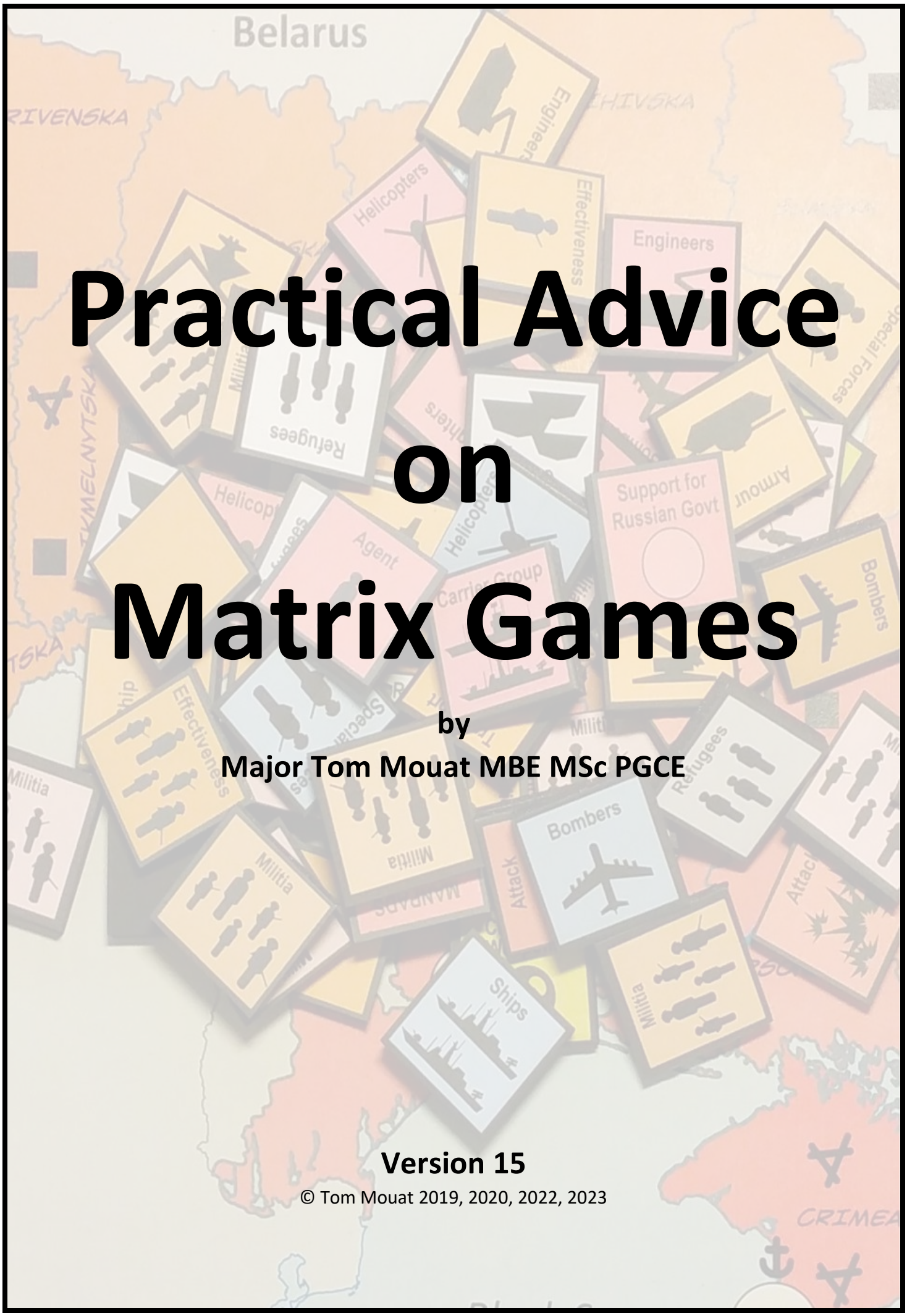

Practical Advice on Matrix Games

by

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Version 15

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Practical Advice on Matrix Games

by Major Tom Mouat MBE MSc PGCE, Head Defence Modelling and Simulation School

I have been running Matrix games since 1988. I felt that I should be prepared to stick my neck out and try to provide some practical advice on how to run the games in order to get the best results.

Terms

I will use some specific terms relating to Matrix Games that I need to outline:

- "Actors" are the primary roles in a Matrix Game, such as "The USA", "The Anonymous Hacking Collective", or even "The Earthquake". They can represent individuals, groups, concepts (such as "the spirit of Clausewitzian Friction") or complete nations.
- "Players" are those carrying out the actions of the Actors. There can be one or several players operating as a team, representing an Actor.
- "Arguments" are the expression of an Actor's actions for the turn in the game. They are made up of "something the Actor wants to happen", "what measurable effect will that have" and "a number of reasons why or how."
- "Serious Games" are those intended for a serious educational or training purposes as their primary aim. A Matrix Game used for instruction on the Cyber Operational Awareness Course at the Defence Academy of the UK, would be classed as a "serious game".
- "Recreational Games" are those whose primary aims are for recreation (even if education or training takes place). A game about the protagonists on the X-Files television series hunting down a crashed alien spaceship would be classed as "recreational" (unless you were on the scriptwriting team looking for plot inspiration!).

What are Matrix Games?

Matrix games are different to normal Wargames. In a Matrix game, there are few pre-set rules limiting what players can do. Instead, each is free to suggest any plausible action or event during their turn. The chances of success or failure, as well as the effects of the action/event, are largely determine through structured argument and discussion. This process allows for imaginative game dynamics that are lively and open-ended, and yet also grounded in reality.

Matrix games are particularly well-suited for complex conflicts and issues involving multiple actors and stake-holders, varying interests and agendas, and a broad range of (diplomatic/political, military, social, and economic) dimensions. The game system crowdsources ideas and insight from participants, thereby fostering greater analytical understanding.

In a Matrix Game, you use words to describe why something should happen, the Facilitator or the players (or both) decide how likely it is, and you might roll a dice to see if it happens (but equally, in the face of a compelling argument, you might not need to).

If you can say "This happens, for the following reasons..." you can play a Matrix Game.

The games themselves are not intended to be fiercely competitive, with obvious winners and losers. Instead, they operate with the players working to generate a credible narrative. It is from examination of this narrative after the game that the players gain insights and understanding of the situation being portrayed. The player roles have objectives that will probably place them in conflict with other players, but it is perfectly possible for all of the players to achieve at least some of their objectives by the end of the game.

Academic Underpinning

The academic research that Matrix Games seek to exploit, is in two main areas:

- **Crowdsourcing**[1]: Robust evidence from research on intelligence analysis and prediction shows that crowds outperform individuals (Tetlock and Gardner 2015, Brynen 2017), especially when some framework for opinion aggregation is provided. The evidence shows that groups can be better at estimation than individuals, due to a diversity of opinion, decentralisation of expertise, independence of thought and aggregation of the result. The best predictions come from conflict or contest, but too much communication, too early on in the process, can make the group less intelligent.

  Of course, there are "Stupid Crowds" with a homogeneity of opinion, centralisation of decisions in a formal hierarchy, internal divisions and compartmentalisation, imitation based on previous decisions, emotionality and peer pressure, and ultimately 'Group Think'. Ultimately diversity of thought is required, rather than merely ensuring ethnic and gender representation is diverse enough.

- **Role-Play and Prediction**[2]: There is considerable evidence that role-play can be a more effective basis for the prediction of decisions based on conflict resolution, than expert opinion or game theory (Green and Armstrong 2011, Green 2002, Armstrong 2001). The hypothesis being that experts will predict what *should* happen but that role play predicts what *will* happen. This is because when predicting outcomes in conflict, it is necessary to

[1] Tetlock, Philip, and Gardner, Dan. (2015) Superforecasting: The Art and Science of Prediction. Toronto: McClelland & Stewart. Brynen, Rex. (2017) "Here (Very Likely) Be Dragons: The Challenges of Strategic Forecasting." In Thomas Junea, ed.,Strategic Analysis and International Policy-Making: Case Studies in Achieving Analytical Relevance. Rowman & Littlefield.

[2] Green K.C., Armstrong, J.S. (2011) Role thinking: Standing in other people's shoes to forecast decisions in conflicts. International Journal of Forecasting, Volume 27, Issue 1. Green K.C. (2002) Forecasting decisions in conflict situations: a comparison of game theory, role-playing, and unaided judgement. International Journal of Forecasting, Volume 18, Issue 3. Armstrong J.S. (2001) Role Playing: A Method to Forecast Decisions. In: Armstrong J.S. (eds) Principles of Forecasting. International Series in Operations Research & Management Science, vol 30. Springer, Boston, MA

make predictions in a chain, and it is the "action, reaction, counter-action" cycle that generates insight and effective understanding.

In order to get the best out of role-play, it is necessary that you assign the roles before reading the scenario, ensure player roles are typecast (there is no point casting a repressed introvert to play Vladimir Putin or Donald Trump), players should act as if they were the subject, and briefings need to be accurate but succinct (1 page). It should also be noted that environment and materials affect the game, the predictions should be based on a number of games, smaller numbers of players (less than 20) are better than large games, and they are better when considering large changes or unusual events.

My Version of How to Play a Matrix Game

In a Matrix Game, actions are resolved by a structured sequence of logical "arguments". Each player takes turns to make an argument, much like making a legal argument offered in Court, with successful arguments advancing the game, and the player's position. There are a number of ways you can do this, depending on the size of the game and the purpose (each has their own strengths and weaknesses), but the one I would recommend is the "Pros and Cons" System.

In this system, each argument is broken down into:

- The active Players states: **Something That Happens** and a number of **Reasons Why it Might Happen** (Pros).
- The other Players can then state: A number of **Reasons Why it Might NOT Happen** (if they can think of any) (Cons).

Note: The "Something That Happens" should be phrased as an Action or Event with a *measurable* result – the argument is about actions that move the game forwards.

The reasons are evaluated (both Pro and Con) and a judgement made as to the weight of the argument. If the argument and reasons are compelling, quite often the argument succeeds automatically. If there are, however, good reasons both Pro and Con, a decision needs to be made as to the success or failure of the argument.

In most recreational games two six-sided dice are rolled, needing a seven or more to succeed; with good Pros adding to the dice score and good Cons deducting from it. In professional Matrix Games, the appropriate adjudication method is used (usually estimative probabilities) as detailed, along with other methods, below.

The intention is to force the game to move on; generating a narrative and avoid getting too bogged down in detailed discussions about the merits of particular elements of the story.

The game needs a Facilitator to help adjudicate on the arguments, but if you have a limited number of players, you can take it in turns to be the Facilitator – this works out much better

than you might imagine and helps reinforce the idea that your role in the game might be in conflict with others, but you are all working together to generate a credible narrative.

The advantage of the "Pros and Cons" system is that you formalise the advantages and disadvantages of an argument and the role of the Facilitator becomes that of ensuring that the Pros and Cons carry equal weight - perhaps making compelling reasons worth two Pros and two or three weaker reasons against only worth one Con. You will need to ensure you don't end up with a laundry list of trivial reasons, or having the player re-stating a reason already accepted in a slightly different way in a desperate attempt to gain points (which happens quite often).

Of course, one very useful benefit of the "Pros and Cons" system is that it provides reasons for failure should the dice roll not succeed. You can also more easily run the game with very knowledgeable players.

Argument Assessment

The object of the game is to generate a credible narrative in the course of the game and from this we hope to gain insights into the situation. From this, it logically flows that arguments (sensible arguments!) should succeed automatically unless challenged by the other players. The fact that the player has decided that their argument is the most important thing they want to happen that turn, means that unless there is something wrong, it should succeed. It follows on from this that arguments which build on previous successful arguments should be given an automatic bonus because they are contributing to the unfolding narrative.

If two arguments are in direct opposition ("This happens" - "No it doesn't") they represent a Logical Inconsistency since they cannot both be true. The earlier argument has already happened, so it is impossible for it not to have happened. The later player may argue that the event is reversed, but this tends to make for a poor narrative in the game and should be discouraged. *Please also take a look at "The Order in Which Actors Make Their Arguments", below.*

However, if arguments are opposed (have a chance of failure), there are a number of ways of working out if the argument will succeed:

1. **Umpired**. Once PROs and CONs have been identified it might be left up to an umpire (or White Cell or Control group) to determine what happens. This has the advantage that the game outcomes can be aligned with research or doctrine, or nudged along a path that maximizes their educational value. It can also be useful when the players themselves have only limited knowledge of the game subject matter. However, having a third party determine success and failure can make the game seem rather scripted. If players attribute the outcome of the game to umpiring rather than to their own decisions and interaction with their fellow participants much of its value may be lost.

This is the preferred method for using with

2. **Consensus**. Of course, you may prefer to simply have a discussion until there is a general consensus as to whether the argument succeeds or fails. This is a nice idea, but even among professionals this can take a long time and there is no guarantee that everyone will agree. As an alternative, you can try to reach a consensus instead on the probability of the argument succeeding and afterwards throw the dice. This is often easier and faster.

3. **Ask the Expert**. In some technical fields, like Cyber, it can be advantageous to have an expert panel to decide on the success of an argument or the success probability, providing that they can fully articulate the reasons why and generate reasons for failure. Please note that this should only be used for technical subjects – when considering responses to conflict between groups of people (as opposed to whether a type of hacking attack is actually possible) there is good evidence that role-play is a more accurate predictor of outcomes than asking an expert.

