and handle the bulk of in-game decisions. Based on the quality of player actions, adjudication results in outcomes that are close or far from what the player intended. When an action is proposed that affects players under other Controls, the Controls consult and jointly determine the best course of action on the spot. If they are in any doubt concerning their proposed outcome and how it will affect the overall game or sequencing of events, they consult the Pit Boss. Frequent huddles with all Controls, the Deputy and the Pit Boss are necessary to preserve game integrity and to track multiple developing storylines. Most significant player actions require some game time to pass before they are activated, so these adjudication delays due to huddling usually run parallel with player activity and reflect the time it takes for events to transpire.

Facility

In 2013, DKI-APCSS built Maluhia Hall (Haven of Peace) for $9.5 mil. It is a high tech conference facility designed to house a single large or two medium lecture halls with six breakout rooms, all featuring whiteboards and the latest in computer presentation equipment. This space comfortably accommodates various types of TSCW up to 110 participants plus the support team. During strategy-building sessions, larger, international and more secretive teams occupy space in the breakout rooms, while smaller ones sit at tables in the main hall.

Schedule

There are three Moves in a typical TSCW with the first functioning as a primer, the second as constructive and the third as expansionist in accordance with player acumen and experience. Each move is divided into four phases: an initial briefing, a strategy building team phase, an unstructured negotiation and action phase, and a review. The first Move begins with a description of abductive decision making, the game scenario and TSCW mechanics. Next, players convene team meetings with the express purpose of developing a multipronged strategy for the duration of the Move. An unstructured 60-80 min period of interaction follows,

during which, players negotiate frantically to advance their strategic goals. A review is undertaken in four parts following the conclusion of each Move, with a grilling by the International Correspondent, presentation of performance results, polling on the current 'temperature' of the room and reflections on actions taken. A longer reflection occurs at the end of the wargame to draw out impacts, outcomes, lessons learnt and to delve into key decisions, their implications and possible alternatives.

Roles

Radicals runs with 25 to 35 senior participants allocated to the following team roles:
- Paduana Government (5)
- Paduana Security Forces (5)
- Communist Party (3)
- Society for Peace (Sunni) (3)
- Paduana City Community (Sunni) (3)
- Kanatopia Community (Shia) (3)
- U.S. (3)
- China (3)
- TransTrade (3)
- RusAnonymous (3)

Each team receives general guidance and develops its own priorities during the strategy development meeting. In addition, each player receives a list of personal priorities and guidance. These two sets of guidance may be somewhat aligned or may be grossly misaligned. The intent is to create a natural tension between energy expended to further team goals as opposed to furthering personal goals. This serves to introduce unpredictability and uncertainty into relationships and collaborations, which makes trust building a vital endeavor.

Information coherence

While in-stride adjudicators provide the primary source of player feedback, the wargame includes a media team to publicize both player actions and emergent events. Virtually all media releases contain an element of spin doctoring, so they are an additional component of in-stride adjudication.

Media content includes video and non-video injects, periodic news reports and speeches by key players who have attained significant status within the game. Speeches crafted by key players such as the Prime Minister of the Paduana Government build shared awareness of Government actions and reward the Prime Minister or other key players for attaining that elevated position. Video and non-video injects provide players with information on crises or political events. These injects serve to increase player immersion into the wargame narrative, as well as to introduce emergent crises that demand swift action by players to manage or exploit those crises.

A newsfeed is projected onto one of two central screens in the lecture hall, as well as mirrored on screens in each of the six breakout rooms. This newsfeed is published by the Media Editor and updated every ten to fifteen minutes. The newsfeed draws content from both significant player actions and stories written by journalists on the media team. The Media Editor's job is to build shared awareness of player actions and to spin those actions to allocate communal credit and blame. Players want to achieve their strategic outcomes, but they also want to get credit for achieving those outcomes. In some cases, players may even settle for suboptimal outcomes as long as the credit they receive is sufficiently large (Bueno de Mesquita 2009). The newsfeed rewards players for significant actions with increased notoriety or prestige.

Team strategy and action processes

At the start of each Move, teams are required to create or revise their strategies. This forces them to diagnose what is going on in the wargame, creatively consider preparatory actions, reevaluate relationships, reach out to new stakeholders, allocate tasks and redistribute the budget. During this process, Controls guide the players, but do not adjudicate. Copies of a final written strategy along with accompanying goals go to the team leader and to the team performance analyst.

Prior to leaving the Team meeting, players are encouraged to refresh their memory on their current team role and personal guidance. Knowing who-is-who and who to target for a particular endeavor is essential, but it takes most of the first Move for this knowledge to build.

The bulk of unstructured time is spent locating people, making introductions, sharing ideas and negotiating on collaborative action.

Getting anything done requires players to complete Action forms that are designed to ensure a minimal level of quality control. Players write down What is proposed, Why it is being proposed, Who is to undertake the action, How they are going to undertake it, and Where the action will take place. The action originator must have signed the form in addition to all other necessary stakeholders who are required for the action to be successful.

Players are encouraged to think in diverse ways on how to achieve their desired results. Currency is the first and easiest choice for many to incentivize the actions of change. However, since it is distributed unevenly, some players must find alternative levers of change. Government players achieve results by creating new policy, legislation or other boundary-setting devices. Powerful players or those in possession of damaging knowledge may use direct influence to sway another player or entire team. Players with means may even resort to applying pressure through threat or direct criminal action. However, nothing beats good ideas brought to bear by creative energetic and charismatic players.

Once a player has filled out an Action form that clearly spells out their What, Why, Who, How and Where, they take their Action to a Control who determines if it is aligned with team and/or player guidance, and if it has the necessary alliances, support, skills and resources to make it work. Beyond a binary decision of success or failure, in-stride adjudication requires the Control to decide on the outcome of the Action, with consideration for possible second or third order effects. No Action ever works totally as planned. Larger Actions require consultation with other Controls or the Pit Boss to ensure that existing Actions in play are not conflicting or contrary. The Control considers possible broader effects and repercussions and lets all associated parties know the outcome.

The Controls are not moral gatekeepers and do not create interaction, but are in place to provide guidance and implement the rules and the outcomes. They must feel the flow of the wargame and must moderate adjudication from loose to tight depending on what is happening.

In-Stride Adjudication

In-stride adjudication is essential to facilitating the complex negotiations found in TSCW Radicals. This system of adjudication requires highly competent adjudicators that can efficiently determine the consequences of diverse actions in concert with other adjudicators. By evaluating this system, we gain valuable insight into best practices for game designers interested in implementing similar systems in their own wargames.

To document these insights, we interviewed seven adjudicators that participated in at least one iteration of the TSCW Radicals. They included one Wargame Director, one Deputy Director and five Controls. Each adjudicator was individually asked the following eleven questions as part of a 30-minute interview:

1. How well did your experience as a subject matter expert (SME) prepare you for adjudicating the TSCW?

2. How well did your personal or professional experience in gaming prepare you for the TSCW?

3. Did you feel you had sufficient time to deliver your adjudication on actions?

4. How did you deal with shortages in decision-making time?

5. Approximately what percentage of actions did you reject?

6. What was a common reason for rejecting actions?

7. Did the sequence in a set of potentially contradictory actions ever cause a conflict or dispute? If so, how was that dispute resolved?

8. Did you ever intervene to assist a passive player in becoming more active? If so, were you successful?

9. How satisfied were the players in your adjudication?

10. Did you make any adjustments in your adjudication style throughout the TSCW?

11. Do you have any suggestions for how the role of a Control can be improved in future iterations of the TSCW?

Their answers shed some light on the following three questions: First, what type of experience is required for in-stride adjudicators to effectively perform their roles? Second, how do in-stride adjudicators make quick decisions that fit within the context of the wargame? Third, how do multiple in-stride adjudicators coordinate, align and sequence their decisions with each other to create and maintain a consistent narrative within the wargame?

First, the TSCW benefited greatly from its experienced adjudication team made up of "pracademics," with both academic backgrounds and practical field experience. However, given the rising demand for wargames, such adjudicators may be unavailable, and game designers may need to choose between those with gaming experience and subject matter expertise. Within our sample of TSCW adjudicators, 57% found their subject matter expertise to be beneficial to their role. However, only half of these (28%) used their subject matter expertise to determine the outcomes of actions. By contrast, the entire 57% credited their prior management experience in allowing them to engage effectively with players, prioritize actions, facilitate the game and deal with unforeseen circumstances. For similar reasons, all adjudicators with prior gaming experience (86%) found that experience to be valuable in their role as adjudicators.

