Narrative Machines: A Ludological approach to Narrative Design

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In this chapter, we discuss the design of games as *narrative machines* – mechanical systems that create narrative experiences. The role of narrative in games has been a hotly discussed topic in Game Studies, and indeed there are many ways that play and story can come together, from static scripts authored by the designer to improvised scenes freely role-played by players. We wish to address a middle-ground of particular interest to boardgame design: the *emergent* narratives that result from the interaction between the players and the rules.

We argue for the deployment of *systemic* narrative – stories that are the result of carefully designed systems and which employ emergent play as a viable design tool, based on a close analysis by Malcolm Ryan (the lead author). We outline an approach that Ryan calls *narrative-driven design*, in which the designer begins by analysing the desired narrative as if it were a game being played. We ask ourselves: "Who are the players in this scene? What actions are available to them? What are their incentives? What conflict are they experiencing?" When this is understood, we can begin to recreate the same situation through the mechanics of our game.

To illustrate this process, Ryan presents within the chapter an account of their own design process in creating *The Road* (Ryan 2015), a zombie-survival card game set in the Australian outback. *The Road* is a game of heroism, hope, betrayal, tragedy and revenge. The game has no scripted encounters, instead the mechanics are designed so that familiar post-apocalyptic narratives play out of their own accord, driven by the players' own desires. To demonstrate how this is achieved, we present a close reading of the game mechanics, an overview of some

of the surrounding critical concepts, and comparable insights from the design and playtesting process.

What is emergent narrative?

Consider the following simple game. A player has a health track with values from 20 (full health) to zero (death). Every 4 positions along the track, a scar token is placed, which the player gains the first time their health drops below that level. This represents a permanent scar to their health. The game is played over twenty turns. The objective is to reach the end of the game with health remaining. The game ends in death if heath ever reaches zero.

On each turn, the player first rolls a four-sided die to determine how many points they add to their health, to a maximum of 20. The value shown on the die is reduced by one for each scar the player has, and can go negative if the die roll is less than the number of scars, in which case the player loses health. There is an encounter deck of 20 cards, shuffled at the beginning of the game. On each turn the player draws and discards one of these cards. Most of the cards have no effect, but three of the cards cause the player to lose 4, 6 and 8 health respectively. The player wins the game if they make it through 20 turns without dying.

This game is clearly not very complex and lacks any kind of choice, but it has an interesting dramatic structure. The graph in Figure 1 shows three example playthroughs of the game with different narrative arcs:

Player 1 faces a major encounter early in the game and is significantly scarred, but with luck manages to regain enough health to face the second and third encounters without issue, and wins the game relatively unharmed.

Figure 1. Example playthroughs of a simple game, showing players' health over time.

Player 2 is not so lucky. The first encounter is only slightly scarring, but as they are on the verge of recuperating, the second encounter hits, leaving them with more major scars and slowly dying. The third encounter, when it happens, is enough to finish them off.

Player 3 shrugs off a minor encounter at the beginning of the game and is on full health for a while, but then two more encounters in quick succession leave them close to death. Nevertheless, with luck they are able to make it to the end, winning the game with only one health to spare.

This example is illustrative of the concept of *emergent* narrative – the creation of meaningful narrative structure through the player's interaction with gameplay systems.

The term *emergence* is often used in an ill-defined way, sometimes bordering on 'magic', but it ultimately has a prosaic definition. Schelling (1971) describes it as 'systems that lead to aggregate results that the individual neither intends not needs to be aware of'. It hinges on our ability to recognize high-level abstract structure in the details of a low-level concrete system (Bedau 1997). Thus, for example, in the classic example of Conway's *Game of Life* (Conway 1970), the concrete system describes the way individual pixels turn on and off, but we recognise high-level structure in the stable patterns that evolve over time, such as blinkers or gliders. We talk particularly of 'emergence' when there is an apparent disconnect between the simplicity of the low-level systems and the complexity of the resulting patterns, although this distinction is often subjective.

When we talk of *emergent narrative* (Louchart et al 2008, Sweetser 2008), the abstraction we desire is recognisable narrative structure: suspense, resolution, reversal, etc. The system and the player interact to produce a sequence of fine-grain actions and events. In the terms of formalist narrative theory (Walsh 2001), this is the *fabula*, the unstructured temporal flow of events that underlie the narrative. It is left to the player to recognise and mentally construct the *sujet*, the relevant narrative relationships between events (Jenkins, 2004). This is a skill that human beings learn early in life. Given the myriad of events we experience in a given 24 hours (*fabula*), we adeptly edit and compress, amplify and connect, to tell the story of our day (*sujet*).