4. **Weighted Probabilities**. This system of adjudication places a great deal of emphasis on the arguments put forward by the players, while introducing the element of chance. It is slightly more complicated than the previous systems. There is also risk that some professional audiences may recoil at the sight of dice—associating these more with children's games than serious conflict simulation and gaming. In this system 2 six-sided dice are used, with a score of 7 or more being required to succeed, with each strong and credible PRO argument counting as a +1 dice roll modifier, and each strong and credible CON counting as a -1, with especially high or low results representing more extreme outcomes. This also provides a "narrative bias" to the game as a score of 7 is actually a 58.3% chance of success and helps contribute to the evolving story. If you don't like that idea, you can still roll two six-sided dice for a "true" 50% (on the basis that, without any Pros or Cons, an argument is equally likely to succeed as to fail) as noted on the "Result Determination Cheat Card" below. This method tends to be used in recreational games, and in instructor-led educational games with junior students (for ease and speed).

5. **Estimative Probability**. Alternatively, players or teams can each be asked to assess the chances of success, and these can be aggregated. In analytical games, this provides potentially valuable insight into how participants rate the chances of a particular course of action. There is a set of estimative probability cards which can be used for this purpose, below. Following discussion, players or teams simply select the card from their hand that, in their view, best represents the probability of an ACTION's success. These are then aggregated together (you can use the mathematical MEAN, but it is mathematically better to use the MEDIAN number in small groups (less than 20 or so) in order to reduce the effect of extreme outliers), and percentage dice are used to

determine success or failure. Of course, the players are supposed to "step back" from their roles and try to assess the probability objectively – which can be an issue if the players are immersed in the developing narrative or are just fiercely competitive.

I used to use the Weighted Probability method all the time. I would normally judge the players present and form my own opinion of the Pros and Cons, modified to reflect the general consensus in the room, and then roll the dice (if necessary – later in the game you should find a greater number of arguments succeeding automatically as people adjust to the developing narrative). If it is a technical argument and we needed advice, I would then ask an expert.

This use of Weighted Probabilities reflects the early widespread use of Matrix Games in the hobby community. As a method, it is inherently understood by anyone with any familiarity with games and is relatively easy to explain for those without. It is fast and provides the Adjudicator more licence in influencing the pace of the game to ensure it doesn't get bogged down in excessive debate.

The main concern I now have is that this, and all the alternatives above, failed to specifically address to one of the academic underpinnings of Matrix Games, that of Crowd Sourcing the results.

Based on Surowiecki's popular book[3], there are a number of elements required to form a "wise crowd":

Criteria	Description
Diversity of opinion	Each person should have private information even if it's just an eccentric interpretation of the known facts.
Independence	People's opinions aren't determined by the opinions of those around them.
Decentralization	People are able to specialize and draw on local knowledge.
Aggregation	Some mechanism exists for turning private judgments into a collective decision.

[3] https://en.wikipedia.org/wiki/The_Wisdom_of_Crowds

A fundamental part of Matrix Games involves crowdsourcing ideas from diverse participants, and I believe that the element of aggregation would be best served by the use of Estimative Probability cards (above). It is generally felt that this is a more accurate method to leverage the work on Crowd Sourcing, as well as making the resulting probability more accessible and acceptable to the participants. The terms on the cards also reflect those commonly used in the intelligence community. It also follows that the participants in the Estimative Probability method should be from all those present and not just be limited to the specific roles in the Matrix Game.

Oinas-Kukkonen[4] has made a number of conjectures based on Surowiecki's work, asserting that "too much communication can make the group as a whole less intelligent", which we can address by the encouraging relatively quick moves, and the intention to avoid too much detailed debate following a player's argument. This means the game can have a reasonable number of moves, requiring that the participants to have to live with the consequences of their actions made earlier in the game. I would suggest at least 6 moves, to allow for two cycles of Action-Reaction-Counter Action by the players. **I would therefore recommend, at least for high level policy and analytical games, that the Estimative Probability method is used**.

The procedure should be, following the arguments, to have all participants with their own deck of cards, and assess the probability of success independently and without discussion. They should then all reveal them simultaneously to the facilitator for adjudication. My preference would be to select the MEDIAN of the results, rather than the MEAN as explained above (and is quicker).

Excessive outliers can be discussed quickly. In most cases they are nothing more than that – outliers. But on some occasions, it may indicate specialist knowledge, so care should be taken not to dismiss them. It is usually best to ask if the individual was surprised that everyone voted the other way – and if they were not, why? [5] There may be a good reason.

A word of warning, however! If you use the estimative probability cards, it makes the use of "spendable bonuses" (discussed elsewhere) a little more problematic. You would have to say that having a "Diplomatic Bonus Card" will offer something like a 10% bonus to the dice roll – but this is not the same as permitting a +1 to the dice when using 2 six-sided dice as multiple plusses with 2 six-sided dice have a proportionally greater effect, as you can clearly see in the chart below.

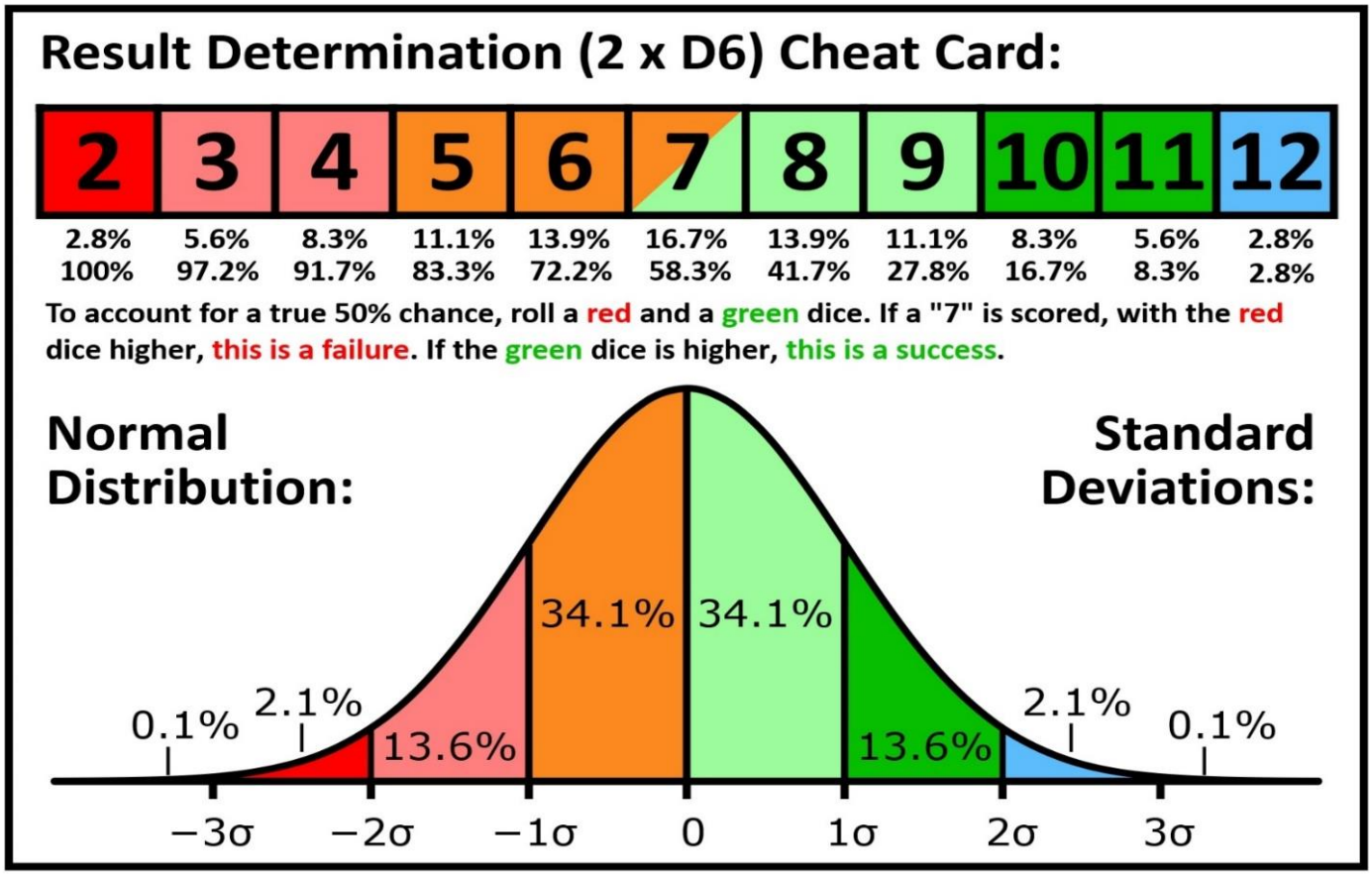
It should also be noted that, when using percentage dice to determine the final result, it is usually best to be consistent in expressing exactly what the dice roll is for (the success of

[4] Oinas-Kukkonen, Harri (2008). Network analysis and crowds of people as sources of new organisational knowledge. In: A. Koohang et al. (Eds): Knowledge Management: Theoretical Foundation. Informing Science Press, Santa Rosa, CA, US, pp. 173-189.

[5] Prelec, D., Seung, H. & McCoy, J (2017). A solution to the single-question crowd wisdom problem. Nature 541, 532–535. https://doi.org/10.1038/nature21054

the argument) and what score is needed with participants who are not gamers (E.g. "A 70% chance of success, which is a score on the percentage dice of 70 **or less**"). There is evidence that participants perceive "a 70% chance of success" differently to "a 30% chance of failure" despite their mathematical equivalence, so consistency in expression is advised.

Personally, I prefer to use 2 six-sided dice with the score approximating to the probabilities from the "cheat sheet" below, so: 90% = 4+, 70% = 6+, 50% = 7+ (using red and green dice as explained in the diagram below), 30% = 9+ and 10% =11 +. It is easier for non-gamers to understand.



This chart allows for a "true 50%" by splitting the score of "7" if you don't want a "narrative bias" in the "weighted probability" adjudication method of adjudication as explained above.

Diceless Adjudication[6]

It is worth mentioning a couple of alternative methods of assessment without using dice. While I personally believe that dice are important to represent risk, there are some who instinctively recoil from them. They are incorrect to do so, but attempting to explain why takes time and involves some complexity, and so it may not be appropriate depending on the circumstances.

For example, if it is intended to have some form of Matrix Game at an international event, such as a NATO regional workshop, you will have a large number of delegates from

[6] I am indebted to Sue Collins from NATO ACT for her work in this particular area.

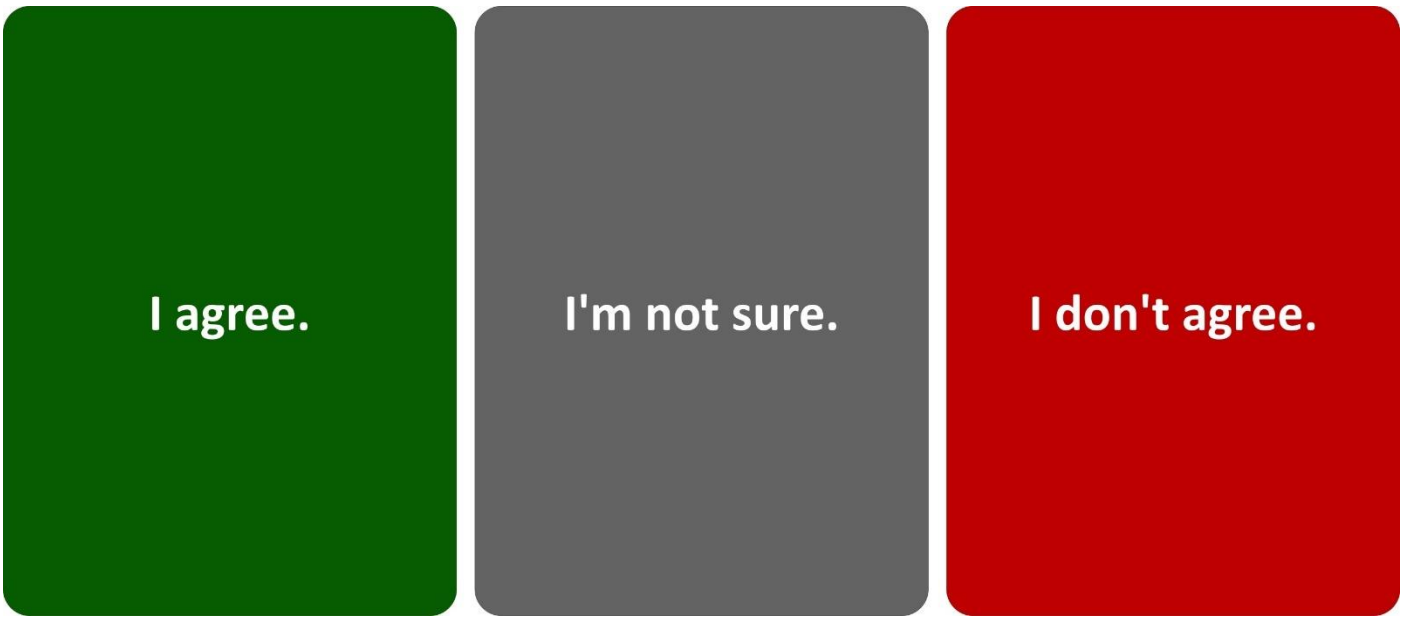
different nations, with differing levels of facility with English. It would be inappropriate to ambush them with a game system involving dice, if you are unable to ensure they have the necessary "buy-in" to the process beforehand.

Also, if someone sufficiently senior says they simply aren't going to roll dice, you are probably wasting your time – so it is essential that you have alternative methods up your sleeve.

I am making the assumption that you do not wish to use the **Umpired**, **Consensus** or **Expert** methods discussed above, as they don't leverage the benefits of Crowd Sourcing. Instead, I would strongly suggest you should use some form of "voting system":

1. **Show of Hands**. This is the simplest and most basic method of voting and needs every little explanation. You will need to ensure that you are consistent, however, in that the vote is always whether the players support the argument, so you avoid confusion. In order to get the best results everyone should try to vote at the same time, with the most senior personnel voting last so as not to influence their subordinates. Success or failure is judged as to the level of support for the argument, with a majority needed to succeed at some level.