For a complex, asymmetric negotiation wargame like TSCW, prior management or gaming experience played an outsized role in effective adjudication, far surpassing the need for specific subject matter expertise. This finding is distinct from more traditional map-based tabletop wargames like RAND's "Defense of the Baltics," which games out NATO's deterrence of Russian adventurism into Eastern Europe (Shlapak and Johnson 2016). In "Defense of the Baltics," subject matter experts (SME) add realism and unpredictability to the wargame's adjudication, allowing players to gain more useful insight into a true warfighting environment. However, in the TSC's negotiation-based wargames, the senior-level players themselves add that realism and unpredictability by taking strategic actions to compete against each other. In this case, the adjudicator's role becomes more about facilitating player-to-player interaction while constraining those actions within the established mechanics of the wargame.

Second, drawing from their ample management and gaming experience, TSCW adjudicators made efficient and effective decisions that facilitated the smooth flow of the game. Technically, TSCW adjudicators have an unlimited amount of time, within the limits of the game itself, to render decisions as there are no fixed goals or deadlines for players to meet. Rather, the narrative is allowed to develop semi-organically based on each player's assigned powers and interests. However, rapid action is required for the smooth and robust development of that narrative. As one adjudicator put it, "The longer you take, the more irrelevant your decision

becomes. If you wait too long, you destroy the value of the action you're making a decision on." With players submitting a constant stream of actions for adjudication in real time, the adjudicators work hard to prevent game-breaking holdups or bottlenecks by efficiently processing action forms. Often, players will write several related Actions and attempt to present them all at one time. If they are trivial, Controls may let them occur, but otherwise, Controls pace these injects or may even negate them by injecting outcomes that are contrary to player expectations. Inexperienced Controls tend to let more Actions pass often with outcomes that are closer to player expectations.

Seventy one per cent of TSCW adjudicators mentioned the importance of prioritizing actions for immediate or delayed decision making. Action forms were processed immediately if they were easy to adjudicate, if their impact was immediate or if delaying adjudication would hold up game flow. By contrast, adjudication was delayed if the decision required input from several other adjudicators or time needed to pass before the Action could manifest.

Within a short timeframe, adjudicators would decide whether to accept or reject actions. Between these adjudicators, rejection rates varied from 10% to 25%. Actions were commonly rejected if they lacked sufficient buy-in from fellow players, they lacked critical information necessary for implementation, they conflicted with the player's interests or they were pro forma actions that did not significantly advance the game. The importance of deciding on actions within the context of the game's narrative and flow was discussed by 57% of adjudicators. For example, one adjudicator would reject actions if they had been "overcome by events" (OBE).

Third, TSCW adjudicators developed systems of coordination to build a coherent in-game narrative that players would find intellectually stimulating. In educational wargaming, a coherent narrative is vital for player immersion, motivation and learning. However, with multiple adjudicators each rendering simultaneous, independent decisions, there is an elevated risk that the game will fracture into multiple worlds.

Recognizing this risk, the TSCW Radicals included several mechanisms to increase narrative coherence. First, the TSCW used action forms to document player actions and maintain a

permanent record for resolving conflicts or disputes. While this system works well with no conflicts or disputes or need to backtrack as yet, future iterations of TSCW could experiment with digital action forms submitted electronically to a central database that timestamps each action as they come in. Since this is not an analytical game, the reasoning behind adjudications are not captured except in hotwash and After Action Reviews meetings. Second, two adjudicators were set aside to act as Wargame Directors responsible for overall coordination with Controls and resolving disputes. While 40% of Controls felt this mechanism worked well, 60% felt that it could be improved, for example, by scheduling more regular huddles to plan for upcoming narrative developments. Third, the media team increased information coherence among both players and Controls by regularly publicizing significant actions and narrative developments. While the media was essential for maintaining narrative coherence, the number of significant actions frequently exceeded the media's available publication space of one screen. Future iterations of the wargame could explore different media platforms for reaching players, such as a private Twitter account or blog that players could reference at their leisure throughout the game. This might serve as a player distraction, as it does in real world crises, but may also be ignored by players trying to make a practical difference in accordance with their objectives.

Conclusion

Foresight gaming systems, such as DKI-APCSS transnational security cooperation wargames, are an effective and proven method for amplifying "plurality, diversity and multiple perspectives, which are essential for understanding and steering through postnormal conditions" (Sardar 2015). Futurists have long used games and simulations because they "embody some of the core tenets and long-standing practices of futures: systemic, yet playful, inquiry; engaged and collaborative curiosity; and anticipatory action learning through experiential approaches" (Sweeney 2017). By exploring a variety of simulated futures, pathways to preferred futures can be created (Inayatullah 2008).

TSCW Radicals is an instrument for experiencing the politics of dealing with radicals in a complex environment and is a powerful foresight tool that provides insight into plausible alternative futures. Its unstructured format allows individuals and teams to generate a broad

variety of responses that give other participants a wider understanding of what might occur in possible futures. Based on participant surveys administered both during and after the game, most participants found their experience in the wargame to be engaging, challenging and valuable to their work as security practitioners.

The ability of these wargames to simulate the fast-paced and rapidly evolving nature of several concomitant complex crises relied heavily on excellent adjudication by the TSCW in-stride adjudication team. Interviews with these adjudicators revealed key insights into best practices for in-stride adjudication, including: the importance of adjudicators having prior management and gaming experience; the importance of prioritizing adjudication on actions based on their complexity, urgency and relevance; and the importance of maintaining narrative coherence through adjudicator coordination and technological innovation. These findings provide a valuable roadmap for incorporating and improving in-stride adjudication mechanics in future wargames.

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2.13 Lessons from Umpiring Modern World War II Reenactments

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This paper is based upon experiences as an Umpire during the unscripted force on force tactical events at a World War II reenactment conducted each January at Fort Indiantown Gap (FIG), Pennsylvania by the World War II Historical Association (WWIIHA). Two four-hour scenarios presented on consecutive days at this annual reenactment are based upon some aspect of the fighting between Allied and Axis forces collectively known as The Battle of the Bulge.

World War II Historical Association

WWIIHA's stated mission is to preserve the history of WWII from all sides of the war and to educate future generations about how it affected the lives of everyone then and today. The members strive to provide historically correct information and present an accurate impression of the World War II soldier for future generations. The Association is the organizer of what it describes as one of the largest WWII living history events on the east coast, The Battle of the Bulge Commemoration at Fort Indiantown Gap, held every January with over 1,200 participating reenactors until this year when it was announced that this was the last time it would be held at FIG.

Umpiring WWII Historical Reenactments

Beginning in 2015, WWIIHA designated an Umpire Team Leader to recruit and lead teams of Umpires to work during tactical reenactments in an attempt to improve the historical accuracy and realism of the experience for participating reenactors/living historians. The Umpire team is evenly divided between those wearing Allied and Axis uniforms (I wear the uniform of a Captain, 1st Battalion, Royal Ulster Rifles). All Umpires work with both sides in the field as necessary.

The Umpire team is guided in its work by concepts and principles of operation drawn from original World War II period US and British Army manuals, including the in-stride adjudication of tactical events. A manual compiled for the work of the Umpires draws from the following original period manuals:

- Umpiring, Military Training Pamphlet No. 61, February 1944, War Department, UK (replacing the 1940 manuals)

- Umpire Manual, FM 105-5, 23 April 1942, War Department, US
  (replacing the mimeographed February 1941 Umpire Manual used for the Louisiana and Carolina GHQ Maneuvers in 1941)

- German Military Training, Special Series no 3., 17 September 1942, War Department, US

- Umpire Manual, FM 105-5, 10 March 1944, War Department, US

The 1944 British War Office manual in "Section 2. - GENERAL, 5. The Duties of umpires" includes tasks which reflect the role of umpires in supporting realistic engagements and operational tempo in a training exercise including In-Stride adjudication though that term was not then in use:

(a) To create the atmosphere of war by describing the sights, sounds, and smells that are present in battle but lacking in exercises.

(b) To decide the results of contacts, and to assess casualties to men and material accordingly.

(c) To influence the actions of commanders by describing the effects of hostile fire, both from ground and air, in terms of casualties.

(d) To represent headquarters and troops not taking part in the exercise.

(e) To keep the next senior umpire informed of the results of engagements, the intentions of commanders, and dispositions of troops, in order that the exercise may be controlled in a realistic manner.