In distinguishing between *scripted* and *emergent* narrative, it is usually this narrative abstraction we refer to. In a scripted game narrative, the units of interaction are of coarser granularity, loaded with individual narrative significance (*rescue the cat* for example, or *forgive the thief*). The narrative structure is clearly represented in the rules of the system, and

the author has more control over the story by explicitly presenting a desired narrative interpretation of the events. As a result, the player has less sense of narrative control, choosing narrative pathways that have been set out for them rather than discovering their own narrative structure in the game.

In contrast, emergent narratives are "not pre-structured or pre-programmed, taking shape through the game play, yet they are not as unstructured, chaotic, and frustrating as life itself" (Jenkins 2004, 128). In an emergent narrative, the player's choices occur at a finer granularity (*move left*, *throw the ball*), having individual significance that is material, but of little narrative consequence. It is only through what Sicart calls the *aggregation of choices* that the bigger picture arises (Sicart 2013, 104), and each decision is recognised as a step in a bigger narrative arc.

However, it is not "magic" that keeps these fine-grained choices from being "unstructured and chaotic". Rather, it is the design of gameplay systems with well-understood dynamic properties[1]. Ideally, these systems draw the player along a narrative path without dictating their choices or forcing their hand. So, for example the game described above combines a random walk with a positive feedback loop. The average number of points of health earned per turn is 2.5 minus the number of scars. As long as the health stays above 8, this will result in a net positive trend. When health drops below 8, the trend becomes increasingly negative as more scars are accumulated. The three encounter cards are each survivable on their own, but take a while to recover from. With only one scar, the 4, 6 and 8 encounters take an average of 2.7, 4, and 5.3 turns respectively for the player to regain full health. Simulation

[1] Although, of course, such systems can and do arise serendipitously, and a sufficiently complex game may exhibit dynamics (and thus, tell stories) that the designer never anticipated.

shows that this fortunate outcome happens about 28% of the time. In the other cases, the encounters appear more closely together in the deck, and the player is not given enough time to recover from one before facing the next. This makes it much more likely that a second scar will be incurred, slowing the player's recovery. If the player is unlucky, a third scar will be gained, at which point the game becomes a race to the end before health runs out. On average the player dies in about 12% of games.

This simple example illustrates what we call a *narrative machine* – a game system designed to exhibit particular dynamics that have a meaningful narrative interpretation. In this paper, we emphasise the idea of emergent – or, we prefer, *systemic* – narrative as a designed thing that can be constructed through an understanding of drama and system dynamics. To design a narrative machine, we first need to understand the narrative structures we want it to exhibit. What patterns should exist in a sequence of events (*fabula*) generated by our game to prompt the player to recognise and construct a meaningful story (*sujet*)? The answer will depend on the kinds of stories we want to tell: suspenseful, heroic, tragic, comedic, or otherwise. Given this set of patterns, we need to reverse the interpretive process. We design game mechanics which generate the patterns as system dynamics, emergent patterns of play such as the feedback loop exhibited in the example above (Adams & Dormans 2012). The tools we have for storytelling are not the words of an author, or the shots of a film director, but the differential equations of a mathematician, creating high-level behaviour from low-level interactions.[2]

[2] For an excellent and accessible introduction to the dynamics of differential equations, we recommend *Modelling Life* by Garfinkel, Shevtsov and Guo (2017). While this isn't a book on game design, it contains a lot for game designers to think about.

In literary theory, the field of *poetics* is dedicated to the structural analysis of literary devices and forms (Culler 2011). Twentieth-century narrative theorists such as Genette (1983) and Barthes (1975) were interested in the linguistic structure of narrative and how it affected the reader. We can learn from their analyses to recreate these devices within our games, as systems of rules which play out in particular ways to tell particular stories. In this way, we can construct our own poetics of narrative systems (Ryan 2009).

In the following we present our approach to the design of systemic narrative, which we call *narrative-driven design*. Following this method, we design by imaginatively reverse-engineering the games being played by characters in the stories we want to tell. We identify the important mechanical elements of these games, which give rise to the narrative structure as patterns in dynamic systems, and we recreate these as mechanics in our own games[3]. We outline this process more thoroughly in the next section. We then provide an in-depth example, based on the lead author's experience in designing *The Road* (Ryan 2015), a post-apocalyptic survival card game with a strong emphasis on systemic narrative.

Narrative-driven design

A story is typically about characters making difficult choices, facing danger, and the like. In narrative-driven design, we look at these stories as if the characters were playing a game, and ask ourselves "What are the rules of the game?". In particular:

Beliefs: What do the characters believe about the world? Are their beliefs correct? What important things do they not know?