2. **Agree, Disagree and I'm Not Sure**. This is slightly more complex, in that the danger of asking for a simple "Agree/Disagree" judgement from the players on sometimes complex actions, often leads to them deciding on a whim. It is normally much better to allow an option to allow them to vote for indifference, irrelevance, unimportance, or insignificance. You will need to explain that you only vote for **Agree** or **Disagree** if you are sure, and that you use **I'm not sure** under all other circumstances.



The permits more subtle gradations of results, with the number of **I'm not sure** votes indicating the level of importance, but also the level of divisiveness in political or social

arguments. For example, if a result is a marginal **Agree** majority, but with a lot of **I don't know** votes, the result is likely to be only marginally effective and people don't really care about it. If instead, the result has very few **I'm not sure** votes, but is still very close, it is likely to be divisive and has the possibility of sparking a backlash against the result that could be exploited in later turns. Examining the reasons for such disagreements can be very illuminating.

An example of voting cards in action: A clear result of **I don't agree** with the argument, with a small number of **I don't know** and **Agree** votes.

3. **A more complex Scale**. Normally used with electronic voting systems, either technologies like electronic clicker systems[7], or mobile phone applications or browsers[8]. These have the potential to offer much better graduation in the adjudication of results, such as a 5-point Likert scale, and potentially more options in a single vote where a number of possible outcomes can be listed and the players vote for which option they think is the most likely. The danger with these is that they depend on the technology, and while they should be simple and easy, I have never used one in anger without some form of failure at some stage (fortunately I had a box of cards with me, just in case).

Voting for Yourself

If you are using voting systems, either as Diceless Adjudication or as Estimative Probability, you should take great care to ensure that the players are being as professional as possible, and not merely "voting for themselves" in a competitive manner. Many players can be ~~quite~~ very competitive, so it may be necessary to not allow them to vote on their argument – and equally it may be necessary to keep an eye on players who are in direct competition. The intention is to develop a narrative, generating insights – rather than trying to win at all costs.

[7] An example is https://www.turningtechnologies.eu/turningpoint/
[8] An example is https://www.polleverywhere.com/

Notes about arguments

The important thing to remember in a Matrix game is that arguments can be made about *anything* that is relevant to the scenario. You can argue about your own troops or about the enemy, the existence of people, places, things or events, the weather, plague, disease or public opinion. The actions and consequences of arguments are reflected in the placement of the generic counters on a map (examples are enclosed), forming narrative markers for the game; or by writing the results on a whiteboard or flipchart so the players can keep track of what is going on.

Some things can seem a little odd to new players – "how can he argue about my troops?" – It is true, he can't give them orders, but he could argue that their morale and motivation are low because they haven't been paid in months. The only criteria for judgement is the likelihood of the event taking place. With a bit of imagination, common sense and rational thinking, it is possible to present persuasive arguments as to what should happen in any scenario - from traditional military campaigns to the strange worlds of cyber or defence procurement.

A common error in Matrix games is for a player to argue about another *player* being influenced by something or them agreeing to a course of action. The player is present and can simply be asked – so providing time between turns to allow the players to negotiate with each other (in secret if necessary) makes for a better game. It might be that a player wants to argue that all parties come to negotiations – in which case let them state their case, then simply ask the other players if they want to come along. If they agree then the argument is an automatic success. Arguments are for actions – if the players want to negotiate with each other, they can do that in between turns.

Turn Zero

In most games with inexperienced participants, it is usually best to have a "Turn Zero" couple of arguments before you start the game properly. Rather than have an entire Turn with all the participants making arguments, I usually select two of the actors who are in direct opposition and ask them to come up with example arguments which we can then discuss in detail so people get the idea about how the game works.

Number of Things you can do in an Argument

Sometimes players get carried away with their arguments and try to do several different things at once. You should only get to do **one action** a turn because part of the insight in the game comes from deciding what the highest priority is. The action itself could be large (like a general mobilisation of the Militia), but it should be a single action, so mobilising the

Militia and ordering a strategic missile strike, would be two separate actions – which one do you want to do first?

This doesn't mean that they are doing nothing else – it is just that the other things are part of the "business as usual" background noise – and the action is the one that they think will have the most impact, either immediately or in the future.

You shouldn't slavishly follow this rule with inexperienced players, however. Sometimes it may be necessary, in order to get the participants to come up with ideas outside their normal way of thinking, to force them for example to make one argument about conventional military things, and a second argument about Political, Economic, Social, Information or Infrastructure issues. This should be the exception however!

Of course, like Newton's Law of Motion, once an argument has succeeded, the situation remains that way until another argument changes it.

In some cases, the players may wish to take time to come up with a plan in advance of the "game" itself. This is perfectly permissible but the planning should be conducted in such a way as to be able to break down the elements of the plan into no more than about 3 Arguments, and the appropriate timescales in which they would happen. The Arguments should be written down in the same way as Secret Arguments (below) and not shown to the opposing players. The opposition will then have the same number of Arguments that they can make, in the same time period, openly, as usual. Should one of the opposition arguments demand an immediate response from the players, the plan is then delayed. If any resources are then used that were needed by the plan, the plan is lost. If both sides end up planning, resolve the written arguments in the normal way. "Planned" arguments have a much higher chance of success – but are lost if the situation changes.

Use of Dice

Dice are only used where there is a risk of failure established in the arguments and counter arguments. If there are no counter arguments or there is overall support for the argument, it succeeds. If there is a risk of failure, however, this risk is realised through the use of dice.

In some circles, the use of dice is a credibility issue, where players who lack a grasp of the realities of the nature of "risk" are unwilling to roll dice. They see it as trivialising the issue and reducing the wargame to the status of a child's pastime.

If such a case arises it is usually best to confront the issue head-on. Point out that the player doesn't need to roll dice – all they need to do is to come up with an argument that everyone agrees has no chance of failure. If the player refuses to roll the dice or demonstrates a dismissive attitude, ask them what other mechanism would they suggest. Excel Random number generator? A set of cards with the appropriate probability distribution, shuffled and selected? All of these alternatives are essentially identical to

rolling dice and, in the end, it is essential that where risk has been identified in the game, there is some mechanism to realise that risk.

In my experience, personnel such as those in the Special Forces and senior commanders, who understand the nature of risk, have no problems rolling dice. If possible, select them first and the others will follow.

Passing dice to the player and inviting them to roll is a powerful tool. It focusses attention on the nature of risk and exactly who has the responsibility. Are they content with the level of risk? If not, invite them instead, to make a preparatory argument as an alternative, reducing their chance of failure (but using up a valuable argument and failing to immediately react to their opponent).

Discussions as to the nature of risk in the environment are nearly always very valuable and are an essential part of wargaming, particularly in the diplomatic/political, military, social, and economic domain of Matrix Games.

Reasonable Assumptions and Established Facts

It is important that the Facilitator understands the difference between "reasonable assumptions" in the game, such as the proposition that well trained and equipped Special Forces soldiers are going to be much more effective in combat than untrained protestors; and "established facts" which are facts that have been specifically mentioned in the game briefings or have become established during play as the result of successful arguments.

The latter can be immediately deployed as supporting reasons (Pros and Cons), but the former need to have been argued successfully in order for them to be specifically included. Many inexperienced players will make vast all-encompassing arguments full of assumptions that are not reasonable. For example: It is not a reasonable assumption that unarmed Protestors could fight off trained Police. It is reasonable to assume that the Police are trained, armed, equipped and quite capable of dealing with a group of protestors (after all, that is their job). It would be necessary to argue for large number of Protestors, argue that they had weapons of some sort or argue that they were especially devoted or fanatical about their cause, for them to have a reasonable chance of beating the Police.

Of course, you might argue that your Protesters hugely outnumber the Police, undergo special training, get access to firearms, or are simply fired up with enthusiasm by the powerful and impassioned speech from their leader, so they get a bonus. In this case, you should mark the counter used in the game with a +1 or something similar (depending on the strength of the argument) to show their improved status.

Turn Length (in game)

Another important element to the game is working out how long each turn is supposed to represent. The time allowed in arguments for a turn needs to be appropriate to the

scenario and is, to some extent, not precisely defined. "About 2 to 4 weeks" might be appropriate for a Cyber Scenario, allowing for reconnaissance, some code writing or acquisition of applications, before the actual attack taking place in a subsequent turn.

Care must be taken to ensure this is kept in mind during the game, as timescales can often get unrealistically compressed. Players sometime argue for financial aid or extra troops from Government headquarters, which might take some time to reach a decision and even longer for the resources to arrive. You just need to be aware of the timescales.

Please note that this does not mean that the players cannot argue for long term projects. The whole point a Matrix Games is to provide the players with the chance to do things beyond the limitations of normal games. If they wish to commence a project that will not come to fruition for a number of years, they should be free to do so. Like all Matrix Arguments, if they succeed, the project will go ahead and deliver as argued – unless another argument is made to stop it.

It can be useful to make the players write down what their Actor would aim to achieve over the period of a full Government term (4 to 8 years) as this focusses their minds on the longer term. Of course, grand plans often get derailed by short-term reactions to crises, and if they fail to act for the long term, it is their fault.

Game Length

It is essential that the game provides the players with an opportunity to have to live with the consequences of their decisions made in previous turns. To this end, **it is vital that the game has a reasonable number of turns** to allow an action – re-action – counter-action to take place. In my experience, 6 turns are the recommended minimum.

Since Matrix Games are intended to be fast and have low overheads, this normally translates into a target time of no more than 30 minutes for a turn, making the average game to be about 3-4hrs.

Games can be longer if you wish, some lasting all day, but you need to be aware that you can reach the point of diminishing returns quite early, and much of the time can be wasted. It is also common that the situation the game was originally designed to explore might be reached early on in the game, and continuing will stray into a different game situation. In most cases, if you have all day, it could be preferable to run the game twice, taking time to review the choice of Actors and their objectives between the two iterations. It can also be useful to rotate the players to give them different roles.

End of Turn "Consequence Management"

At the end of each game turn (a cycle of player arguments) the Facilitator should go over those successful and failed arguments that have generate new "established facts" in the game. They should also review situations that are on-going, such as the generation of

refugees from fighting or the arrival of new recruits to a popular cause. If these have not been countered during the turn by another successful argument, the Facilitator should make them continue until someone does make an argument to stop them.

It might also be that some of the arguments, when considered as a whole, will have additional or even unintended consequences that are reasonable to expect to arise. It is therefore worth taking time to consider the consequences of the players' arguments beyond their immediate results. Invite the players to consider the events of the turn, suggest possible consequences and then agree on the most likely that should be taken forward to the next turn.

In some games, it is worthwhile having an individual (if you have one to spare) who is particularly experienced about the sort of subject that the Matrix Game is focussed on, make "the law of unintended consequences" arguments at the end of a turn. This can help to formalise the process and provide good examples to widen the players' understanding of the consequences of their actions.

In many cases "unintended consequences" will have an effect on some or all Actors in an area of the game. It is useful to make a note of this on a piece of card and place it on or near the map so people have their attention drawn to it. It may also be appropriate that on-going penalties will apply, until removed by a successful argument. For example, if fighting is taking place in a city, there may well be a flood of refugees moving away from the fighting. This could mean that any operations in the areas of the refugees suffer a "-1" penalty until the refugees have left, or until they take specific measures to remove them.

Inter-Turn Negotiations

As we have already said, the actual "arguments" of the Matrix Game are about actions that take place in the course of the game. In most cases, the Actors represented by the players may well want to engage in face-to-face negotiation with each other in an effort to strike a deal. Players attempting to make Arguments saying that they want to "influence the Prime Minister" are essentially pointless if the Prime Minister is represented by another player. If they want to strike a deal, then they had better head off to a quiet corner of the room and try a little influence in real life. Of course, if a player wants to make an argument about a position or group not represented by another player, they are welcome to do so in the normal way.

In analytical and policy games, it is important to record the essential elements of these discussions. What was suggested? Was agreement reached and why? If no agreement was reached what were the private and public reasons why the negotiations were unsuccessful? Analysis of these "off-table" negotiations and the reasons the players felt why they were successful or failures can provide important insights. The usual method is to provide a junior member of staff to follow the Actor around and frantically try to record the essentials of the discussions. This is manpower intensive and difficult to do well.

An alternative method is to simply add a short phase to the beginning of each turn (before any arguments take place), where each Actor summarises themselves, what discussions took place and what they heard. It can be very instructive, especially when “what they heard” was not “what the other party meant”. They should all do this in turn, and a single scribe can then record the details, but care needs to be taken not to take too long and slow the game down.

Elections

In certain games Elections are very likely. In general, they would probably need a successful argument to invoke (unless they are planned in the scenario). My advice is to ensure that there has to be at least one game turn after the Election is announced in order to permit a round of arguments that affect the voting.

In most cases, Elections will be resolved by one vote per Actor, modified by the results of successful arguments (and inter-turn negotiations!). Any successful arguments generating political capital during the game (I normally record this using the "happy face" icons) can of course be "cashed-in" for additional votes (*see "Spendable Bonuses" below*). This assumes that the scenario is balanced between the number of Actors and the position they take in the game.

Secret Arguments

There will be some cases where you want to hide from the other players the thing you want to argue about. It could be that you have booby trapped a piece of equipment you think your opponent will use, or that you have swapped the vital blueprints for a set of fake ones in case the safe is broken into. In this case, you simply write down your argument on a piece of paper and present it to the Facilitator announcing to the other players that you are making a secret argument.

The argument then remains hidden until events in the game cause it to be revealed. For example, in the example above, the blueprints may eventually get stolen when the spy breaks into the base. When they take them back to their base, they may find out that the blueprints are actually fake – wasting time, effort and expense. The time to actually adjudicate the secret argument is a judgment, but I would do it as soon as the blueprints are taken. There is a slight chance that the fakery will be obvious and fail to deceive the spy. If the failure is really bad, it may provide information as to where the real plans are.