The purpose of the Umpires in the reenacting world as described below is similar to their purpose in the original training world and described in this passage from the Reenactment Umpires' Manual:

- Encourage as realistic as possible tactical experience by limiting unrealistic tactics;

- Maintain the tactical movement forward of the reenactment at an historically accurate pace;

- Minimize dangerous tactics and behaviors by reenactors; and,

- Ensure that reenactors abide by limits and restrictions imposed on the event by FIG command structure and WWIIHA Excon.

Reenacting Umpires are not required to observe, record, and evaluate the performance of participating units and individuals. However, without singling out specific units, our After Action Reports do identify behaviors and tactics that should be the focus of future reenactor training efforts. For example, many reenactors do not disperse widely enough in road marches or do not know how to make the best use of terrain and cover or concealment.

WWIIHA participants, both the Exercise Control Staff (EXCON) and the reenactors in the field, are a mix of currently active or prior military service personnel and those who have never served in the Armed Forces and thus have little or no actual military training. The Joint Tactical Operations Center (JTOC) which exercises control and oversight of the reenactment is staffed by WWHIIA members including individuals from both Allied and Axis reenactment communities. The Umpires, who are not all WWIIHA members, also reflect a similar mix of prior service to no military training.

This event is invitation only, units must be approved by WWIIHA to participate. Reenactors register for this event by "unit", a unit being a voluntary grouping of participants usually based upon shared interest in the historical unit designation adopted as the basis for their historical portrayal. WWIIHA's website listed the 'units' approved for participation in the 2018 reenactment before that website was taken down first in preparation for 2019 and then because that event was canceled.

No reenactment unit fields a complete and historically accurate number of personnel or equipment. Effectively, Allied and Axis formations take the field respectively as a battalion sized Task Force and a Kampfgruppe. No field artillery or aircraft are involved in the reenactment; therefore the engagements are infantry heavy with a dash of armor support. Both forces are supported by an array of soft skinned vehicles including Kubelwagons, Jeeps, motorcycles, and trucks and some lightly armed vehicles in the form of halftracks and armored/scout cars (including Bren Carriers). The presence and participation of tanks, self-propelled guns, etc. varies from year to year but rarely amounts to more than a half dozen armored vehicles total.

Fort Indiantown Gap (FIG) is a live-fire, maneuver military training facility in central Pennsylvania on the edge of the Poconos, administered and managed by the Pennsylvania National Guard (http://ftig.png.pa.gov/about/Pages/default.aspx). FIG encompasses 17,000 acres and 140 training areas and facilities for year-round training. Annually, it reportedly supports 20,000 Pennsylvania National Guard personnel and more than 120,000 additional personnel from other branches of service, interagency partners at the federal, state and local level and multinational partners.

Reenactment units using FIG training areas fire blank ammunition in their small arms (minimum range of 20 feet), but other pyrotechnics including hand grenades have been banned. This reflects an ongoing EOD problem at FIG resulting from the burial of surplus hand grenades several decades ago as well as an overarching security environment that often leads to unidentified or suspicious items being handled as an EOD problem. Both Allied and Axis units deployed light and heavy machine guns, either with the infantry or on vehicles, operated with a propane/oxygen bottle gas mixture that provided sound and muzzle flash. For the 2018 reenactment, WWIIHA obtained authorization from FIG to use replica WWII 'dummy' or 'inert' mines for hasty emplacement on designated roads within the authorized training area. The dummy mines would be inventoried, counted out for deployment, and counted back in for control purpose FIG Range Staff monitor WWIIHA activities in the field during the reenactment.

Based on the manuals, World War Two Era Umpires used a simple, strictly arithmetical adjudication method reflecting the relative firepower/combat value of the two forces engaged, with adjustments for tactical advantages and the use of cover and/or concealment. Victory in

any exercise engagement was awarded to the side bringing the greatest combat and firepower to bear as agreed upon by Umpires working with each side. The classic 3 to 1 ratio was invoked as the basic prime ratio and casualties were assessed on a percentage basis for the forces engaged. For example, this is the guidance given in the 1942 US War Department Manual for assessing casualties from infantry fire on an infantry unit:

> *19. INFANTRY.—c. The average losses sustained by Infantry are indicated as follows: Fire by opposing Infantry—1-3 percent per hour.*
> > *When two infantry units of substantially equal strength oppose each other under the same conditions, the casualties may be taken as 2 percent per hour. For example, a company of 200 men would lose 4 men per hour of active combat. If a unit attacks a strong position, or if it encounters especially heavy fire, the rate may be 3 percent per hour. If a unit is on the defensive, well protected, or if it attacks a markedly inferior force, the loss may be only 1 percent per hour.*

Cumulative casualties were also recorded by umpires during the exercise for assessment purposes in the After Action Reports but units were not removed from the exercise due to losses.

Reenactment umpires follow similar guidelines. On field in-stride adjudication is carried out by Umpires when available and by reenactors themselves when necessary, depending upon nature of the engagement, tactical situation, and presence or absence of an Umpire. As in World War Two exercises, reenactment infantry on infantry small arms engagements are adjudicated on the basis of respective numbers engaged, weapons, intensity of fire, use of concealment, use of cover, use of maneuver and fire support, ranges at which fire is executed, and finally halted in the event of closure to minimum safe distance. The Umpires assess respective casualties and indicate whether one side or the other should withdraw and how far before activity resumes. Casualties are instructed by the Umpires to move behind their respective lines and wait a specified period ranging from 10-20 minutes before being allowed to reappear on the field. Within the four hour Bulge scenario, this is explained as the appearance of stragglers moving towards the sound of friendly action, but it also respects the reenactors' commitment of time, effort, and funds by maximizing their opportunity to participate.

Engagements between crew served weapons and vehicles are adjudicated using dice and a results table. Each Umpire is issued two six sided die for use in conjunction with fire solution tables provided in the reenactment Umpire's manual. The Umpire identifies the weapon firing, gauges the range to the target, and rolls his dice to determine the result. Using two different color six-sided die, the combat result can be found with one roll of both dice together – one die determining a hit and the second determining whether the target is destroyed or simply immobilized. This provides a quick resolution less subject to complaints about arbitrary Umpire adjudications.

The scenario presented by EXCON to the Allied and Axis forces provides a specific number of direct artillery fire support missions and the ability to request additional general artillery support (availability and caliber to be determined by an Umpire's die roll). Given the size of the forces deployed and the size of the training area, both sides at FIG are limited to single battery fire missions only. Reflecting differences in wartime doctrine and organization, the interval between call for fire and fire on target for the Allies is 8 minutes and 15 minutes for the Axis.

Maneuver Element commanders double as Forward Observers who can request fire missions via radio to the TOC. The TOC Umpire confirms the availability of a direct fire mission or whether a general fire mission can be requested and what caliber is available - by die roll for the last two. The TOC Umpire notes the nature of the fire requested, confirms the coordinates given by the FO on the map, and rolls for possible deviation. He then radios the umpire closest to the designated target coordinates and conveys the time on target, the point of impact, and the number of rounds impacting. The Umpire on the ground waits the appropriate interval before the projected arrival of the artillery fire and then alerts the commander and troops in the vicinity of incoming artillery fire. He determines the center of impact for the incoming fire on the ground and assesses casualties on any units affected by that fire.

Artillery – Indirect Fire Weapons				
Weapon	*For Mission*	*50 Yard Box*	*100 Yard Box*	*200 Yard Box*
US 75mm	1	X		
US 105mm	3 - 4	X	X	
US 155mm	5	X	X	X
US 203mm (8 inch/ 240mm)	6	X	X	X (up to 300 yds)
US 4.2 inch mortar	2	X	X	
German 88mm	1 - 3	X	X	
German 105mm	4 - 5	X	X	
German 175mm	6	X	X	X

Casualties for Indirect Fire Weapons:
1. Troops in the open – 50%
2. Troops in fixed positions – 20%
3. Light skin vehicles in the open – 60%
4. Light armor in the open – 30%
5. Armor in the open – 20% - (30% if US 203mm or German 175mm fire)

The effects from Items 4 and 5 are assessed via reference to the Kill Columns on the table

for Crew Served Direct Fire Weapons versus Tanks below:

Crew-served Direct Fire Weapons (37mm and Up) versus Tanks (front/side)					
Weapon	Range	Hit Mobile	Hit Stationary	Mobility Kill	Outright Kill (front/side)
88mm (German)	LOS	1 - 2	3 - 6	1 - 4	5 - 6
75mm (German)	LOS	1 - 2	3 - 6	1 - 3	4 - 6
50mm (German)	LOS	1 - 2	3 - 6	1 - 2	3 - 6
37mm (German)	500 yards	1	4 - 6	1	6
76mm (US)	LOS	1 - 2	3 - 6	1 - 3	5 - 6
75mm (US)	LOS	1 - 2	3 - 6	1 - 2	3 - 6
57mm (US)	LOS	1 - 2	3 - 6	1 - 2	3 - 6
57mm RR (US)	500 yards	1	5 - 6	1 - 2	N/A
37mm (US)	500 yards	1	4 - 6	1 - 2	N/A
25mm (UK)	300 yards	1	4 - 6	1 - 2	N/A

Although it has not yet been used in a reenactment, we have noted that the World War Two manuals include instructions for adjudicating attacks on ground targets by real or simulated aircraft and how to assess casualties/damage on ground targets. Following is a chart compiled for the Umpire Team, based upon the original manuals' charts on air attack which has been accepted by WWIIHA. To date, no scenario used for the Bulge reenactment has called for the use of aircraft reflecting the extended bad weather that historically grounded Allied air power in the early days of the battle. In actual reenactment event use, an air attack would be conducted in the TOC with results reported to the Umpire nearest the target so that he can assess and report damage and casualties to the reenactors and the TOC.