[3] In this way, narrative-driven design is a specific instance of the more general idea of the Mechanics-Dynamics-Aesthetics (MDA) architecture of LeBlanc, Hunicke and Zubek (2004), where the story is the aesthetic experience and the dynamics are the narrative structure.

Desires: What do the characters desire?

Actions: What actions can the character take? This includes not just the final action taken, but also the available alternatives they may consider.

Outcomes: What outcomes could happen in each case? In the case of chance outcomes, what are the odds?

Conflict: What conflict are the characters experiencing? How do they arise from their desires and their knowledge of the world?

In asking these questions, we need to focus on what elements of this 'game' are crucial for the dramatic nature of the narrative. For example, consider the following scene from the story *The Tale of Peter Rabbit* by Beatrix Potter:

[Peter] rushed into the tool-shed, and jumped into a can. It would have been a beautiful thing to hide in, if it had not had so much water in it. Mr. McGregor was quite sure that Peter was somewhere in the tool-shed, perhaps hidden underneath a flower-pot. He began to turn them over carefully, looking under each.

Presently Peter sneezed—'Kertyschoo!' Mr. McGregor was after him in no time.

And tried to put his foot upon Peter, who jumped out of a window, upsetting three plants. The window was too small for Mr. McGregor, and he was tired of running after Peter. He went back to his work.

(Potter 1902)

This is a fundamental moment of suspense (Ryan et al. 2008). Peter is hiding in the watering can, stifling a sneeze while Mr McGregor draws closer and closer. Things might be bad for Peter if he is caught. The sudden sneeze gives Peter's position away, but in a last-minute reprieve, he jumps out the window to safety.

What is the game being played here? Consider Peter and McGregor as players. To answer our previous questions:

Beliefs: McGregor knows Peter is hiding someplace but is uncertain where. Peter knows the farmer is getting closer, but it uncertain about whether he will be found.

Desires: McGregor wants to catch Peter, but also wants to get on with his work. Peter desires to be free and to elude McGregor for now.

Actions: At any moment, Peter can either stay hidden or run. McGregor can keep looking, or go back to his work.

Outcomes: If McGregor chooses the place where Peter is hiding, Peter will be revealed and caught. If Peter runs, there is a (small) chance that he will safely escape, or else be caught. The longer Peter stays in hiding, the greater the chance is that he will sneeze. If he sneezes, McGregor will know where he is.

Conflict: The conflict for Peter is thus whether to keep hiding in the hope that McGregor will give up the search, but with the risk of sneezing and being discovered, or else to run immediately knowing he will be revealed but hoping to escape anyway.

We can now see how a game could be designed to provide the same dramatic narrative. There are several possible hiding spaces for Peter's player to choose between, without McGregor

knowing. McGregor's character can either look in one of the places or go back to work. Each turn spent looking has a cost to the farmer, to be weighed off against the reward of finding Peter. Meanwhile Peter can choose on any turn whether to stay hidden or run. If he chooses to run, there is some probability he either escapes (win) or is caught (lose). If Peter stays hidden, there is a chance that he sneezes, which gives the farmer information of where he is hiding.

There is a major difference between the original narrative and this systemic design: in the game, Peter can lose. This is an important problem for narrative-driven design. For the tension and sense of danger to be real to the player, as it is to Peter in the story, there needs to be a real possibility of failure. In the story, Beatrix Potter only had to write one outcome, but in the game, we need to consider all possible outcomes and make sure they are all worth playing. Will the story of Peter's capture still be worth telling if McGregor gets it right on the first guess? This is where we have to give up some authorial control and allow our systemic narratives to sometimes be less satisfying. Rather than force this situation to play out in a particular way, we provide an open space for different narratives to occur. Perhaps being caught will lead to Peter being carried to the kitchen to be made into a pie, presenting new opportunities for drama.

Lifting from the particular to the general, this story is an example of a general narrative design pattern for suspense as a combination of *uncertainty*, *danger*, and *inevitability* (LeBlanc 2006; Costikyan 2013). We can create dramatic tension by putting the player in a situation of potential danger where there is uncertainty about how it will resolve with the threat of a bad outcome. The situation is then slowly resolved over time, leading towards an inevitable moment of decision. We can also add *powerlessness* to this equation — the player

needs to have limited options to control the outcome, instead being made to wait and hope for the situation to resolve in their favour.

Dramatic tension is a relatively simple narrative element to implement systemically. To demonstrate how we might approach more complex themes, we will introduce Ryan's own game *The Road,* and discuss the elements that went into designing its complex inter-character drama.