If a piece of equipment is sabotaged, the argument should be adjudicated when the equipment is used. In many cases, opposing arguments will be made that a decision to sabotage another government's equipment would be complex and take a long time in a Western Democracy, and so wouldn't happen. I would judge that this argument, while true, is offset by the fact that the players elected to make the argument in advance (thus

allowing time for the decision-making process). They are taking the risk that the events specified in the secret argument actually take place, so should be rewarded when they do.

An area of potential danger is when the secret argument is not precisely defined. This can lead to the Actor claiming that the event contained in the secret argument happens, while the opposing Actor claims that the interpretation was too wide and that it might not have been triggered at that time, or the argument catered for too many options that would have required a disproportionate amount of resources or decision making. It is the responsibility of the Facilitator to ensure that the secret arguments conditions are sufficiently tight to prevent this. In the event of a mistake being made, I would simply require the Actor making the secret argument, to have to make an additional argument as to why their secret argument should be triggered in this specific instance.

You should be careful, however, that the players don't make too many secret arguments. This can ruin the game's atmosphere and reduce the focus, so that the game drags on unnecessarily. They must only be permitted when they refer to quite specific things or events. An argument about gathering information from a spy, in most games, will be quite a generic argument and should be argued openly. Similarly arguing about the placement of an IED to catch forces moving down a route should be made openly as the results will take effect the same turn.

Secret Arguments should only be for misdirection – something you conceal when you are sure that an opposing Actor will try to take or attack later in the game. A good example would be to create a "honeypot" email server filled with fake documents, as the French President Emmanuel Macron did in April/May 2017 during the lead up to the French Presidential Elections. The argument is judged as to its effectiveness when the "campaign email server" honeypot is hacked, and in President Macron's case was very effective.

Measures of Success

In many arguments, success or failure may not be a simple "Yes" or "No" proposition. There might well be a sliding scale of success or failure in terms of numbers or the quality of the outcome, which is usually represented by the score on the dice. If you needed a 7+ to succeed and rolled a double-six (12), this can indicate an especially notable success. Conversely, a roll of a double-one (2), it could represent a disastrous failure. The "Result Determination Cheat Card" (above) also shows a normal distribution and standard deviations in the results, which can help with explanations (or simply blind them with science).

When an argument is made players sometimes provide counter-arguments (Cons) that are about the consequences of the action rather than the action itself. In my mind this means that they have already accepted that the argument is a good one and should automatically succeed, so they should switch the discussion to the quality of the results. This can be a

subtle switch in the point of view and as a facilitator you should watch out for it because it is important.

Killing Arguments

Depending on the context, murder and assassination are perfectly acceptable arguments which should be judged like any normal argument – that is, on the likelihood that the reasons given are sound.

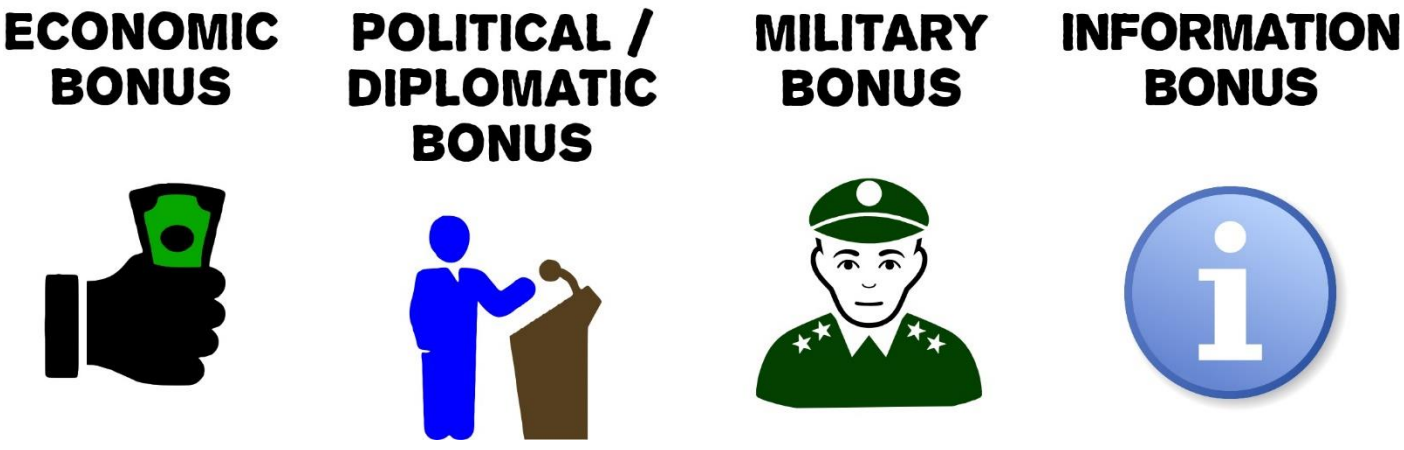
However, just because an individual in the game dies, doesn't mean that the player has to stop making arguments.

It can be interesting to see, after a successful or botched assassination attempt happening, that the attacked player often responds in an emotional way that is often contrary to their stated objective in the game. Quite often they bear a grudge and act in revenge, rather than focussing on achieving their aims. It can be very enlightening when this happens so, if you manage to notice it, be sure to make a note for the after-game review.

Spendable Bonuses and Permanent Bonuses

In many cases during Matrix Games, the Actors will argue for policy objectives, for example: anti-corruption measures if the previous Government was accused of being corrupt. If successful, I usually place a "smiley face" counter in front of the Actor representing the increase in popular support for the action (as mentioned above). Unlike the generic representation mentioned in the previous section, in this case it can be used as a "dice modifier" improving the probability of a successful adjudication in a later argument, indicating they are "calling in favours owed" or "spending their political capital" to ensure the success of the proposed measures. Of course, in this case the counters are "used up" in doing this and handed over to the Facilitator.

You can differentiate 'spendable bonuses' from the generic effects by using small cards as shown below, relevant to the area in which the bonus can be 'spent':



Personally, I'm not sure that all of the cards are relevant for all scenarios. For example, in a hacking scenario the 'Information Bonus' is relevant, but in most other cases it isn't.

Arguments can also be made for things like permanent increases to unit effectiveness, affecting all units of that type. This sort of wide-ranging argument would normally have a lower chance of success due to its scope (and bearing in mind the "Reasonable Assumptions" discussion elsewhere). I would normally have the players roll the dice for the quality of the outcome (see "Measures of Success" elsewhere) and if they were only partially successful, I would instead provide a suitable number of 'spendable bonus' counters that could be used instead of a full-scale permanent bonus.

In some cases, it may be useful to specify exactly what the 'spendable bonuses' can be used for, such as a single card may be used as a +1 or -1 on a relevant dice roll, two card could be used to generate an additional argument in the relevant area during the players turn; and three cards could be used to generate an additional argument at any point during the game (but again, only in the relevant area)[9].

Levels of Protection and Hidden Things

At the start of a game there are certain things that are not readily accessible to some of the player characters. For example, in a Cyber-Security Game the secret plans for a new submarine would be heavily protected.

Things that are hidden or secret require a successful argument merely to find them. Things that are protected will require successful arguments to overcome the different levels of protection. A secret government base may be declared by the Facilitator to have 3 levels of protection: Its hidden location, its boundary fence, and the security guards, all of which must be overcome by successful arguments before the base can be penetrated.

As a rule of thumb, nothing should have more than 3 levels of protection as it will simply take too long and dominate the game to the exclusion of everything else.

Big Projects or Long-Term Plans

Depending on the level of the game, some actions and events represent such a large investment in time and effort that they require multiple arguments in order to bring them to fruition. As a rule of thumb, a Big Project should also take no more than 3 successful arguments (like protected and hidden things above); otherwise, the game is focussed too much on this single thing.

This does not mean that arguments have to only be about things that can happen within the turn length of the game. It is possible to make "long term" arguments like anything else. If, in a Baltic game with week-long turns, you want to argue that an electricity cable between Sweden and Lithuania is to be built with the aim of reducing Lithuania's dependence on Russian energy, this would be judged as normal. It just would not come to

[9] I am indebted to Prof Rex Brynen for this suggestion.

fruition in the length of the game – but, assuming the argument was successful, it would succeed eventually unless another Actor argued that it lost funding or was delayed.

Number of Actors

Matrix Games are best played with an even number of Actors as it is the action and counter-action running through the game that generates the insights; but occasionally having an "outsider" role with an interest in events can also be useful. The game works best with 6-8 Actors and a facilitator.

It quite often happens that the sponsor for a Matrix Game wants the Actors involved in the scenario to be quite one-sided, so that there are several Actors on one side and only one opposing them. Apart from not generating a very interesting game, it may be necessary to point out that there wouldn't be a crisis if one side outnumbered the other by such a margin. It might then be necessary to dig down into exactly who the Actors really represent and their capacity for independent action, in order to make the game more balanced and generate the insights required.

For example, in high level political/military games it is common for the sponsor to suggest that the Actors involved are a "laundry list" of the States present. This is a fundamental error because the Actors in a Matrix Game only get to make one argument each so, in a Baltic States game for example, having the USA, Estonia, Latvia, Lithuania, Poland, Sweden, Finland and Russia as Actors would mean that most of the time Russia would only get a single action against seven opposing ones each turn. A better way of representing things would be to have Russia, Russian Dissidents, the Baltic States as a single block, NATO, Poland (with its own agenda) and perhaps the Nordic States as a block.

If this proves too conceptually difficult, you can balance the game by "points" where perhaps Russia is allowed a number of points of arguments (so they can argue twice or have a single argument with double effect), against everyone else's single point argument. The difficulty with this approach is that it can introduce too many arguments per turn and slow the game down excessively.

Personally, I would rather frame the Actors in such a way as to balance the game, rather than using a chit system with the more powerful players having more chits. I think that getting people to model people is usually a better way. My standard model is to select Actors that break down into 6 rough groupings: The two main protagonists, their two main supporters (but perhaps with their own additional objectives) and then either their oppositions, or associated Actors you might suppose were supporting but definitely have additional objectives that could be in conflict to the main Actors. Then, after all that, possibly an external power with an interest.

So, for a Dutch Election Game, the Actors were:

- The Hofstadt Network: an Islamic Terror Group.

- The Saudi backers of the Group.
- The Right-Wing Neo-Nazis.
- The Left-Wing Dutch Coalition Government (as a coalition they had 2 players, the Right-Wing, Left-Wingers and the Left-Wing, Left-Wingers, each with conflicting objectives, and they had to agree in order to make an argument).
- The Dutch Emergency Services (Police, Military, Fire, Medical)
- Geert Wilders, the Right-Wing Opposition Parliamentary candidate.

In the "Lasgah Pol" Game, about a 6-month Tour of Afghanistan, the Actors were:

- Coalition Security Force Commander.
- District Governor (pro-security force)
- Afghan National Army Commander (pro-security force)
- Taliban Commander.
- Tribal Elder (anti-security force)
- Afghan National Police Commander (corrupt).

Discussions as to the Actors involved and balance in the Matrix Game can generate insights into the geo-political situation in their own right and prove to be almost as valuable as running the game.

However, it is all very well to conceptually make the game design decision that you are not going to represent the Baltic States as Actors in a game about the political situation in the Baltic, because the "Great Powers" in the region mostly ignore their wishes and do what they want; and quite another to play a game involving representatives from those countries. So, for example, at a NATO workshop on regional stability in the Baltic, it would be quite inappropriate to design such a game and alienate a significant proportion of the participants from the outset.

In this case an alternative approach that can work, is to represent all the relevant Actors in the game, but only call on them when it is appropriate or necessary to do so[10]. In this case you should start the game at the point of crisis between only two of the actors. They will make their arguments in turn, with all the other players participating in voting on the argument assessment, going back and forth, as if it was a two-player game. This continues until one of the other Actors decides that the events taking place have reached a point that is more important than their internal national agenda, and they must act. At which point they make an additional argument and it is resolved in the normal way. This works far better than I expected, because it discourages the smaller actors from "butting -in" with minor arguments that don't affect the situation in any significant way, and take up too much time in the game.

[10] Again, I am indebted to Sue Collins from NATO ACT for coming up with this idea.

If you have several players representing an Actor in a Matrix Game, you can get them to work up alternative arguments for each turn and the team (or team leader) can then choose the best argument to take forward. This is especially useful for analytical games if recorded and the reasons for acceptance/rejection noted.

Writing the Briefs for the Participants

Success in Matrix Games lies in making them simple and accessible for the players. Long games with excessive briefing materials, complex structures and IT support are probably best carried out using a different technique. Matrix Games are about exploring ideas and original thought, so briefings that are excessively serious fail to create the right atmosphere and can encourage institutional thinking. They should be short and interesting.

It is often useful to test the suitability of an Actor's objective by simply putting an exclamation point at the end of the phrase or sentence. If it looks odd, rephrase it until it is appropriate. For example: in a game about an election, it is often better to phrase an object as "Prevent extremism!" or "Stay in Power!" rather than "Ensure the continuity of the electoral process and ensure that extremist politicians do not gain undue influence…".

For more serious analytical games, it is often best to provide the Actors with briefs (no more than a single side of paper) about their role and then get the players to derive the actual objectives for the game themselves. This serves two purposes – a short list of pithy bullet-point objectives makes for a faster and easier after game review and, by looking at the objectives the players have chosen for themselves, you can confirm they have actually read the brief and are prepared to role-play the Actor correctly.

It is also useful if you tell them that at least one of their objectives should be long term (at least the life of a Presidential Term or Government (say 4-5 years)) so that, at the end of the game, the players have only themselves to blame if the game only consisted of short-term arguments.