Attack by Low Flying Aircraft			
Infantry/Artillery in position are neutralized when attacked by:	1 aircraft versus 1 company/battery or less	3 aircraft versus 1 battalion	9 aircraft against 1 regiment
Infantry in Column attacked by an appropriate number of aircraft:	Lose 10% per attack if surprised; Lose 2% per attack if not surprised	Lose 10% per attack if surprised; Lose 2% per attack if not surprised	Lose 10% per attack if surprised; Lose 2% per attack if not surprised
Infantry deployed or in bivouac attacked by an appropriate number of aircraft	Lose 3% per attack if surprised; Lose 1% per attack if not surprised	Lose 3% per attack if surprised; Lose 1% per attack if not surprised	Lose 3% per attack if surprised; Lose 1% per attack if not surprised
Vehicles lost per airplane per attack when attacked by low flying bombers in formation appropriate for the purpose	*With Surprise:* 1 armored vehicle per attacking aircraft; 2 unarmored vehicles per attacking aircraft	*With Surprise:* 1 armored vehicle per attacking aircraft; 2 unarmored vehicles per attacking aircraft	*With Surprise:* 1 armored vehicle per attacking aircraft; 2 unarmored vehicles per attacking aircraft
	Without Surprise: 1/5 of an armored vehicle per attacking aircraft; 1/3 of an unarmored vehicle per attacking aircraft	*Without Surprise:* 1/5 of an armored vehicle per attacking aircraft; 1/3 of an unarmored vehicle per attacking aircraft	*Without Surprise:* 1/5 of an armored vehicle per attacking aircraft; 1/3 of an unarmored vehicle per attacking aircraft

Application to In-Stride Wargame Adjudication

An important objective in WWIIHA's introduction of Umpires has been to support historically accurate tactics down to the small unit level and historically accurate behavior in tactical situations by reenactors. In stride adjudication by umpires in the field provides quick

resolutions that do not hold up the progress of a time limited exercise (4 hours). The use of Umpires and in stride adjudication of reenactment tactical engagements represents the application of an available, accessible, and sufficiently precise technology in this context in which the emphasis is upon proper tactics, fire and maneuver, and cover and concealment and less upon technical performance specifications of the weaponry.

We are actually dealing with multiple levels of simulation. First, there is the simulation by each participant that he or she is a member of a military or paramilitary force in the year 1944. Secondly, there is the simulation that they are conducting tactical field operations against a similarly armed and trained opposing force. Presenting the umpires in similar period uniforms and kit supports these simulated experiences within the limits of safety and obvious nature of pretend accompanying "combat" with blank firing weapons. Being able to cite original World War II guidelines and manuals for umpires from at least two countries, further supported these attempted simulations. Reportedly some reenactors in 2018 were still concerned that umpires represented a hostile intelligence threat which complicated the briefing of to the umpire team of each side's tactical plan.

An Umpire in an exercise, whether in the 1940s or in a reenactment today, relies upon acceptance of his authority (wearing officers' rank helps) and the cooperation of the trainees/reenactors to be effective. The 2018 Bulge event at FIG was the third occasion in which umpires took to the field to provide in stride adjudication. Cooperation in part reflects the reenactors' perception that the Umpires are neutral, impartial, and provide a quick and reasonably accurate resolution of combats in a way that keeps the reenactment moving. Reportedly some reenactors in 2018 were still concerned that umpires represented a hostile intelligence threat which complicated the briefing to the umpire team of each side's tactical plan. Since the reenactors on both sides were acting in accordance with the plans made by their respective commands, being briefed on those plans was essential to effective adjudication. In spite of this slight obstacle, the impartiality of umpires applying in stride adjudication to engagements in the field met no challenges during the exercise and was specifically approved in after action comments by both sides.

The use of dice by umpires in the in-stride adjudication of the more complex direct fire by crew served weapons against vehicles was also accepted without comment. Dice have been used in conjunction with results tables to adjudicate simulated military engagements since the 19th Century kriegspiels of the Prussians. Livermore's American Kriegspiel, adopted by the U.S. Army in the 1880s, even introduced what was in effect a 12-sided die. Dice and results tables have been used in commercially sold board wargames and modern miniatures wargame rules since the mid-1950s. I believe that this general familiarity lead to the acceptance of the die rolls by the reenactors. I also wonder if the use of dice rolls cross-referenced with a results table might have somehow been seen as more authoritative and less arbitrary than an umpire's decision in the field.

The Umpire Team Leaders compiled AAR, like those of their WWII predecessors, do not include assessments of even comments on tactical decisions made by reenactor commanders nor do they offer advice or share any observations about a tactical situation. The AAR does include Umpires' observations regarding points of focus for WWIIHA's future training programs reflecting observation of tactics and the individual reenactor's use of ground, cover, and concealment during the tactical scenarios. AAR comments do not single out any individual or unit unless a serious safety issue arose in which WWIIHA may need to take remedial steps.

Conversations and reports over three years indicate that both Umpires and Reenactors look favorably on the experience and expect it to continue. Umpire team members are already following up on their individual AAR points and looking deeper into the actual World War Two era manuals and AARs to improve review our contributions to enhanced historical and tactical accuracy. I am currently pursuing a wartime US Army Intelligence translation of a German Umpire Manual reportedly to be found in the National Archives. I have located a US Army Military Intelligence report from 1942 and shared its discussion of German Umpire practices and usage which so far appears consistent with Allied practices. The German experience may offer further insights into the effective use of Umpires in a period correct fashion while supporting the credibility of our continuing efforts to be accepted as fair and impartial in the reenacting community.

Conclusions

The take-aways from the WWIIHA Bulge experience are this:

- In-stride adjudication can be done with basically the tools at hand, you can make it as simple and easy or as complex and technical as you need (with the right tools).

- Training of your adjudication personnel in your chosen process and on any supporting equipment are key, closely followed by any training audience they would interact with.

- You need to establish training criteria for your adjudication personnel and integrate them into the design process and Exercise Control during the actual exercise.

- It can be applied in a wide range of environments and settings and any number of simulation formats (in the field, BOGSATT, tabletop, computer, etc.).

- Because of the concept's flexibility you need to be clear as to the costs/benefits of applying in stride adjudication and ensure that it supports the focus of your exercise/simulation as it balances precision versus speed of execution.

- Applying in-stride adjudication is also a learning process in that each time you apply it there will be insights gained in how to do it better next time or to apply it in different settings and/or situations.

Appendix A: Do's and Don'ts for Umpires

From (UK War Office 1944)

Do's

> (a) DO Keep in the picture the whole time; if you don't know what the enemy or neighboring units are doing, find out.
>
> (b) DO make certain that the troops understand the picture you are painting; if they do what you think is wrong, it may be because your description of the situation was not sufficiently clear.
>
> (c) DO be realistic in assessing casualties; be severe on inaction and carelessness.
>
> (d) DO insist on realistic fire control; if troops have exhausted their ammunition, don't let them continue firing until they get some more.
>
> (e) DO look ahead and try to foresee what is likely to happen, so that you can give an immediate decision when it is needed.
>
> (f) DO consider the fire effect of both sides before you give a decision.
>
> (g) DO be firm; once you have given your decision, stick to it.
>
> (h) DO use your white flag to halt a movement that you feel is out of control; it is far better to have a brief pause in an exercise than to let it develop into a farce.
>
> (i) DO all that you can to maintain the interest of the troops.
>
> (j) DO keep a proper record of events; if important times and events are missing, your report will be of little use to anyone.
>
> (k) DO send in your report to your senior umpire at the times ordered; he is anxiously waiting for it to complete his picture of the battle.
>
> (l) DO get in touch with the umpires of the opposing side before an attack; unless you know the dispositions and plans of the defenders, you will be unable to give a realistic decision.
>
> (m) DO remember the value of the exercise very largely depends upon you.