The Road

The Road (Ryan 2015) is a zombie-apocalypse survival card game for 3-5 players. In this section, I write in the first person to personalise the design decisions made in developing the game. As with any game, the design described below was developed through a long process of prototyping and playtesting. The following observations are based on both my design intentions and the stories that arose during playtesting, as well as play sessions anecdotally reported by other players.

Let us briefly outline the structure of the game before launching into analysis. Play takes place over a series of in-game days, with morning, noon and night phases. In the morning, players need to eat from their limited supply of food, or else run the risk of going hungry with the possibility of losing health. Initially the risk is low, but it increases as hunger and tiredness accumulate. Then, as a group, the players must decide where to go that day, drawing two alternatives from a deck of location cards. Locations offer different amounts of danger (most often zombies and other threats) and rewards (loot and other beneficial effects). The living players must agree on a destination by whatever means necessary, and travel there. This triggers the start of the noon phase. Zombies are revealed by drawing cards from a Zombie deck. If zombies appear, the players can fight, hide or flee, making their decisions

simultaneously. Battles can take several rounds of action until all the zombies are killed, or the players have fled or died. The remaining players can then loot the location to reveal a certain number of equipment cards, including food, weapons and other items, both useful and useless. These items can be distributed among the players however they please, subject to hand limitations. When distribution has been completed the night phase begins. Players must choose whether to sleep or stand guard, as there is a possibility they may be attacked during the night. Failing to sleep accumulates tiredness, which adds to the risk of injury due to exposure.

The game ends when all the players are dead (losing health from hunger, exposure or combat) or when they reach the Airfield location, deep in the Location deck. When the Airfield has been cleared of zombies, a certain number of players are given the option of escaping on a plane. The number of available seats is determined by a card drawn at the very beginning of the game but kept hidden until the end. If there are more players than seats, they must decide amongst themselves who stays and who goes.

My aim is designing *The Road* was to create memorable narratives in the style of *The Walking Dead* comics (Kirkman 2003) and TV series (Darabont 2010). In these stories the zombies are only the external threat and the real drama comes from the relationships between the survivors and the difficult decisions they need to make to stay alive. This is a common theme within zombie narratives:

More than any other monster, zombies are fully and literally apocalyptic... they signal the end of the world as we have known it for thousands of years. Also, in the original meaning of “apocalyptic,” they reveal terrible truths about human nature, existence and sin’. (Paffenroth 2006, 13)

I wanted to explore themes of trust and betrayal and the tension between looking after the group versus looking after yourself. As such, it is a cooperative game, but one in which you might choose to sacrifice a player for the good of the group, or for your own selfish desire to survive. There have been a rash of 'hidden betrayer' games of late, with examples including *Dead of Winter* (Gilmour and Vega 2014) and *Battlestar Galactica* (Konieczka 2008). While I enjoy these titles, I wanted to make something different. I never wanted to tell the player "You are the betrayer" as I believe that making this decision for the player removes the moral impact of the choice. In *The Road*, you are not born Good or Evil, rather you make the choice to do what you need to do to survive, and live with the consequences. In this way, the game reveals "terrible truths" about the players themselves. Every moral decision is left upon the player's shoulders. If they choose to betray the group, they cannot pass off responsibility by saying "the game made me do it". There is always the option to die (heroically, tragically, ignominiously) instead.

For this reason, there are many places in the game where the players need to make a group decision without any clear mechanic defining the process. For example, when a location is looted, several equipment cards will be played face up on the table. These are then up for grabs for the players to take however they like, provided they maintain their hand limits. At first, players often grab anything they can and negotiate trades later, but most groups realise the need to agree on a fair process. The game deliberately leaves it up to the players to determine this process, and to police it for themselves without recourse to "the rules". These kinds of social decision problems are the focus of the game's design.

The heart of the game is the combat system, inspired by my reading of economic game theory and political science (particularly Michael Laver's *Playing Politics* (1997), which I cannot

praise highly enough). The combat mechanics are designed to work as a *free-rider problem*, a situation in which everyone benefits but not everyone pays (Hardin 2003). When facing a zombie in *The Road*, everyone acts simultaneously, choosing (typically) to either attack or defend. The more players attack, the more likely it is that the zombie will be killed, but each extra attack has diminishing returns, increasing the probability of success by smaller and smaller amounts. The zombie attacks at the same time, and it is more likely to target a player who is attacking it. Defending is a much safer option as the player is less likely to be targeted and more likely to avoid damage. Thus the best strategy for the sake of personal survival is to take a 'free ride', convincing the others to attack while you defend. Of course, if everyone acts this way, the zombie gets a free round to attack while everyone defends. To exacerbate the problem, the zombie has a chance of calling further zombies to escalate the battle, making things worse for everyone.