As a rule of thumb, if you are writing a brief for a serious game (rather than a few bullet points) you should always try to broadly cover the full range of effects. These elements of power are often abstracted as Diplomatic, Information, Military, and Economic (DIME) actions and their Political, Military, Economic, Social, Information, and Infrastructure (PMESII) effects, particularly in the USA. I would selectively pick and choose from these to get to the following headings:

- Political.
- Military.
- Economic.
- Social.
- Infrastructure.

- Nature / Geography – only if the visualisation for the game doesn't cover all the relevant elements of geography or if the timescales would include the effects of global warming.

Please don't feel that in every scenario these aspects should have equal weight applied to each of them, but all of them should be reflected somewhere in the brief, so it is sometimes helpful after you have written a brief to spend a few minutes going back over it to make sure you have the range of topics covered.

It is also essential to ensure that the briefings reflect the situation from the Actors point of view. We are expecting them to role-play that Actor – so they will need to try to imagine themselves as that Actor, rather than merely think what that Actor would do. It is therefore essential that the brief reflects the situation from their perspective.

I find it useful to generate the Actor briefings by cutting and pasting the relevant material from information available on the internet. So, for example, the briefings for the North Korean Actor would be taken from the North Korean website in order to properly express their point of view. Similarly, Russia Today or Sputnik are a useful source for Russian views on important issues, rather than the dry prose of intelligence briefings.

This has the dual purpose of make the briefing more accessible, but also *unclassified*. Having a game where the material can be shared openly, on contemporary topics that are of great concern, is especially useful. It means that organisations can play the game "in house" under whatever security regime is appropriate, but also, they have the opportunity to compare their results with other groups, into order to widen the diversity of opinions in the game Actors and also the sample range from which the results are assessed – increasing overall confidence in the results.

Matrix Games are about actions and results, rather than the minute detail of ways and means. They therefore create an arena in which certain topics, like Cyber, can be sensibly discussed without the spectre of high levels of security classification restricting the audience and stifling debate. This can be very helpful.

Recording the Effects of Arguments

In most cases the Actors will present arguments for intangibles at some stage in the game, such as ensuring that the Police are paid on time, having the population more accepting of the soldiers operating in their town, or improving the morale of their followers so they work harder.

There is no need for complex record keeping - in the majority of cases, simple generic counters such as those with a "Happy face" or "Sad face" are all that is required to keep score of the effects of the successful arguments.

If the arguments are more wide-ranging (in that they would affect a number of counters in the game) it can be better to use a "Marker Track" alongside the game map, rather than

spend the time piling markers on counters. Tracks can be generic (in that they simply record the number of plusses or minuses applied) or they might have specific "trigger levels" (in that when the morale of the infantry is reduced to -3, the "raw" units will desert and return to their homes.

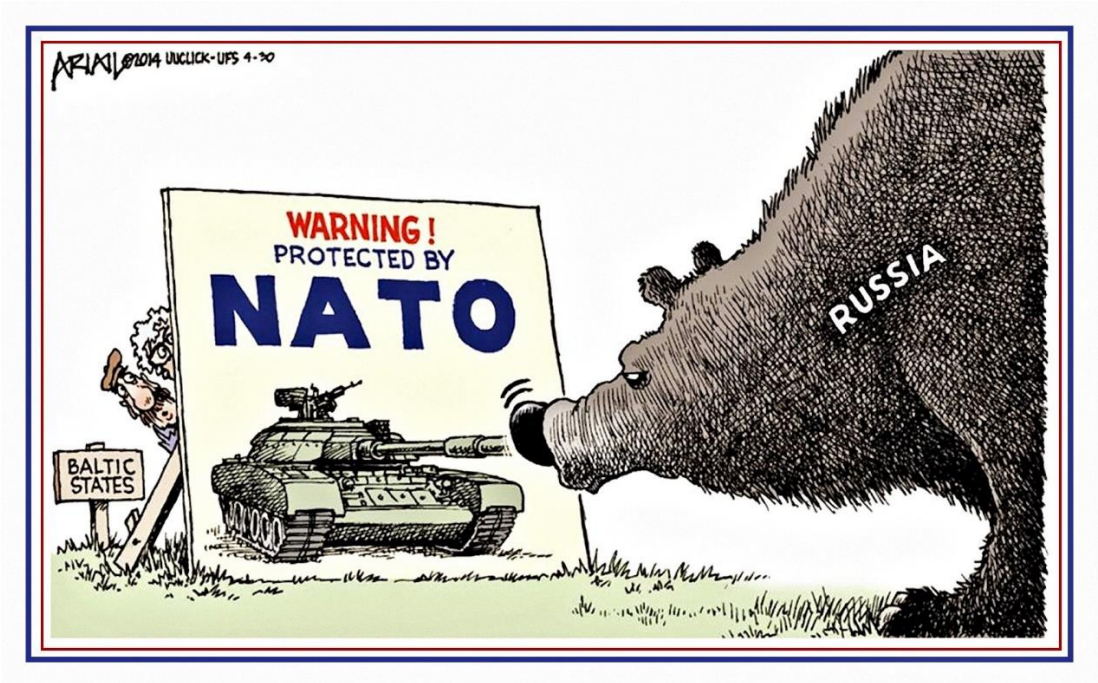
It can also be useful to have a "Press" actor whose job it is to record the results of arguments (both visible to the public and those not), as well as putting the "Press spin" on the events. This role can be useful in looking after the "Consequence Management" elements mentioned earlier.

The Components (and Characters) Affect the Game

When participants are thinking on their feet, what they can see will affect what they argue about, more than most of the other elements in the game briefing. If the game only has representative markers for military units, most arguments will be about military or kinetic actions. If the full range of Political, Military, Economic, Social, Information and Infrastructure effects are represented by counters or markers on a map, play will be more well-rounded and a full-spectrum approach.

It is also worth bearing in mind that the characters will also affect the game. Quiet and introverted people who shy away from confrontation are probably unsuitable to play ruthless dictators, so an element of character selection is important. This can usually be dealt with by asking for volunteers for the various roles if you don't know the individual participants well.

Lastly, you may wish to consider set decoration in the form of posters, political quotes, or even national headgear for the actors (although in most professional games I would make sure this is acceptable to your audience). Reproductions of political cartoons can also be very effective.



Starting Conditions

At the start of a scenario there may be recognised advantages or penalties understood for an Actor. These can be highlighted and exposed to the players so they can be corrected or exploited during the game, or can be hidden from the other players. Hidden starting conditions can be included in the game objectives for the Actor, such as having an objective that is important, but not related to the main thrust of the game play that needs to be addressed at some stage during the game (representing this that would distract the Actor from the scenario goals). Alternatively, the start conditions affecting the Actor could be printed on cards and laid out for all to see. This presents a dilemma for the Actor – do they spend time addressing a problem that the card represents or do they get on with the main game objectives and accept the penalty the card might represent?

A good example of this is included in the ISIS Crisis game where the institutional incompetence of the Iraqi Government is a starting condition. In game terms this means that any arguments involving Government decisions are automatically given a -1 penalty against success, unless there is a successful argument made about reforming the institutions and ending corruption.

Another aspect of starting conditions is the possibility of an event acting as a trigger to the crisis. These could be pre-defined as part of the scenario or they could be random. For example, in a game about the South China Sea, the game started in a state of reasonable equilibrium among the Actors. A number of random even cards were generated and revealed as a new situation that came into effect at the start of each turn, such as: Corruption allegations against a senior figure, typhoon weather and resulting casualties, a warship running aground being a national embarrassment or perhaps a valuable mineral discovery in the region. These helped the players imagine things they could exploit to improve their position and achieve their objectives. (Please see Random Events, below).

Cue Cards

Cue cards in Matrix Games are similar to starting conditions explained above. They represent capabilities that are possibly of interest to the Actors in the scenario and are there to nudge the player's attention and imagination. An example of a cue card could be to draw attention to a particularly strong opposition group, a noted gap in weapon system capability that could affect one side in the timescale in the scenario, or perhaps that one force has popular support from a section of the population so operations in that area would gain an advantage. These should be printed and visible to all the players.

Gaining the effect form a cue card requires an argument in the normal way, but they can be given weighting scores + or – to represent their ease or difficulty in acquiring.

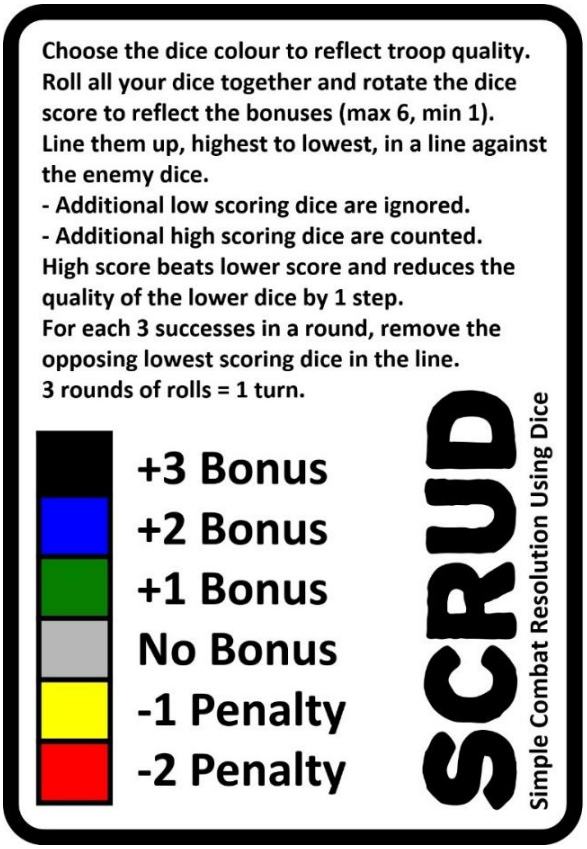
Large-Scale Combat

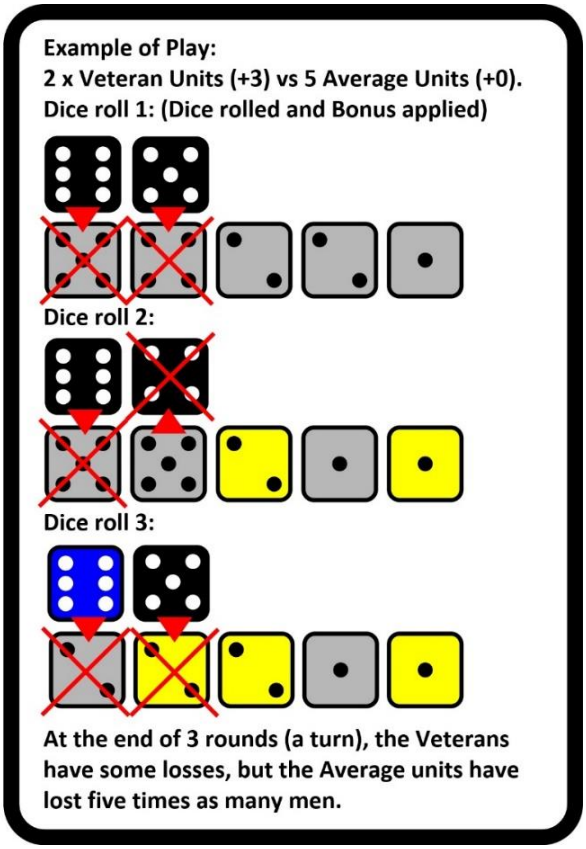
Most Matrix Games are not about the large-scale engagement of purely military units. There are other techniques that are usually far more appropriate for those kinds of games, but there will be games in which numbers of units will engage with each other in the game, in among all of the other Political, Military, Economic, Social, Information and Infrastructure effects in the scenario. For example, in a civil war or coup type scenario.

Small numbers or rare combats are best resolved by having additional separate arguments in the normal way. The Actors should be invited to offer arguments as to why they think their forces might win in the conflict, and the opposition why they might fail. If dice are to be rolled, it is usually best to make the rolls *opposed* as it heightens the tension and increases player involvement. So, if the chance of success for Actor "A" is 6+ on 2D6 against Actor "B", both should roll. "A" needs to get 6 or more and "B" needs to get 5 or less – with one succeeding and the other failing to win. If both succeed or both fail, the dice are rolled again, with the number of repeats reflecting the intensity of the fighting.

If combat is to be more frequent, an easy way of adjudicating combat for a number of units is by using the Simple Combat Resolution Using Dice (SCRUD) technique. In this each unit is represented by a single six-sided dice with positive or negative modifiers applied to them.

A number of different colours of dice are used, with the different colours representing differences in troop quality and equipment capabilities, and their associated modifiers in a table. The effectiveness for the different units can be assigned in the scenario, but are all about to be modified by successful arguments.





A House Divided

In many cases the Actors represented in a game do not represent a unified and efficient command structure – for example the Government may be a coalition of different political parties with differing aims and objectives. This could be represented by allocating a separate Actor for each faction, each making arguments, but this can unbalance the focus of the game and create too many Actors, slowing down play and losing momentum.

In these cases, it can be better to give the Actor a team of players with conflicting briefs, and require consensual or voting decisions in order for them to make arguments. Without the consensus, the Actor simple does nothing that turn due to internal bickering.

Of course, for an analytical game the intra-team discussion leading to making a successful argument will need to be captured to understand what sorts of concessions led to cooperation in the competing factions.

Announcements

Actors quite often make policy announcements or Press statements as part of their turn, to inform the other players of their stated intentions. In many cases these are not really "arguments" as part of the game, so shouldn't count as their action for the turn, unless they wish to specify a measurable effect (such as increasing their approval ratings).

Trade Agreements

In some games, trade forms a very important part of the game narrative. In most cases this can be treated simply as part of the normal ebb and flow of the argument process. However, in some circumstances, particularly when timescales are long, trade can require greater attention as to the nuances of the economic benefits and impacts. In these cases, it may be necessary to get the two sides to make additional arguments as to what they expect to achieve over the agreement (noting that these may be different to what was actually negotiated!) and adjudicated in the usual way. This may, of course, result in one side getting more out of the deal than the other.