Don'ts

> (n) DON'T take sides; your job is to assess the value of fire impartially.
>
> (o) DON'T compromise exercise security by word or deed; your umpires' forecast of events is "exercise secret" and must not be communicated to the troops.
>
> (p) DON'T give away impending developments or the presence of a patrol by conspicuous behavior or careless exposure on your part.
>
> (q) DON'T give information that would not be available in war; this is bad training and only results in wrong lessons being taught.

(r) DON'T get in the way of commanders or troops more than is absolutely necessary.

(s) DON'T look at fields of fire from a vehicle; get down and see them from the level of the actual weapons.

(t) DON'T be bluffed, but check up yourself; things are not always what they are claimed to be.

(u) DON'T order tactical withdrawals; if the superior commander wants troops to withdraw, he will give the order himself.

(v) DON'T tell formed bodies of troops that they have been taken prisoner; if they are good soldiers, they would far rather be dead.

(w) DON'T dictate to commanders what they should do; they are commanding troops, not you.

(x) DON'T allow argument, but give reasons; be tactful and avoid giving offense.

(y) DON'T leave a situation you are umpiring until either the situation has been cleared up, or you have handed over your responsibilities to another umpire.

(z) DON'T criticize commanders in your report; state the facts clearly and let them speak for themselves.

Appendix B: Common Mistakes of Umpires

From Appendix A (US War Department 1942b, pp. 65—68)

a. Ignorance of situation, projected course of maneuver, and own missions.

b. Inaction or insufficient emphasis on clear description of hostile fire, or failure to report to superior umpire or direction officer.

c. Calling out: "You can't advance beyond this point."

d. Revealing a projected course of maneuver. This is detrimental to the training and fighting efficiency of troops.

e. Insufficient comprehension of projected course and purpose of maneuver. In every situation the umpire must know if, how, from what direction, and how long fire should be delivered; the number of casualties; and what measures his injected situations should cause the troops to take. He should also know what should be done in case the enemy attacks, etc.

f. In defense situations: assessing too few casualties, before and during hostile attack.

g. The same applies to attack situations.

h. Permitting a long exchange of fire without determining who is the victor.

i. Giving hostile date to leader only, instead of aloud so that all can hear.

j. Conspicuous behavior, thus revealing the situation.

k. Failure of mounted umpire to report promptly his own fire to opposing umpire, if latter's troops act as if unaware of this fire.

l. Vague exclamation: "Shells falling here," instead of detailed information as to arrival, number of shells, point of impact, duration of fire, type of fuze, and caliber. Above all, intensity, area, and time limits should be given.

m. Failure to report to superior umpire concerning any independent measures and intentions.

n. Vague exclamation: "Machine gun fire has ceased." He should say: "Hostile surprise attacks have ceased." ("No more bursts of machine-gun fire are expected.") When the troops have no cover, or their cover is only simulated, he should say: "If you move, you will be fired at."

o. Shouting: "Enemy is withdrawing" instead of "No. 1 rifleman, you see a hostile soldier running toward rear***etc."

p. Shouting: "Gas" instead of "You smell mustard."

q. Permitting an attack to succeed without fire protection, without advancing by rushes, without individual soldiers working their way forward, or before the enemy withdraws or suffers severe losses.

r. Failure of mounted umpire to inform all umpires immediately as to situation and pending missions. (He should use the signal "Leaders come to me.")

s. Failure to listen to the orders of the platoon commander.

t. Failure to observe the troops uninterruptedly.

u. Mounted umpire permitting opposing troops to gather in numbers within reach of each other without digging in (simulated), or without being put out of action.

v. Shouting: "Take shelter," or "Shoot," when an enemy machine gun fires somewhere with blank cartridges. Instead, he should make remark such as "Bullets are whistling around you."

w. Divulging knowledge of terrain, or showing a map to the troops when they have no maps at hand, or when they are forbidden to use maps.

x. Crossing railroads except at designated crossing points.

y. Disregarding safety regulations.

z. Permitting roops to expose themselves without taking corrective measures.

aa. Failure to cause machine-gun barrels to be changed at appropriate intervals, even when firing blank ammunition.

bb. Stopping troops by shouting: "Shells are falling here." He should say: "Intense machine-gun fire--bullets throwing up ground all around us," or "Shells are falling 50 meters ahead of us."

cc. Shouting: "Machine gun fire" instead of "Uninterrupted intense firing," or "Bursts from two or three machine guns are striking here (pointing), the bursts are getting closer."

dd. Dulling enthusiasm of troops by restraining measures during hot and courageous pursuit of beaten enemy.

ee. Permitting troops to halt and remain inactive without calling out "Artillery fire," to force them to dig in.

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2.14 Do Not Forget the Fundamentals

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This paper represents his own views, not those of any past, present, or future employer.

For some people in the professional wargaming community, in-stride adjudication — defined for our purposes as "adjudication performed simultaneously with game play" — is the Holy Grail of game execution.[38] This belief is not wrong per se — there are many games which could surely benefit from improved in-stride adjudication, in terms of design flexibility, execution speed, and player engagement. Nonetheless, in-stride adjudication does not cure all that might ail a particular game.

The thesis of this paper is that adjudication needs to be tightly coupled to both game design and game analysis and must be thought of in those terms. This is not — at least, I hope it is not — a radical statement, yet I feel it is one that bears repeating, because it is easy to lose track of the fundamentals. Those fundamentals include the following three major points:

1) The game design must flow directly out of the objective of the game.[39] For a professional game, that objective usually will involve an analytical, educational, or training objective. Hobby or commercial games have the advantage that the primary objective is to have fun, the implications of which will be discussed below.

[38.] This is a personal observation based on 11 years as a professional wargamer for the US Department of Defense, first at the Center for Naval Analyses, then later as a professor of wargaming at the US Naval War College.

[39.] Okay, maybe "objectives," but I hesitate to say that, because frequently once you acknowledge that a professional game can have more than one objective, the sponsor takes that as permission to have a hundred objectives. There is no hard-and-fast rule — it really depends on how compatible the objectives are — but if you can't count all of the objectives in one hand, you have too many.

2) The game design must support the analysis plan for the game. A game without analysis is at best severely limited, and at worst is professional malfeasance. Admittedly, for well-established training games the analysis might be a simple review of what the problems were this iteration, but for analytic games, the objective cannot be met without game analysis, and hence the analysis is reason for the game.[40]

3) The data collection plan must support the analytical plan, because can't have analysis without data collection. Indeed, a frequent best practice is to produce a written Data Collection and Analysis Plan (DCAP) during the design process, to make sure that data collection and analysis remain on the same page. Data collection aims to provide the answer to not just *What Happened*, but also *Why*.[41]

Assuming those fundamentals are honored (by the designers, the sponsors, and any other stakeholders with the wherewithal to affect the game design), what are the implications for in-stride adjudication?[42]

First, adjudication is a major factor determining the battle rhythm of the game, and thus in-stride adjudication potentially adds flexibility to the game schedule. By "battle rhythm" I mean the schedule of player activities to be executed per turn. Most of the games I participated in during my time as a wargaming professional had an adjudication phase built-in to the schedule,

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[40] If it is claimed to be an analytical game, yet the analysis is not considered important, then it is not really an analytical game after all.

[41] There is data to be collected at many different points in the game. In Newport seminar games, frequently data was collected by having players fill out templates that were then sent to the White cell at the end of each turn. This is a good first start, but it is also important to have observers in the room taking notes. These observers are useful in understanding the context of the decisions, the interaction of the players within the cell, and whether artificial game effects (such as time pressure) are having a distorting influence on the process. If games are about human decision making, then how the decisions get made, and not just the decisions themselves, needs to be examined. Observers also form a hedge against failures of the other data collection methods.

[42] The above discussion is heavily influenced by my background as a wargame analyst at the US Naval War College. Most of the games I participated in while in Newport were seminar-style games, and did not focus on the outcomes of the game so much as the decision-making process of the players. The major exception was Halsey Group Alfa, a faculty-moderated, student-run research group that used iterative wargaming as a research tool to allow meta-analysis across games.

For a good introduction to what games can and cannot do, please see Peter Perla's *The Art of Wargaming*. It was considered required reading during my time in Newport, despite that fact that Peter is neither dead nor German.