To further complicate this situation, not everyone starts off equally well armed. Weapons are randomly distributed at the beginning of the game: a knife, a machete, a shovel and a cleaver. The machete is the most powerful weapon and the cleaver is the least, in terms of both hit probability and damage done. This may seem unfair to the player with the cleaver, but it can also be turned to an advantage. The cleaver is so weak in battle that it is easy for that player to argue that it would be better for everyone if they did not attack. After all, nobody benefits from the player getting hurt unnecessarily. On the other hand, the player with the machete often ends up taking the brunt of the battle, a fact that players are quick to complain about. However, they are often reluctant to accept the obvious solution – give up their machete to another player between battles.

These mechanics are designed to fuel tension between the players while also giving players deniability. A choice to attack or defend changes the odds of battle succeeding, but there is no way to unequivocally prove that it would have made a difference. During playtesting, new players showed a tendency to adopt an 'all-in' strategy in which everybody attacked at once, regardless of the odds. This would often end up being overkill and made it more likely that someone would be hurt. Shrewd use of the defence action would be better for the group in the long run, but deciding who has to attack and who gets to defend often proved a difficult problem for the players. I recall an instance in which two players faced a single zombie and both defended round after round, goading the other to attack. Eventually they resorted to threats and bargaining to convince the other to do the job. This was a joy to see as a designer, and created a memorable story that the players repeated long after the game was over.

To make this dynamic work, another important aspect of the design needed to be addressed: winning. In the rules for *The Road* there is no mention of winning the game. There is an ending in which the player dies and an ending in which they survive, but it is up to the player to decide which is more important. Crucially, there is no distinction made between surviving on your own or with others. Sometimes keeping the other players alive is your best bet for survival; sometimes it is better to cut and run. This is important, because 'mixed motive' games like free-riding rely on individual payoffs being *non-zero-sum*. In economic game theory, a zero-sum game is one in which an advantage to one player implies an equivalent disadvantage to the other(s), so the total gain is zero (Binmore 2007). Such games are strictly competitive, whereas in a non-zero-sum game there is the possibility for an outcome to advantage or disadvantage players independently. Mixed-motive games such as the *Prisoner's Dilemma* and *Chicken* create more complex play dynamics by mixing the benefits

of both cooperative and competitive play. These ‘games’ are at the root of many of the difficult social dilemmas of our time (ibid.).

Any game with a single winner is ultimately zero-sum; every move that advantages one player disadvantages the others. This is particularly problematic in trading games such as *Settlers of Catan* (Teuber 1995). Trading is non-zero-sum; it only takes place when it benefits to both parties. Early in *Settlers of Catan*, when there is no obvious leader, trading is common as it allows players to get ahead. However, as the finish line draws near, this kind of interaction dries up as players become reluctant to make a deal that would allow their trading partner to win. *The Road* deliberately omits the idea of winning for this reason, it allows mixed-motive play to continue all the way to the end of the game.

This omission has an additional advantage: it allows players to choose their own goal for the game. Some people play ruthlessly “survive at all costs”. Others strive to maintain community “leave no man behind”. Others embrace self-sacrifice for the good of group “You go. Just leave me the gun. I’ll be fine.” This was an important lesson to me as a designer: winning is overrated. We tend to regard the win condition as a fundamental mechanic of every boardgame. One of the first questions when playing a new game is “how do I win?”. *The Road* has no solid answer to this question and is a better game because of it. I learnt this from *Day Z* (Hall 2013), another zombie-survival game, first published as a mod for the ‘realistic’ shooter *Arma 2* (Buchta 2009). *Day Z* is well-known for having popularised the multiplayer open-world survival game, a genre in which many players are challenged to survive in a hostile online world. The notable thing about *Day Z* was that it had no explicit goals or narrative, apart from staying alive, which was often punishingly difficult (Carter, Gibbs & Wadley 2013). As in *The Road*, the relationship between players was fluid – they

could get ahead by helping one another, or by preying on each other's weakness. This lack of explicit goals in a hard, morally charged world lead to a remarkable wealth of player narratives, which were often shared online, as players found their own way in the world and made their own stories (DayZStories 2017).