This can draw particular attention to the deal in itself, leading to further economic arguments as to the unintended consequences of the deal on other Actors or stakeholders in the game.

The Order in which Actors make their Arguments

As a designer, you should try to have arguments from opposing points of view alternating in the turn order, so you get oppositional arguments.

In most cases the order in which the Actors make their arguments doesn't cause any concern but, occasionally when Actors have been involved in "inter-turn plotting", they might want to change the sequence in order to maximise the effect they wish to have.

I normally simply say to the players that the Actors concerned wish to temporarily swap their positions in the turn order and carry on. It is very rare for there to be objections and the very fact that they wish to do so is a good indicator that the Actors are now working closely together.

Very occasionally the turn order can cause problems when an Actor earlier in the sequence carries out a successful action that prevents, or renders irrelevant, the action an Actor later in the turn order *of the same turn* was going to do. I normally explain that they were merely unlucky and the other Actor managed to complete their action early – however, it is imperative that you find a way to balance that circumstance to prevent it being repeated.

One way is to randomise the turn order – personally I will always start with a fixed turn order and only change if I need to, because most of the time this situation doesn't arise – but once it does, you may need to "rebalance things" or lose the confidence of the players. The simplest way of randomising the order is to use a set of numbered cards equal to the number of Actors and deal them out at random each subsequent turn.

Gaming Possible Futures

When running game events, it is often necessary to consider scenarios taking place at some time in the future. If the events are in the near future, the implications may be minimal, but if the events take place over some years, political terms, or even decades into the future, the implications may be considerable.

For example, the Trump administration changed the nature and character of US international relations during his tenure, and many policy responses could be characterised by uncertainty compared to previous administrations. It was therefore necessary to determine if this is likely to continue in the timescale envisaged by the game, or if there would be a return to the status quo. This is not limited to US politics, as major elections offer the possibility of similarly significant shifts in the political mood among other Actors.

If the event is singular, such as an important election, with the potential for a significant change in policy priorities, it is usually best to simply get the participants to vote (using diceless adjudication or estimative probability).

Other examples relate to on-going events such as responses to climate change, advances in technology, or things like long-term infrastructure projects that will impact on the Actors in any scenario.

If such a situation exists in the game, one simple method of dealing with it is as follows:

Each Player in the game is required to note down the "the most important things to happen in the specified time period" from the point of view of the Actor they represent.

The number of things the player should specify is dependent on the number of participants and the time available. As a rule of thumb, a list with perhaps 10 to 15 different items can

be dealt with in a reasonable time. Since it is perfectly possible that several people may choose the same, or very similar, things, small groups of about 6 participants should consider coming up with 3 things each. Larger groups, proportionally less, and much larger parties be invited to collaborate in pairs or small groups on the "single most important thing" for each group.

In their deliberations, they should be invited to think across the full range of types of things, following the PMESII-N model (expanded to include elements of Nature, such as Climate Change):

- Political
- Military
- Economic
- Social
- Information
- Infrastructure
- Nature

Care should be taken not to discuss the exact definition of "things to happen" in too much detail, as the most senior or loudest voices in the room may dominate, and this acts to limit the participant's imagination as to the full range of effects and events.

These things should be noted down in some way, such as bullet points on a PowerPoint slide, or written on separate sheets of paper, and displayed where everyone can see them. This process is using crowd-sourcing to determine the ***possible futures***.

Finally, each Player should be invited to vote as to whether the thing happens, using the "Yes, I think it will happen", "I'm not sure…" or "No, I don't think it will happen" voting system. The respective scores should be noted against each possible future, and the list re-arranged to place the things in order, with the most voted for item at the top. This process is using crowd-sourcing to determine the ***likely futures***.

This will end up with a list of things, for the purposes of this game, that will happen over the time period, with increasing impact and likelihood higher up the list the item is.

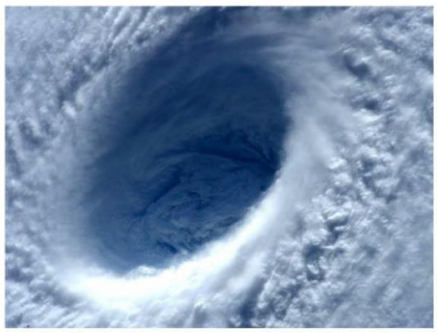
Random Events

In some events the scope of the game may involve a scenario where there is an equilibrium at the start of the game. There is no obvious crisis that has triggered the game to take place, such as a nerve agent attack in London against a Russian dissident. The game may also be set to take place over a long timescale, where the players tend to consistently think long term, so they don't get distracted by a sudden crisis upsetting their plans. In these cases, including random events may be useful to provide a focus for disruption and promote a more engaging game.

My advice is to create a set of cards with generic crises on them, such as: Eco Terrorism, Radiation Leak, Economic Downturn, Mineral Discovery, Extreme Weather, Corruption Scandal, etc.

Anonymous Hacking Attack

Fishing Dispute



Extreme Weather

There are two schools of thought with regard to “random events”:

The *events* should be chosen at random, with random degrees of *severity*, and applied to the *participants* at random during the game.

The *events* should be chosen at random, but *given to a different player, in turn*, throughout the game. They introduce the event as an “*additional argument*” that *they can apply as they wish* in order to contribute to the game narrative.

My view that because a Matrix Game is deliberately short, with a limited number of actions possible throughout the game, having “random events” happen *completely at random* is problematic. An Actor may be disadvantaged purely by chance, more than once during the game, which can reduce their immersion and engagement. The narrative develops during the game based on the decisions of the players and their reactions to the decisions of other players. Having random events imposed on them by chance breaks this “cause and effect” cycle and degrades the game flow.

The alternative is to give the random event to the participants. They will then make a decision as to how this can contribute to the narrative being developed by the players. They will still need to make a suitable Matrix Argument as to who it affects and the severity, but it becomes part of the player decision process and so preserves the “cause and effect” cycle of game play. They also know that everyone will have an opportunity to exploit a random event, so this is a fairer method in a game with limited numbers of Actors and game turns.

An example: During a "Belt and Road" game about global infrastructure development, the Chinese and Russian players have worked together to exploit the melting ice pack and establish a trans-Arctic “Road” from China to Europe. This will disadvantage the ASEAN and

Indian Actors by reducing trade in their areas. The Indian player has an “Extreme Weather” card and elects to argue that, despite the ice pack receding in the Arctic, global warming leads to more extreme weather events, and there is a shipping disaster where two huge Chinese container ships are lost in a storm in the Arctic, highlighting risk for this route, reducing investment and profitability.

This is perfectly reasonable and it is likely to succeed – but of course opens up the possibility that another Actor may argue later that extreme weather and rising water levels could affect low lying areas of Bangladesh, causing loss of life, famine, migration and exacerbate regional tensions with India.

Senior Officers, Dominant People and Contentious Arguments

It is not uncommon in a Matrix Game that the participants want to "debate" the arguments. To a limited extent this is ok, but as stated elsewhere, the game needs to move at a pace, creating an immersive narrative and forcing the players to have to live with the consequences of their earlier decisions.

It can happen that a Senior Officer, used to "seminar wargames", will interrupt when you want to move on and say "wait a minute - this is a really valuable debate - let's just dig down..." You should try to point out that this is not that sort of game - Matrix Games are to gain an insight and understanding in a specific way. Short notice, minimal preparation and materials, a short game, and small numbers of participants. If they want to conduct a "deep dive", this isn't the appropriate game - the purpose is to identify the insights – so make a note and move on. The "deep dive" should follow later or in a different type of game. You should, therefore, make sure you include this point in your introductory briefing so that the players are clear from the outset.

When dealing with dominant people, who continually interrupt and dominate the Arguments, you need to take a harder line. You should interrupt them when they interrupt another player making a point. Point out to them that they had their chance. This isn't a debate. This is a turn based adversarial wargame and the procedure for arguments is similar to a Court of Law – you have a chance to have your say, but then you have to remain silent while the others respond.

One Actor goes, the others respond, then adjudication takes place. There should be strictly limited back and forth. Just because these are oral arguments doesn't give anyone the right to interrupt after every point. Again, like in a Court of Law - interruptions should only be on points of provable fact or procedure.

You cannot be too dictatorial, however. It usually happens at least one point in the game, that the argument is contentious – in that the participants continue to argue after making their initial points and are reluctant to stop. This needs to be handled carefully as imposing an adjudication can dramatically reduce buy-in to the result and the game overall. In these

cases, it is usually best to appeal to the professionalism of the participants and a switch to the estimative voting probability adjudication system is usually the best way of moving on with the rest of the game.

It also happens that someone may raise an objection late, often during voting – usually because they didn't raise the point at the appropriate time (possibly because the facilitator was trying to push the game along at pace). It is worth pausing, explaining the right time to make those points in the turn, apologising for pushing the game forward too fast – and then re-running the adjudication procedure.

Nit-Picking vs Important Clarification

It is important to remember that the theory of crowd-sourcing the adjudication requires that you present the Pros and Cons of an argument, as if you were in a Court of Law, and you do not discuss the argument too much. Excessive discussion allows the loudest voices and dominant personalities in the room to shape the argument and induce an element of "group-think" which we are trying to avoid.

The argument should be simply put with an Action/Event that happens, with a measurable result, supported by reasons why or how. This is then offset by opposing reasons, if they exist and the appropriate adjudication method is used to gain a result.

You may find that certain players want to have an excessive degree of clarification as to exactly what the argument is, what it really means, and how it will affect the other Actors, in detail. This is dangerous and can lead to "excessive discussion" as mentioned earlier, but under a different guise. A useful measure is to look around the room and if nobody else is desperately in need of this clarification, then it is usually that individual's problem and play should proceed – I usually bring to their attention that in the initial briefing about how a Matrix Game works, I explained that too much discussion makes the room less intelligent, so I am happy to proceed unless someone else in the room thinks we need to dig into the detail.

Care should be taken, however, as some points of clarification are important. How elections and voting is carried out is always important to be clear about. Understanding the measurable effect should be clear as well – and it is the role of the Adjudicator to ensure that they understand this and can explain it to the other Actors if necessary.

This is an area where experience counts, so being aware of the issue can help in spotting this when it occurs, and taking time to reflect on the circumstances may assist in future games.

Why I like Matrix Games

- Designing a Matrix Game can be done quickly with the minimum of fuss.
- Participating in a Matrix Game does not require an understanding of complex and unfamiliar rules.
- Matrix games can cover a wide variety of possible scenarios, including conceptual conflicts like Cyber.
- They are especially good in the non-kinetic, effects based, domain.
- Matrix games deal with qualitative outputs so are especially useful for non-analysts.
- The games work best with small groups, increasing immersion and buy-in to the game.
- Matrix games are extremely inexpensive (and they work best with short sessions lasting half a day).
- They are perceived to be new and innovative (despite being around since 1987).
- They are easy to transport, requiring only pen and paper – with perhaps a few maps and counters.
- They work well in multi-domain, multi-agency contexts allowing all Actors to participate equally.

A few Words of Warning

- The fact that a Matrix Game requires little infrastructure can be a problem – it just doesn't look sexy and the strengths that it can be done quickly with the minimum of fuss, can be reduced by efforts to make it look cool/expensive.
- The non-quantitative nature of the game can frustrate analysts.
- Matrix Games require an experience facilitator to run them.
- Components and player selection can affect play: so, if all the counters are military, inexperienced players tend to make the majority of their arguments about military actions; and equally, it is no good getting a quiet introvert to try to play a dynamic leader like Vladimir Putin.
- A facility with language is important, which might prejudice play with multi-national participants.
- Matrix Games don't scale well and, while there are mitigating techniques for large groups (50+), they lose some of their impact.
- There is a paucity of academic research in this area (but this is improving).
- The games are vulnerable to a "Senior Figure" accusing the game structure as "just making things up!"
- Some players have great difficulty with the concept of "only 1 action per turn".
- Some players (fortunately very few) appear fundamentally unable to grasp the concept, which in a small game has a disproportionate effect.

Final Comments

Some of the most insightful and well-run games happen when the players all end up with a mutually shared understanding of the situation. The game has created in the participants a shared story-living experience of the situation of the game, with the Actors role-playing their parts. There is good evidence that role-play can more accurately predict outcomes in conflict than other methods, and Matrix Games use this as a fundamental part of the methodology[11]. This happens best with small groups (less than 20 participants) and having the game flow naturally. An experienced Facilitator can be invaluable in helping the story move along, linking the arguments made and weaving them into the narrative so they make sense.

As a result, Matrix games are probably best served in the early “understand” phase of considering a problem. They have demonstrated countless times their efficiency in getting all the participants to a shared level of understanding about a problem situation, far better than any number of briefing notes. DSTL have used them on numerous occasions in order to confirm if the Sponsor for a piece of research is asking an “intelligent question” before expensive and time-consuming analytical research is carried out.

It is tempting to add extra rules and complexity to the simple base technique of the Matrix Game. This should be avoided if at all possible – the strength of Matrix Games come from their speed and simplicity. Additional rules can slow down production, complicate the game, hinder play and distract the players.

Try not to be clever – just keep it simple.

Having time at the end of the session to discuss the game and understand the objectives of the different Actors involved is vital. Going around the participants and asking them to read out their objectives and explain why they though they succeeded or failed can be most instructive. Also, if you then ask the assembled group "who won?" and they all agree, then this can be a very powerful indicator of things that might need to be looked at more closely as a result of the game.

Finally, the insights from the game can take a little time to come out. They might not be immediately obvious, so taking time to consider what happened in the game and whether individual events are noteworthy, is very useful. I am continually surprised at the predictive power of such a simple game.