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which in turn pushed games towards one turn a day (the White cell misses dinner) or two turns a day (the White cell misses lunch, too), to avoid player down-time. As such, the schedule of the games was pretty well locked in; while changes might be made during the game (semper gumby!), the net effect was to push the game "off schedule."[43] By moving the adjudication in-stride and breaking the rigidly scheduled adjudication phases, the schedule can adapt to the game play rather than the other way around.

Second, some types of games might be better suited to in-stride adjudication than others. In-stride adjudication is much easier to implement, for instance, at the hobby gaming level -- indeed, it is fundamental to most hobby games. Roleplaying games have an in-stride adjudicator – the gamemaster – as effectively a player in the game, whereas board or miniatures wargames generally adjudicate battles either in-stride or so close to in-stride as to make no difference. Of course, in most cases hobby games have but a handful of players, and when scaled to the sizes typical of most seminar games run they into problems.[44] An exception to this statement is the National Security Decision Making Game, which can perform in-stride adjudication with a hundred players through a system of hierarchical and decentralized adjudication. The adjudication is hierarchical in that certain topics are always addressed by a designated controller, e.g., all military responses must go through the military controller. Most political decisions, on the other hand, are decentralized and handled by controllers imbedded within the cells.[45] (It helps that this is a purely recreational game, and hence they do not have

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[43.] While at CNA I participated in a game where the sponsor was convinced that an 80-page proprietary spreadsheet model needed to be incorporated into the game. Game turns were supposed to take an hour, with the spreadsheet adjudication taking 15 minutes per each of the three teams. Of course, the players on the three teams did not turn in their moves until the end of the allocated hour, and there was only one spreadsheet operator, meaning that the planned one-hour turns were really closer to two hour turns. To make matters worse, while the spreadsheet calculated answers to four or five decimal places, the player inputs were SWAGs at best.

[44.] For example, in October 2005 I played in a naval wargame celebrated the 200th anniversary of the Battle of Trafalgar. We used Clash of Arms *Close Action*, which was not really designed with 70-plus players in mind. The combat adjudication procedure was modified -- specifically, decentralized -- in a way that played almost as fast as the standard game of 10 players. Because the modification involved recording both gunfire and outcomes, it had the side effect of documenting the game.

[45] According to NSDM's Merle Robinson: "NSDMG's runs PMESII games focused heavily upon negotiations among players. The approach involves four types of control staff:
  1. Dedicated controllers for adjudication of major issue areas including:
    • Military actions

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to collect data about the players moves to analyze.)[46]

Third, in-stride adjudication has the potential to dramatically complicate the job of the analyst(s) collecting and analyzing the game data. One of the advantages of the traditional white-cell-doesn't-get-lunch-or-dinner approach is that, by necessity, the game produces materials of benefit to the analyst. Player moves must be recorded in some way in order to be communicated to the White cell; and White cell decisions must be recorded in order to be moved back. While this is probably not sufficient (from my time as an at-sea exercise analyst at CNA I learned to appreciate the role of a trained, notebook-equipped observer, as both a way to gain context and as a backup to a computer system failure), it is a good start. In-stride adjudication, with its implications of decentralized adjudication performed at speed, threatens to streamline data collection out of the process, and hence this may form a natural limit on how well in-stride adjudication can be implemented in analytical versus educational/training games. In theory, the designer can integrate and simplify data collection into play with short action/move sheets, automated recording of unit movement, et cetera, although the more such efforts that take place, the less "in-stride" the adjudication becomes. At a minimum, game designers and analysts need to understand the essential tension between speed of play/adjudication and data collection, which must be balanced in accordance with the objectives of the game and the type of analysis that needs to be done to meet those objectives.

- International Economics & Results of National Policies and Budgets
- Central issue/story line to be explored.
2. Dedicated controllers for any national cell in Play handling domestic issues and single-issue trade deals.
3. Facilitators to simulate any non-player states/organizations in negotiations.
4. Game Director in charge of game pace, identifying staff disconnects, triggering any scripted events, dealing with player challenges/problems.

Sometimes 5 minute stand-up meetings are used to align control staff actions or confer player-generated surprises. NSDMG also uses short action sheets players use obtain staff adjudication of critical issues which could be used for data collection."

[46] NSDM is run at several gaming conventions, mostly in the eastern half of the United States. For more information on NDSDM, see their Facebook page at https://www.facebook.com/NSDM-The-National-Security-Decision-Making-Game-187557132044/.

In this paper I have tried to emphasize some of the fundamentals of game design, so in conclusion, I'd like to revisit the three points I made early on:

1) The game design must flow directly out of the objective of the game.

2) The game design must support the analysis plan for the game. These are, fundamentally, the reasons for game taking place. Any adjudication system must take these factors into account.

3) The data collection plan must support the analytical plan, because can't have analysis without data collection. Data collection aims to provide the answer to not just *What Happened*, but also *Why*.

3 Workshop Notes

This section contains notes from workshop participants' data collection sheets collected during the event, emails received after the event, and responses written by members of the working group after the event. We ignored repetition of content from the working group briefings and papers, statements of agreement with content from the working group briefings, and items that are not relevant to in-stride adjudication. Disagreement with these exclusions and additional comments can be made on PAXsims using the WordPress commenting facility.

1. **I define Ed McGrady's "Agency" as the players' ability to control or feel in control of the scenario … to feel like they can make a difference.**

    Stephen Downes-Martin: This ties into Peter Perla's definition of wargaming, that players make decisions that make a difference and have to live with the consequences of those decisions. This participant's definition of "Agency" therefore means that either the players must be aware their decisions make a difference when they are playing a real game (the magic circle must remain intact), or they are fooled into thinking their decisions make a difference when they are not playing a real game and their decisions do not make a difference (the players are part of an experiment perhaps?) To <u>be</u> in control is not the same as to <u>feel</u> in control. Players (and warfighters) often try to wrest control of the game (situation) from their opponents, and if possible to do so without the opponent realizing it. If the latter has succeeded and the opponent feels in control (but is not) does the opponent have agency (as per Ed McGrady's definition) or not? It seems to me that "make a difference" is a weaker form of "control the scenario", and there are two levels (being "able to" and "feel like one is able to") that can be applied to Ed McGrady's definition of Agency. In my opinion the workshop participant has defined a different set of concepts that are interesting, but require a different glossary definition from Ed McGrady's that takes into account the spectrum of self-awareness versus delusion that the players lie on concerning their feelings.

    Ed McGrady: By "agency" I'm referring to the player's ability to affect the games progress. That is very different than control which is who is in charge of the game. If players exercise agency they do it under control of the game system. Let's take rigid Kriegsspiel as an example. There is nothing constraining a player from doing anything they want to win the game, from punching the opponent senseless to deliberately misinterpreting the rules. However, within the Magic Circle of the game we come to understand that everyone will behave according to their role. As a player/adjudicator the rigid Kriegsspiel player understands that they must play within the social and game rules they have been given, or they are not playing the game. They can make stuff up, but that will be a different game, or not a game at all. Likewise, in professional games there is an expectation that people will follow roles: players will play, and may be invited to comment on adjudication, but controllers are in charge and unbiased participants (not the same as players – but not entirely out of the game – we can discuss this more). So, players need to feel they can make a difference, but they also need the constraints both social and rules (adjudication) to feel that they have made that difference in an

environment that challenges and constrains their decisions. If they don't have those constraints and challenges then their decisions are just random statements, and the players lose agency. So, what I'm saying is that control plays an important role in granting players agency through observing, executing, and managing the game.

2. **I interpret Ed McGrady's "shenanigan" to mean incorporating player agency without breaking the game.**

   Stephen Downes-Martin: Is this a reasonable summary of the term? My interpretation of this comment is that it fits Ed's definition if the workshop participant meant "breaking the game" to fit Ed's definition of a Shenanigan going "outside of what the designer predicted, or simply cannot be modeled given the resolution of the game, the physics involved, or the complexity of the situation."

   Ed McGrady: This comment makes perfect sense when interpreted as addressing how the controller should treat shenanigans. The controller will always have the best interest of the game, and game objectives, in mind when ruling on anything, but especially shenanigans. It is not a definition of the term, there are many ways to incorporate player agency into a game design and dealing with shenanigans is only a small and relatively obscure aspect of that challenge.