The other lesson I learned from *Day Z* is: don't make it easy. Survival while playing *The Road* requires careful management of resources and mistakes cannot be easily shrugged off. After a couple of battles, playtesters would often ask "So how do I heal?". There are only two sources of healing in the game, and neither one is guaranteed. If the players do manage to find the Medkit or locate the Hospital, it is a difficult decision when to make use of these resources, and on whom. Death, when it inevitably occurs, is permanent. This is a risky decision in a boardgame — nobody likes being out of the game early — but it is important to the design that death is a major threat. This raises the stakes and makes every decision more dramatic. It also makes for greater narrative cohesion. Being able to heal and start each new battle "fresh" isolates one battle from the next. Designers often adopt this design deliberately (particularly in computer RPGs such as *The Witcher 3* (CDProjekt RED, 2015) or *Skyrim* (Bethesda Game Studios, 2011) in which rest and meditation between encounters can restore the player to full health) to allow players to clean the slate after a near loss, but it also reduces the possibility for a longer campaign narrative, in which the mistakes made in one battle have bearing on every battle to come.

Addressing the problem of death was important. I wanted a way to keep players who died early interested in the game without reducing the impact. The solution came from one of the playtesters: I had noticed that dead players often enjoyed watching the rest of the game play out to see how their story ended, to cheer for the survival of their friends and the

comeuppance of their betrayers. The key was to keep them involved by giving them a way to influence events, without putting them back in the game. The answer was a "ghost" mechanic. Once per game day, a dead player can call for a single dice to be rerolled. This gives the ghost the chance of turning a crucial failure into success, or vice versa, and maintains their investment in the narrative. It also fits thematically with the game, leading to scenes where a player can be haunted by the angry ghosts of the ones they betrayed, or supported by the memory of a friend's heroic sacrifice.

The long-term narrative of *The Road* is one of increasing desperation, often resolved in a moment of crisis. Without healing the players' health slowly dwindles, and death becomes a realistic danger. To compound the risk, a player who dies at the hands of a zombie will themselves rise as a zombie and attack the party, so a player on the verge of death is a liability to the whole party. The ongoing free-rider problem is designed to create simmering tensions in the group, but when things start looking grim, there are options for more significant betrayal. In addition to the *attack* and *defend* actions, players have the option to run from battle leaving their friends behind, or to turn on one another, by choosing to play the *run* or *attack ally* cards. These options are always available throughout the game, and hang over the story like Chekov's gun (TV Tropes, 2019), raising the ever-present option of betrayal without signalling the exact moment it should occur. By always being available as alternatives, it is left up the player to decide when and how to use these actions, if at all.

This is an example of how the game was specifically designed to avoid one of the common pitfalls in the design of moral play in games: the obvious signposting of certain moments as 'ethical choices' with a set of scripted solutions. This is a common design pattern in story-driven video games such as *The Walking Dead*, and 'storybook' boardgames such as

Tales of the Arabian Nights (Gallela et al., 2009). This pattern draws an artificial boundary between the "moral" and "not moral" elements of gameplay, and reduces the impact of the player's choice by prompting particular outcomes, leaving authorial control firmly in the hands of the designer (Ryan, Staines & Formosa 2017). In *The Road* my aim was to put ethical responsibility on the players' shoulders, by taking a systemic rather than scripted approach (Formosa, Ryan & Staines 2016). There are no explicit 'ethical choice' mechanics in *The Road*. Morality is never mentioned or measured. Rather, through the design of the setting and interaction, it is lens through which all the players' actions are interpreted.

To take a specific example, there is a scene in season 2 of the TV series *The Walking Dead* in which one of the protagonists, Shane, betrays Otis, another member of the group (Gimple 2011). The two are on a mission to an abandoned school to retrieve some supplies when they are trapped by a horde of zombies. Wounded and desperate, they run, but they can't outpace the horde and they are almost out of ammunition for their guns. Otis empties his gun uselessly at the horde. Then in a decisive moment, Shane turns on his friend and spends his last bullet to shoot him down. The zombies pile onto the wounded man and tear him apart, allowing Shane to escape. This scene is revealed in flashbacks throughout the episode, revealing the emotional scar this choice has left on Shane, and is a powerful driving force for his character for the rest of the season.

One of my deliberate design goals was to reproduce this scene within *The Road,* without explicitly scripting it. Rather, I wanted the problem to organically arise from the systems of the game and for the 'solution' to be the player's invention, rather than presented as an explicit option. My method was to follow the principles of narrative-driven design, and consider the rules of the game being played between Shane and Otis:

Beliefs: Shane and Otis both know they are in a desperate situation. The odds of getting out alive are slim. Otis is out of ammunition for his gun and Shane has one shot left.