[11] See: Game theory, simulated interaction, and unaided judgement for forecasting decisions in conflicts. Kesten C. Green. International Journal of Forecasting 21 (2005) 463-472.

Matrix Game Checklist

Pre-Game

- Assemble Map (if appropriate) – if not appropriate, work out how success and failure is to be recorded (Flip chart? PowerPoint?)
    - Wikipedia has very good vector country maps for free download.
    - Avoid making the map too detailed – players get bogged down.
- Assemble Briefings
    - Short Briefings with objectives, for recreational games.
    - Full briefings for educational or more analytical games.
- Assemble counters to represent forces, effects and influence.
    - Print counters onto A4 labels, stick to foamboard and cut out with a sharp knife.
    - Or print on plain paper, apply to self-adhesive plastic floor tiles and cut out with heavy duty scissors.
- Ensure you have the necessary cards for the players if you are using Estimative Probabilities, or Diceless Voting to adjudicate arguments. Also have a pack of numbered cards in case you need to randomise the turn order.
- Timings: You want about 6 turns in the game to make the players live with the consequences of their decisions, so with 30 min turns, allow at least 3 hrs.

Game Start

- Explain the game type and how arguments work, as well as any special rules for the scenario.
- Allocate roles, then get the players to read their briefs and generate objectives (for analytical games), *including long term goals*.
- Explain turn order (and think about changing the order during the game).
- Tell the players how long a "turn" is (game time) and how long you expect a turn to take (real time).
- For games with inexperienced players it can be a good idea (if you have time) to have a "rehearsal" pair of aguments to ensure they understand how "arguments" work.

In Game

- Ensure that the game is pushed along and there is the minimum of unnecessary chat when making an argument.
    - The arguing player give an Action and a *measurable* Result along with reasons Why or How (Pros).
    - The other players give reasons Why Not (Cons): "Can anyone think that argument won't work?"
    - The Facilitator works out the chance of success (weighted probability method) or the player use the estimative probability voting card method.

    - If unopposed or a really good argument – no need to roll the dice, it just happens.
    - Remember – this isn't a debate – so make sure it doesn't degenerate into one.

- Roll the Dice.
    - Roll a 7+ on 2D6 for games with a "narrative bias", adding or subtracting depending on arguments, or,
    - Roll a 7+ on 2D6 for games with no "narrative bias", adding or subtracting depending on arguments, but using Red and Green dice (if the score is 7 and the Red dice is the higher, the argument fails), or,
    - Roll against a percentage if using the estimative probability voting card method, with success being a roll *lower* than the stated probability.
    - The scale of success or failure can have an additional effect and the Facilitator shouldn't be afraid of modifying the result to ensure it is consistent with the timescale of turns in the game – so where the turns are short and someone argues for something that would take a long time, you can say on a success that it has started and will continue (unless someone stops it).
- Alternatively, use a Diceless Adjudication method with voting.
- Note successes and failures down (It can help if you use a flip chart where everyone can see it).
- Summarise the successes and failure at the end of the turn.
- As the Facilitator, carry out "consequence management" based on the arguments of the players. Add refugees, note media reactions, etc., and raise issues that if unresolved will have consequences in later turns.
- **Between Turns**: Take a pause at the end of the turn for players to take a comfort break and talk to each other, conducting diplomacy, plotting or perhaps making deals for the next turn. Make sure this time is limited because the game should not be allowed to drag on. Any discussions should be noted down in higher level policy games.

Post-Game

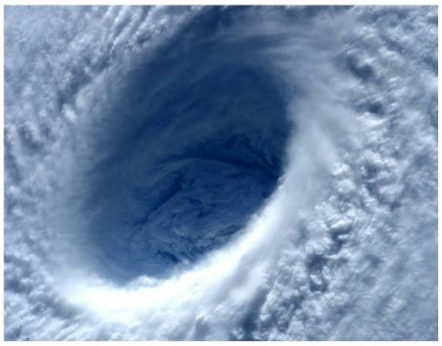
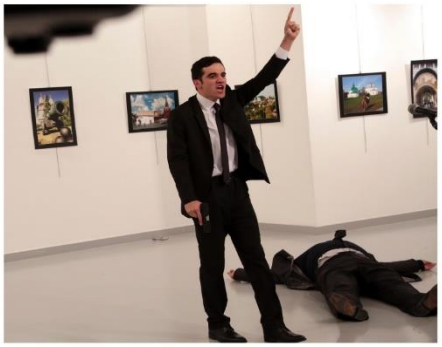
- Sometimes it is useful to have a final round of long-term arguments – especially for character driven games.
- Have the players read out and discuss their objectives.
- Always allow time for a discussion about what went well, less well and ideas for better ways of working.
- Make immediate notes to help you later. There will be a great many observations coming out, so try not to miss anything.
- Take time to reflect on the game. Many insights only become useful after some time to appreciate what they are.

Sample Spendable Bonus Cards

ECONOMIC BONUS 	POLITICAL / DIPLOMATIC BONUS 	MILITARY BONUS 	INFORMATION 
ECONOMIC BONUS 	POLITICAL / DIPLOMATIC BONUS 	MILITARY BONUS 	INFORMATION 
ECONOMIC BONUS 	POLITICAL / DIPLOMATIC BONUS 	MILITARY BONUS 	INFORMATION 
ECONOMIC BONUS 	POLITICAL / DIPLOMATIC BONUS 	MILITARY BONUS 	INFORMATION 

Sample Random Events

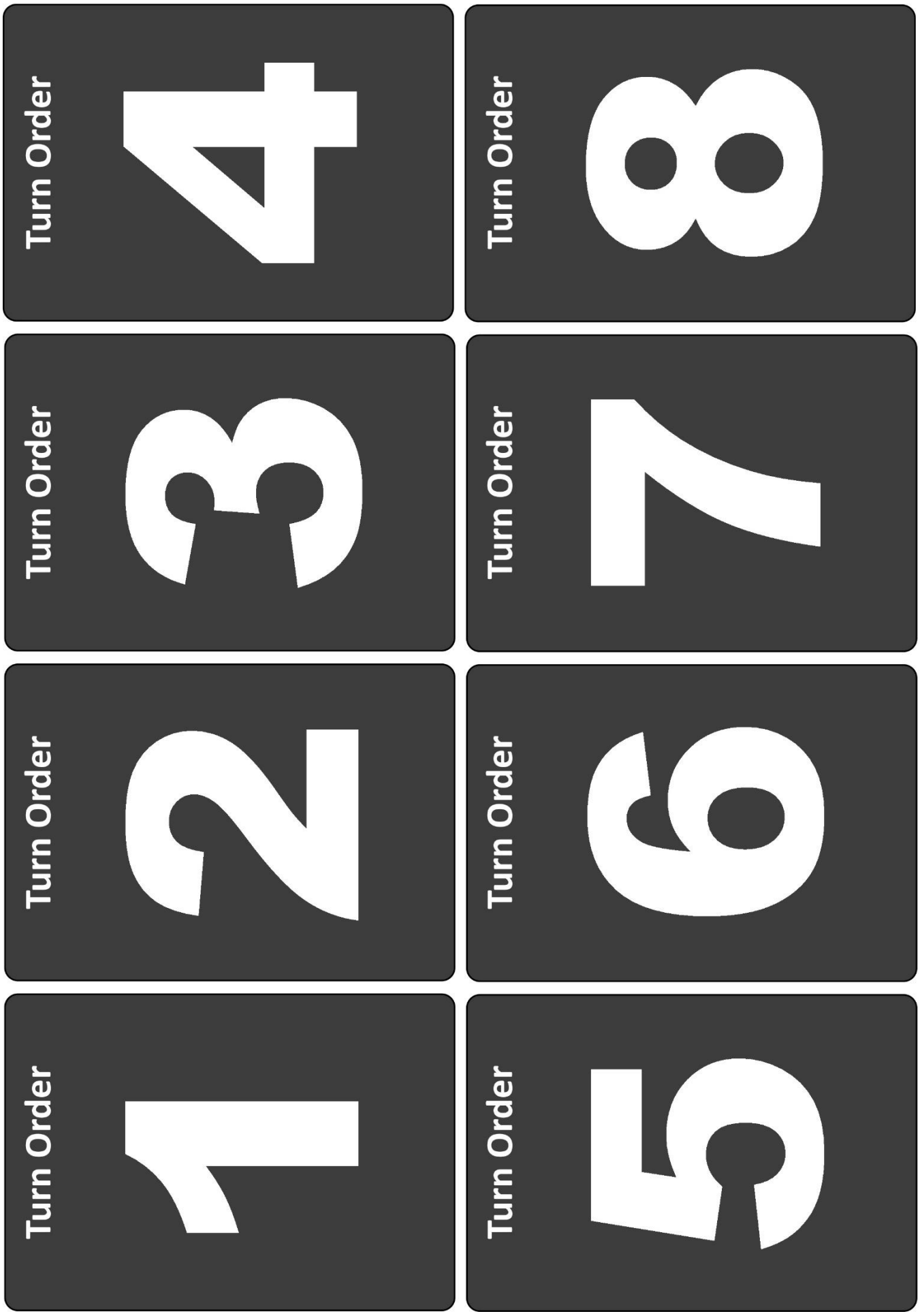
		
Regional Tensions	Nuclear Accident	Financial Crisis
		
Rare Mineral Discovery	Toxic Spill	Extreme Weather
		
High Level Corruption Scandal	Shipping Disaster	Economic Upturn

		
Anonymous Hacking Attack	Fishing Dispute	Extreme Weather
		
Economic Downturn	Political Upheaval	Assassination
		
Air Disaster	Military Accident	3D Metal Printing, Artificial Embryos, Smart Cities, Artificial Intelligence, Real-time Translating Earbuds, Supermaterials, Personalised Healthcare, Micro Failsafe Nuclear Reactors. Technological Breakthrough

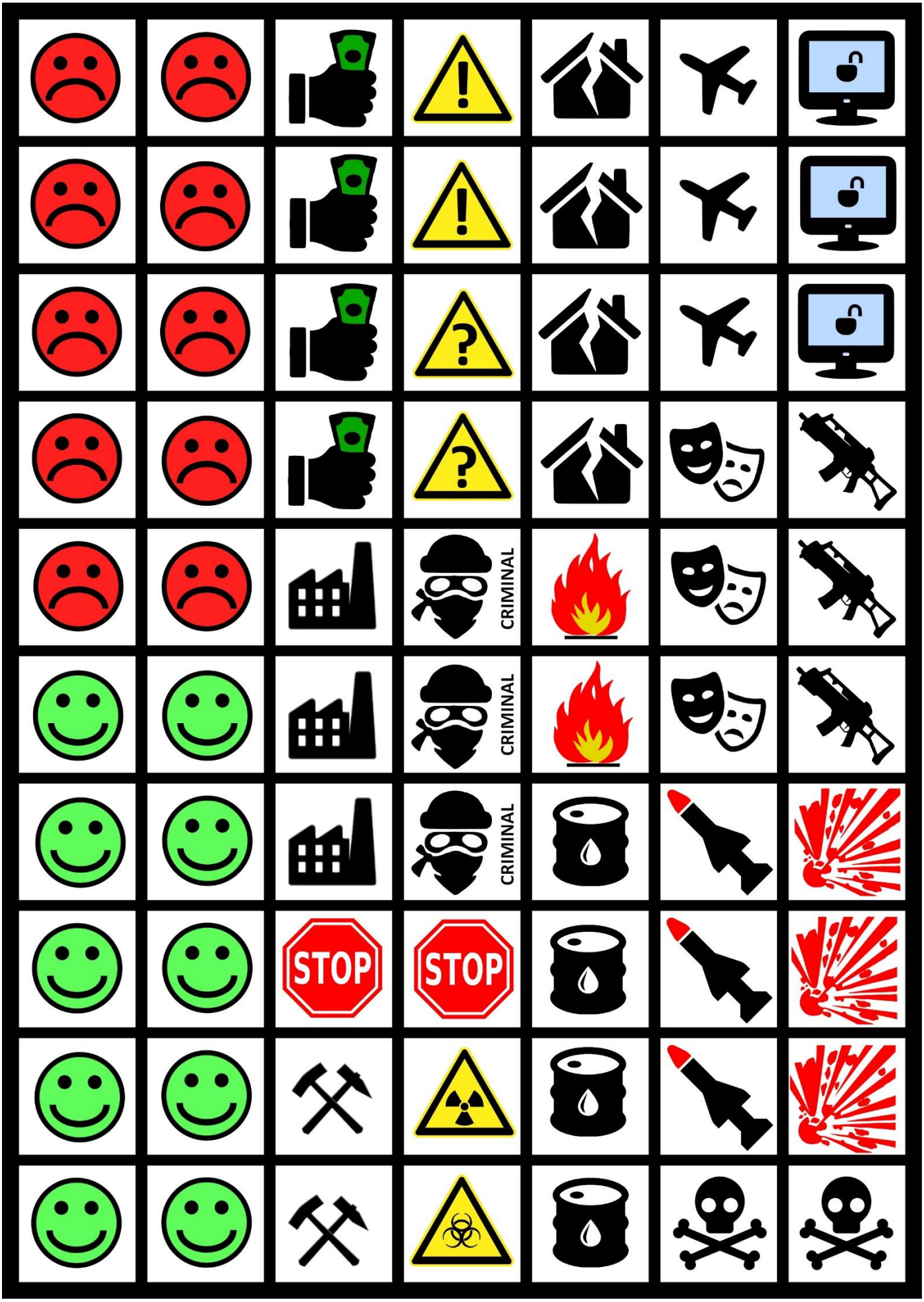
Sample Voting Cards for Diceless Adjudication