3. **How can you tell the difference between a shenanigan and a black swan?**

   Stephen Downes-Martin: In the context of a game does this mean a collection of player decisions that individually are not deliberately made to be shenanigans and might as individual decisions not be shenanigans, but the combination satisfies the conditions for a black swan, i.e. comes as a surprise, has a major effect, and is often inappropriately rationalized after the fact with the benefit of hindsight? My interpretation is that a Shenanigan is outside the universe of the game, but a black swan is very much inside the universe of the game. A shenanigan breaks the game but a black swan fits into it. Even though in both cases it cannot (?) be predicted, you tell the difference afterwards by whether it fits into the game … although I suspect there may be serious disagreements by players over whether something should be treated is a black swan or a shenanigan based on which side gets hurt.

   Ed McGrady: I would think of it a bit differently. A shenanigan is something that the players do. A Black Swan tends to be something embedded in the scenario. At least that is the case for most professional games I've dealt with. A shenanigan is something that the players think up that is possible within the game universe, but unlikely and potentially disruptive if it gets carried out.

   Let's take an example. We are playing a game involving fighting a peer competitor. The Blue players decide on move 1 turn 1 to execute a coup-de-main using all kinds of shenanigans to defeat whatever might prevent such an action and also ensure that massive nuclear retaliation does not occur. Everything is plausible, and the US players have POTUS authorization (assume it's a player in the game). We thought we'd get at least 4 weeks of standard kinetics out of this, now we're in a terrain we didn't expect

with the Capitol doing stuff that is very hard to predict (SOF, space lasers, whatever) and if it is adjudicated as successful the game is over with Blue mission success! That is a shenanigan.

Now let's assume we're in the same game, but the coup never was brought up. Turn 3 Blue forces are feeling their oats and decide to strike a C3 post on the outskirts of a popular city. It's adjudicated a massive success, C3 down, generals killed, some civilian casualties, victory for Blue! Now the Red player, who is our best expert in Red, looks at it and says: "you guys just crossed Red's nuclear threshold!" (Something that is not commonly known by Blue for reasons) Boom! Five BCT's and an airbase just vanish and you're on the first step on the ladder. That is a Black Swan.

Can a shenanigan be a Black Swan? Sure. Perhaps the coup in the example is a Black Swan. But not all Black Swans are shenanigans because the term shenanigan references something players do in the game while a Black Swan is a much bigger concept. Black Swans appear most frequently in HA/DR games, where, for example, we find out that the two tribes we are allied with hate each other more than they hate the bad guys. Or that the asteroid impact produces an EMP that takes all the lights out. Or similar. At least that's my interpretation of the two terms. I'd have to argue with Peter Perla and Stephen Downes-Martin a lot more to refine it as I'm not an expert on Black Swan literature.

4. **Ed McGrady's definition of a shenanigan ("no normal person would do this, only a gamer would do this") applies to Kamikaze attacks.**

   Stephen Downes-Martin: It might also apply during the Japanese Navy's pre-Midway wargames to the location of the US Fleet (and yet, there they were) which senior Japanese officers ignored as unreasonable. Do we need a better definition of shenanigan, or a better way without the benefit of hindsight to distinguish "normal people" from "players"? In addition, are shenanigans exactly what we should be looking for and encouraging during some kinds of games?

   Ed McGrady: … Hmm … let me see if I can parse this.
   1) Kamikaze attacks were not a shenanigan because they were a working system that was actually used. Had they been used during the wargames prior to the war then the Red players could have reasonably been accused of a shenanigan. However, I do not use the term in a pejorative way – control needs to think carefully about when and how to let players execute their shenanigans. There are many reasons to proceed, to learn something, to give the players agency, to shut the players up, to examine some of the constraints and limitations, etc. Frankly in about 80% of shenanigans I encounter in games I let them go through, though some of the ridiculous ones get weeded out by physics. I would have let Kamikaze attacks go, probably after a conference with Red experts to see if that was culturally realistic.
   2) Blue player actions that comply with physics and are not weird are not shenanigans. Repositioning the Blue fleet to a place people don't expect is simply good naval tactics. A shenanigan would be trying to sail the fleet off somewhere else to strike while the game

was focused on Midway.

3) I think shenanigans are an important aspect of game play. They are the players thinking "playfully", something they only tend to do with their kids and in real warfare. We should thus take them seriously, I in no way advocate for not taking them seriously, but we should also approach them judiciously, neither dismissing them or letting them dominate play.

4) We can learn a lot from how wargamers fight wars. It's a shame we don't.

Finally, as a point of clarification, when I speak about shenanigans I am talking about something that can be done ("lets dump a body in the water off of Spain and have it carrying false plans on the invasion") but in execution would be problematic (body must be found, enemy must believe it, etc.). I tend to advocate for allowing such things to proceed, but at a low probability and high possibility of backfire. Even if they do succeed they often do so in a muddled way that has little effect on actions (OK, we hold 1 armored division back in case that intel was right). In a professional game if the players have thought of they can think of it. However, whether they would be allowed to execute it, and whether said execution would work, is often problematic.

5. **The line drawn by Ed McGrady between in-line and other forms of adjudication is in the wrong place, it should be at least between Turn based Rigid and Turn based Free, or arguably between Turn based Free and Role-playing game.**

   Stephen Downes-Martin: However, the participants at the table that made this comment provided no written reasoning for this belief in the notes they submitted. Ed indicates that there is a spectrum of discontinuity and chooses to draw the line where he does because immediately to the right of the line is Turn based rigid where the players continue to play while adjudication takes place in the sense that the players are planning a move which is part of play. My interpretation is that Ed's line is drawn based (in part) on his understanding of what "play" means, that it includes planning, decision, assessing protagonist moves, etc. but controversially (in my opinion) it also includes watching or participating in Adjudication ("watching adjudication" is neither play nor agency in my opinion). I suspect others would argue for shuffling the types of adjudication on the spectrum of "discontinuity in play" and drawing the line elsewhere based on what is included in "play".

   *Ed McGrady: Sure, as I said, this is where *I* draw the line. I even made a picture so I could emphasize that. However, I will argue that when player agency in the game is considered there are few other places to draw it. In turn-based games the players (typically) have the responsibility for both playing the game and executing the rules, so they retain agency throughout the process. The issue with observing adjudication is debatable (i.e. I won't argue too hard against Stephen Downes-Martin), but in professional games it is uncommon for players to sit quietly behind a glass wall while adjudication is occurring. If they see something that they object to, they say something. That is why I assume they retain agency in that situation, not because of observation but the possibility of participation. I think this whole idea of "in-stride" vs. "whatever else we call it" is very difficult and raises a lot of interesting issues. I don't claim I have the answer, I do claim*

that I have a way of thinking about player agency which both makes sense and allows us to say sensible things about the problem that other schema (turns, time, space, whatever) do not.

6. **Not very much discussion on maintaining record of errors in a non-computer wargame.**

   Stephen Downes-Martin: I assume this refers to errors in adjudication. If so then this, in my opinion, is a part of a larger problem with most professional wargames in that the data collection and analysis plan usually does not cover the adjudicators and their decisions despite the fact that adjudicators are decision makers within the game and influence the trajectory of the game (Downes-Martin 2013).

   Ed McGrady: When controllers/adjudicators make a mistake, it is critically important for them to admit what they have done and clean up the mess. If they cannot then that should be accounted for in the game report. On the other hand, adjudicators are busy and if you want them to find every single mistake they make and document it you're going to need a shadow adjudicator with a notepad.

7. **Do large events require more clarity and further removal of control from the players?**

   Peter Pellegrino: I think large games (like mega-games) actually put more control in the hands of the players as there are just too many moving parts for adjudication to attempt to manage. At the Naval War College, we have a large multi-sided game that has very little control exerted over the players. If one team makes a deal with another team, and fails to carry through, it's up to the aggrieved players, not adjudication, to deal with the offending actor. The players are actually quite good at remaining in the bounds of the game, as significant deviation is likely to be detrimental to their ability to win the game.

8. **In-stride adjudication helps maintain the fourth wall by not breaking up the environment into "play" and "adjudication" sessions. Is it better to maintain the fourth wall or maintain buy-in from the players that the adjudicators are being honest? In-stride adjudicators should plan for injects to protect the fourth wall. Can use media feeds for these kinds of inject. If the fourth wall is already broken this should not stop control from acting to rebuild the fourth wall.**

   Stephen Downes-Martin: Jason Li makes an argument for using in-stride adjudication to strengthen the fourth wall and provides a discussion on maintaining and breaking trust in the adjudication process. The tradeoff between the fourth wall and trust when one is at risk probably depends on the sponsor objectives for the game and the level of trust required. For example, psychology experiments on the players using games can probably not only be run but actually depend on breaking that trust.