Desires: Both characters have a variety of conflicting desires. Each one wants to survive, and values the other survival also. It is also important that at least one of them returns to the group with the supplies, for the survival of the others. Finally, each one wants to maintain the trust of the group, which will be lost if evidence of the betrayal is made known.

Actions: Shane has three essential options: shoot the zombies, shoot Otis, or run. Otis has the same options, but spends his last ammunition shooting zombies, so can only run.

Outcomes: Firing a single bullet at the horde of zombies is ineffectual. If they run, at least one of them will probably be caught and killed, possibly both. If Shane attacks Otis, the zombies will most likely attack his fallen friend. Otis will die, giving Shane an opportunity to escape. No one else will know what happened, allowing Shane to return to the group with the supplies and keep the secret from his friends.

Conflict: Shane's desires are at odds with each other. For his own survival and that of the group, he needs to murder his friend. And he must keep it a secret from the rest of the group, to avoid being judged and cast out.

Unfortunately, due to the public nature of boardgame mechanics, it is difficult to allow one player to kill another's character and keep it a secret from the rest of the group[4]. Without a designated gamemaster, most mechanical decisions need to be resolved out in the open. In the

[4] Pooling mechanics such as those employed in *Battlestar Galactica* (Koniecza, 2008) or *Dead of Winter (Gilmour & Vega, 2014)* , are one way in which games in similar areas attempt to hide the attacker's identity.

end, there was no good way to implement the "guilty secret" element of this scene in *The Road*, but the rest of the mechanics are present:

- The zombie-calling mechanic means sometimes an easy fight suddenly escalates into an unwinnable battle, when one zombie attracts several more.
- In combat, there are options to attack the zombies or other players, or run.
- If they run, there is a chance that a player will be attacked by a zombie and have to stay in combat.
- Firearms are powerful but ammunition is a limited resource that needs to be carefully rationed.
- A dead player leaves a corpse which is likely to draw the attacks of the zombies, leaving the other players safe to run.

This specific combination of elements is not guaranteed to arise, but when it does, Shane's solution is a valid strategy open to certain players, without being telegraphed. It is up to them to invent and implement it, and deal with the consequences (including being haunted by the angry ghost of the fallen).

The elegance of systemic narrative is that players have the scope to find alternative solutions to the narrative of their own design, rather than simply choosing from a list of authored alternatives. I have seen this same scene play out but with the Shane character choosing to stand and fight while the others run, knowing that his death will allow the others to escape. A story of betrayal turns into a story of heroism. Or it becomes a story of tragedy, in which everyone stays, fights and dies.

Conclusion

In this extended discussion of *The Road,* we have illustrated the process of systemic, narrative-driven design. The moment-by-moment events of the game, consist of individual combat actions with mathematical outcomes on character's health and wealth, but the long-term patterns that arise can be recognised as narratives of trust and betrayal through the aggregation of many choices. This is achieved by manipulating the beliefs and desires of the players, bringing desires into conflict and offering a rich space of action for the players to explore.

The example reveals a strength and a weakness of the systemic narrative approach: it prioritises depth of representation over breadth. The combat and resource mechanics of *The Road* allow us to simulate social-coordination problems of depth and complexity – as long as they can be represented as combat and resource management problems. The mechanics of scripted narrative, on the other hand, commit to less systemic significance, and as a result they can be used to represent a much wider variety of situations and choices. A scripted game like *Tales of the Arabian Nights*, for example, uses simple, generic mechanics to represent sweeping narratives in large open world, at the expense of the player's inability to interact with any of them very deeply. Neither approach is necessarily better, each is suited to a certain kind of narrative experience.

There are many ways that games and storytelling can come together, from static scripts authored by the designer, to environmental narratives implicit in a world, to improvised scenes freely role-played by players (Pearce 2004). Each of these approaches offers different possibilities for sharing authorial control between designers and players. Among these alternatives, emergent narrative has often been regarded with an element of mysticism, as if it were something that cannot be designed, only serendipitously created. In this paper, we have

attempted to draw back the curtain and look at the systems behind the stories, and how they might be crafted deliberately to give us more control over the kinds of stories they tell. We propose a process of narrative-driven design, analysing stories as if they were games, then designing games that recreate those stories by manipulating players' beliefs, desires and actions. The resulting *systemic* narratives allow an artful combination of player- and designer-driven storytelling, as evidenced in *The Road*. We hope this work can be the beginning of a new poetics of narrative machines, an in-depth study of storytelling through the artful design of mechanical gameplay systems.

Bibliography

Adams, E., & Dormans, J. 2012. *Game mechanics: advanced game design*. San Francisco: New Riders.