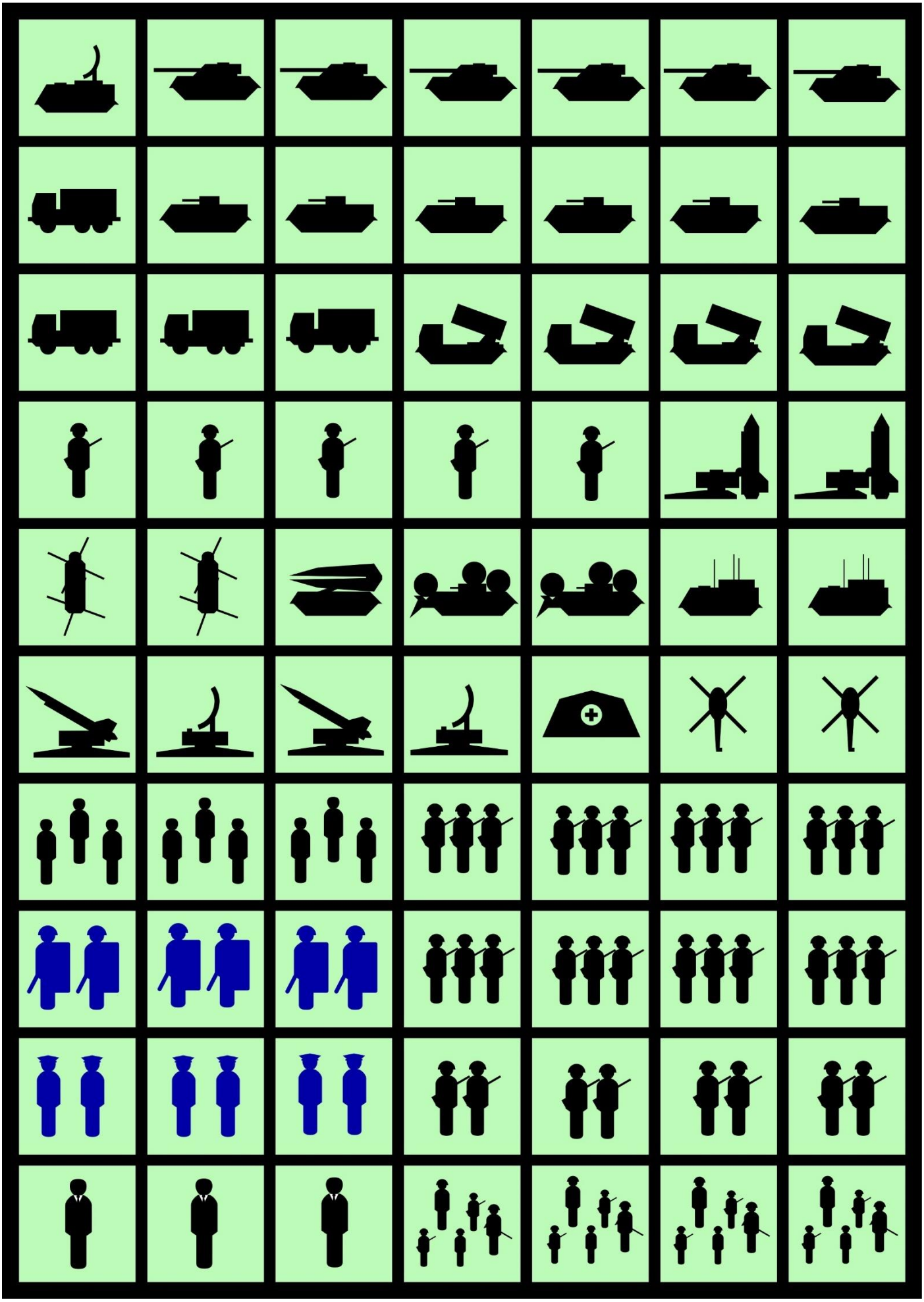
Sample Estimative Probability Cards

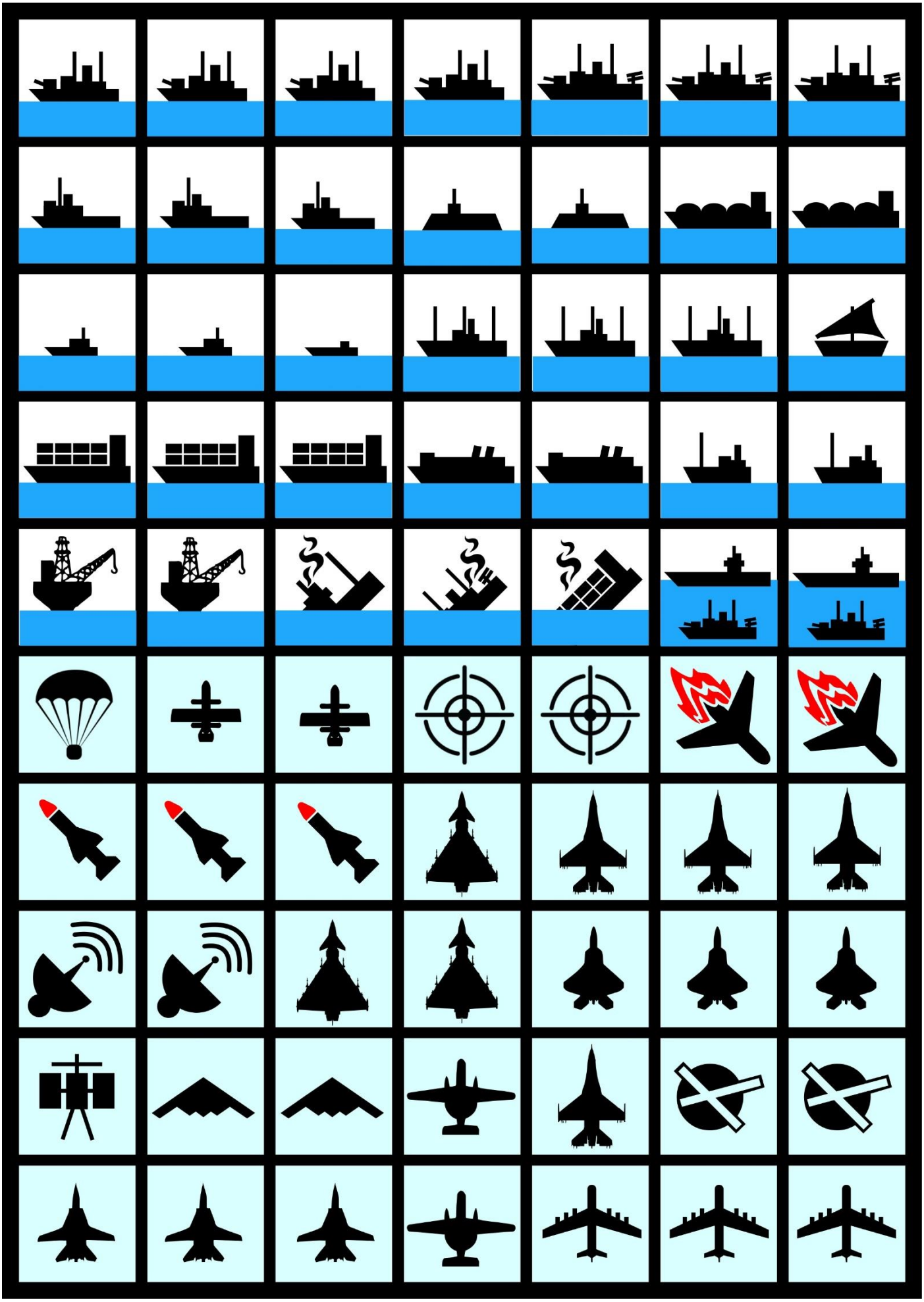
Sample Turn Order Cards



Sample Markers for Matrix Games for Effects and Conventional Forces

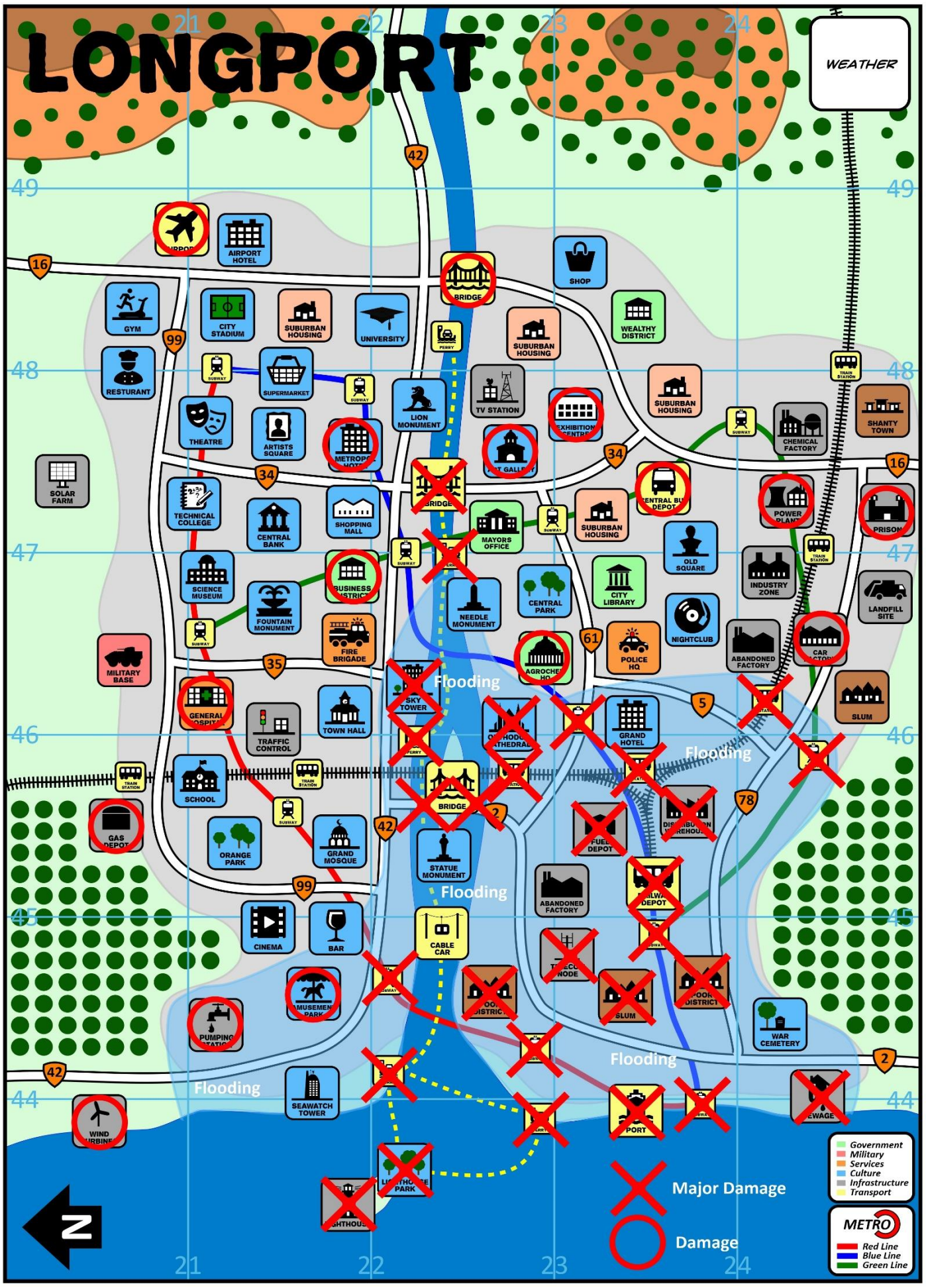






Sample Map for a real-world political Matrix Game

Sample Map for a fictional natural disaster Matrix Game



What are Matrix Games?

Matrix games are different. In a Matrix game, there are few pre-set rules limiting what players can do. Instead, each is free to undertake any plausible action during their turn. The chances of success or failure, as well as the effects of the action, are largely determine through structured argument and discussion. This process allows for imaginative game dynamics that are lively and open-ended, and yet also grounded in reality. In a Matrix Game, you use words to describe why something should happen, the Facilitator or the players (or both) decide how likely it is, and you might roll a dice to see if it happens (but equally, in the face of a compelling argument, you might not need to). If you can say "This happens, for the following reasons..." you can play a Matrix Game.

Matrix games are particularly well-suited for complex conflicts and issues involving multiple actors and stake-holders, varying interests and agendas, and a broad range of (diplomatic/political, military, social, and economic) dimensions. The game system crowdsources ideas and insight from participants, thereby fostering greater analytical insight. The games themselves are not intended to be fiercely competitive, with obvious winners and losers. Instead, they operate with the players working to generate a credible narrative. The player roles may have objectives that will place them in conflict with other players, but it is perfectly possible for all of the players to achieve at least some of their objectives by the end of the game.

About Tom Mouat

Tom Mouat MBE is a Graduate of the Army Staff College and has served worldwide since 1979. He is an expert in both manual and computer-based simulation systems, running large scale military training exercises and designing wargames.

He worked in Headquarters ARRC for 2 years prior to their first deployment to Bosnia, where he was awarded the MBE. Following this he ran the British Army's principal land-based computer simulation system for 3 years. He was also a Requirements Manager for simulation in the UK MOD's procurement organization for nearly 5 years where he was awarded the Chief of Defence Material Commendation for innovation and costs saving.

He has a Master's Degree in Simulation and Modelling, has published articles and delivered lectures about simulations, military history and wargames for professional development, education and recreation since 1983. He a contributing author to the "Handbook of Research on Serious Games as Educational, Business and Research Tools", "The Sandhurst Kriegsspiel", "Dark Guest: Training Games for Cyberwarfare", as well as several others, and has delivered numerous wargames across the MOD.

He is currently the Directing Staff officer responsible for Modelling and Simulation at the Defence Academy of the UK and has recently been awarded the Chief Scientific Officer's Commendation for his contribution to science and technology.