9. **In-stride adjudication keeps players in the synthetic environment throughout the wargame. (Is this a possible definition of "in-stride adjudication"?) It also limits the number of out-of-character conversations. Pauses for adjudication allows players to break their mind-set and forces players to expend mental effort to pull themselves back in (and maybe fail).**

    Ed McGrady: Here it almost sounds like you're talking about a real time RPG where the players are in character and stuff is coming at them. This would both be odd for a professional game, and shade over to a CPX. Basically, for professionals a CPX represents more or less the ultimate real-time game. Of course, this assumes that you have found a way to dispense with turns without making the game either unaffordable or insane.

    Stephen Downes-Martin: I should do a literature search on what experiments have been run on the relationship between immersion in a game world and performance of the players.

    Ed McGrady: I believe any of the roleplaying experiments would qualify here (i.e. imagine yourself as a donkey, now what would you do). Of course, those are not full games.

10. **While the RPG industry provides many excellent examples of continuous player-engaged play it is important to bear in mind that the purpose of such games is recreation and the techniques may not translate to events requiring intellectual rigor.**

    Stephen Downes-Martin: This speaks to the entire philosophy of why people play. However, one goal of the working group was to mine different gaming environments for insights that could be used or adapted for in-stride adjudication, including for events that require intellectual rigor. A further question one might ask is "how can RPG be used when intellectual rigor is required?"

    Ed McGrady: "Continuous player engagement" is not always a feature of manual RPGs. Someone has to be left behind to guard the door. Parties get separated. There are often ample periods of downtime for players in manual games. Professional games use role playing as a way to engage players, and because players often have to literally play a role in the games. There are some types of professional games that do not involve role playing in some form, but those tend to be specialized and highly formal games (e.g. panel games, conference games (i.e. you're putting on a game for conference attendees sitting at tables), etc.). However a formal RPG structure is very rarely used -- by formal I mean one involving rigid rules, a DM like controller, and a set-piece scenario with limited numbers of players. In other words, a D&D style adventure game. I believe there are a lot of unexplored applications for this kind of game. For example, intel players could run a game involving the threat, with all of the details and difficulties and politics the threat faces, in order to gain insight into the constraints and opportunities that the threat actually faces. Just the design of a game, with the need to specify roles, actions, and the scenario, might give a lot of insight into some of the driving forces behind adversary actions.

11. **Ghosts in the machine, mistakes in adjudication add soul and realism to the (game) universe. Some arbitrariness is essential to game flow.**

    Stephen Downes-Martin: *Soul and realism in the sense that people make mistakes may add realism to a game designed for entertainment or one designed to explore how people (players and adjudicators) make mistakes, but for games designed to provide intellectually rigorous insights into topics other than experimenting on the participants they should be reduced as much as possible.*

12. **The style of adjudication depends on whether the players must learn certain procedures that have to be followed.**

    Stephen Downes-Martin: *In most professional national security games military officers or civilian executives are the players because they would be doing a version of the gamed activities for real in the real world. They are usually not gamers, and so such games are designed around their staff processes to limit as much as possible the procedures they have to learn and follow simply to play the game. Adjudication and facilitation fill in the gap between real world staff processes and the game world and its rules. In-stride adjudication probably simplifies the game-specific processes the players must follow in that it removes the need for pauses not found in the real world.*

13. **Is the adjudication method driven by or independent of the fact that the battle rhythm of the game must synchronize that of the players and the adjudicators?**

    Peter Pellegrino: *It's all about the objective of the game. All game design decisions, from how the players are organized and what communications methods they will use, to the type of adjudication and the structure of a move are driven by the objective. As both a research center and a fleet support activity, the Naval War College has to deal with a wide range of sponsor questions, so each game is bespoke and specific to that problem set and designed accordingly.*

14. **Bill Lademan's "maneuver of knowledge" sounds close to "agile organization theory".**

    Bill Lademan: *It's quite true that similarities exist. The terms agility, coordination, integration, fluidity, responsive capabilities, etc. represent ideas which are peppered through papers dealing with agile organizations. The same is true with Marine Corps doctrine with the single important exception that these are ideas which have marked the Service's expeditionary culture since its inception. The maneuver of knowledge is the basis and sum of an individual Marine's requirement to "sense", "make sense", and "act". This entails the deliberate and timely movement of knowledge to a concerned agent for the purpose of achieving a reinforcing outcome. At first glance, this seems little more than the development of effective IT methodologies for the movement, display, and manipulation of ideas at the pace of generation. It is that, but is much more than the narrow search for a technical improvement. Understanding the maneuver of knowledge may reveal a methodology and a fluid structure by which organizational coherence can be maintained during a chaotic change of state imposed by operational realities. In other words, it may be fluidity which generates stability and the maneuver of knowledge may be the concept that forges that relationship. Does this sound like "agile*

organizational theory"? Sure … but the desire for agile, responsive, and resistant organizations that withstand the stress of violent change has been the ideal of military commanders since before Sun Tzu.

Stephen Downes-Martin*: It is worth digging into the insights from industry on this. Several of the "five trademarks" identified by McKinsey are present in Bill Lademan's article (Aghina et al 2018).*

15. **Insight into the decision process used by players will speed and aid the in-stride adjudicator.**

Stephen Downes-Martin*: It seems to me that there are three ways of obtaining insights into player decision processes:*
(1) understanding of the culture from which the players come, especially if the game is designed to use the same types of staff processes the players use in their real world jobs,
(2) data collection on the players (the "why" decisions were made, the "why not" other decisions were not made), and
(3) impose a decision process on the players by the game design.

16. **Reference the need for the adjudicator to see all electronic communications between players, should it be the case that "if the adjudicator doesn't see it, it did not happen"?**

Peter Pellegrino*: I'd challenge the need for adjudication to 'see all.' Like so many things, it depends upon the game. At the Naval War College, we play an annual large strategic multi-sided game where the players are free to negotiate via chat and email channels during the "diplomacy phase." Adjudication explicitly does NOT adjudicate any action "discussed" between players – only those action submitted to subordinate commanders via orders during the "orders phase." Why? In a strategic game, players may say all sorts of things like "we will withdraw our forces from the border," and have absolutely no intent to actually do so. So, in the case of that game it's "if the adjudicator isn't told about it, it does not happen."*

17. **Data collection on the adjudicators must still be undertaken even if in-stride is used.**

Stephen Downes-Martin*: Yes, adjudicators are major decision makers in the game and major influencers on the trajectory taken by the game. Hence my claim in the Diabolus paper that the data collection and analysis plan must include the Adjudicators. The difficulty of collecting on in-stride adjudicators is a function of the pace of adjudication decisions. Do the adjudicators have time to provide the data needed before the next decision is required and if so how does time spent providing this information interfere with the adjudicators situational awareness and quality of the adjudication decisions (Downes-Martin2013)?*

18. **Need to test whether in-stride adjudication can occur within the shortened decision cycles proposed for the USMC NGW Concept.**

Stephen Downes-Martin*: A programme of such tests might include researching frequency, time taken and quality of of adjudication within current games that use some version of in-stride (RPGs, historical reenactment, D&D, etc.), then build a process simulation of the*

USMC NGW Concept (using SIMUL8 for example) and run multiple simulation experiments. Refine the data in the simulation with data from early experiments proposed in the "Implementing the USMC Next Generation Wargaming Concept" paper.

19. **In-stride adjudicators have to make decisions faster and under higher pressure than adjudicators who get an off-line adjudication session. This will alter the kinds of people who make good adjudicators, the kinds of decision process they use, and the quality of decisions they produce. These are trade-offs with the intent behind the demand signal for in-stride adjudication that needs some research.**

Bill Lademan: Yes … and so theory, experimentation, training, and experience are going to be vital in realizing this characteristic of the Next Generation Wargame.

Stephen Downes-Martin: One could look for the kinds of people who might make good in-stride adjudicators among junior officers and NCOs. These are precisely the people who are supposed to be good at making fast decisions under incredible stress.

20. **The USMC NGW Concept use of multiple touch tables introduces the risk that the data needed to adjudicate (electronic from the touch table) is more and different to what is needed to analyze the game for insights.**

William Lademan: Yes … this is so now … data generated by game play (no matter from what source or in what format) is converted into information and combined and arranged during the assessment process to produce inferences, insights, and recommendations. Touch tables are only a more sophisticated means to this end.

Stephen Downes-Martin: in games with simple technology, game control can keep player actions at the tactical level within the bounds needed for the game objectives. If the players have direct access to the tactical level (the touch-tables) then the game must be a tactical level game and the data needed for adjudication is the same as needed for analysis.

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