Barthes, R. 1975. "An introduction to the structural analysis of narrative". *New Literary History*, 6(2), 237-272.

Bedau, M. A. 1997. "Weak emergence". *Noûs*, 31(s11), 375-399.

Bethesda Game Studios, 2011. *The Elders Scrolls V: Skyrim* (PC Game), Bethesda Softworks

Binmore, K. 2007. *Playing for Real: A Text on Game Theory*. Oxford: Oxford University Press.

Buchta, I. 2009. *Arma 2* [PC game], Bohemia Interactive.

Carter, M., Gibbs, M., & Wadley, G. 2013. "Death and dying in DayZ". In *Proceedings of The 9th Australasian Conference on Interactive Entertainment: Matters of Life and Death* (p. 22). ACM.

CDProjekt RED, 2015. *The Witcher 3: Wild Hunt* (PC Game), CD Projekt

Conway, J. 1970 "The Game of Life". *Scientific American*, 223(4), 4.

Costikyan, Greg, 2013 *Uncertainty in Games*, Boston: The MIT Press.

Culler, J. 2011 *Literary Theory: A Very Short Introduction, 2nd edition*, Oxford: Oxford University Press

Darabont, F. 2010. *The Walking Dead* (TV series)

Reddit. 2017. "DayZStories", Accessed Oct 2017.https://www.reddit.com/r/Dayzstoriez/

Formosa, P., Ryan, M., Staines, D. 2016. "Papers, Please and the systemic approach to engaging ethical expertise in videogames". *Ethics and Information Technology*, 18(3), 211-225

Gallela, A. J., Goldberg, E., Maroney, K., Shlasinger, Z. (2009) *Tales of the Arabian Nights*, (boardgame) Z-Man Games.

Genette, G. 1983. *Narrative discourse: An essay in method*. Cornell University Press.

Gilmour, J., Vega, I. 2014 *Dead of Winter: A Crossroads Game* (boardgame), Plaid Hat Games

Gimple, S. M. 2011. *The Walking Dead* S2E2: "Save the Last One".

Hall, D. R. 2013. *Day Z Mod* for Arma 2 (PC game), Bohemia Interactive.

Hardin, Russell (2003) The Free Rider Problem. *The Stanford Encyclopedia of Philosophy*. Accessed Sep 2017. https://plato.stanford.edu/entries/free-rider/

Hunicke, R., Leblanc, M., Zubek, R. 2004. “MDA: A formal approach to game design and game research.” in *Proceedings of the Challenges in Games AI Workshop, Nineteenth National Conference of Artificial Intelligence*, 1-5, California: The AAAI Press

Jenkins, H. (2004) *Game Design as Narrative Architecture, in First Person: New Media as Story, Performance and Game* (Wardrip-Fruin, Harrigan, Eds), 118-130 Boston:The MIT Press.

Kirkman, R 2003. *The Walking Dead* (comic book), Image Comics

Konieczka, C. 2008. *Battlestar Galactica* (boardgame), Fantasy Flight Games

Laver, M. 1997. *Playing Politics: The Nightmare Continues*, Oxford University Press

LeBlanc, M. 2006. “Tools for Creating Dramatic Game Dynamics”, in *The Game Deisgn Reader: A Rules of Play Anthology* (Salen & Zimmerman, Eds), 410-437, Boston: The MIT Press.

Louchart, S., Swartjes, I., Kriegel, M., & Aylett, R. 2008. “Purposeful authoring for emergent narrative” in *Joint International Conference on Interactive Digital Storytelling* (pp. 273-284). Berlin Heidelberg: Springer.

Paffenroth, K. 2006. *Gospel of the Living Dead: George Romero’s Visions of Hell on Earth*. Texas: Baylor University Press.

Ruch, A. & Plunkett, L. 2012. “A DayZ Kidnapping”, Accessed Sept 2017, https://storify.com/LukePlunkett/a-dayz-kidnapping

Potter, B. 1902. *The tale of Peter rabbit (Vol. 1)*. Pioneer Drama Service, Inc.

Ryan, M., Hannah, N., & Lobb, J. 2007. “The tale of Peter Rabbit: a case-study in story-sense reasoning.” in *Proceedings of the 4th Australasian conference on Interactive entertainment*. Melbourne: RMIT University.

Ryan, M. 2015. *The Road* (card game), Accessed Sept. 2018. https://www.thegamecrafter.com/games/the-road

Ryan, M., Staines, D., & Formosa, P. 2017. “Four Lenses for Designing Morally Engaging Games” *Transactions of the Digital Games Research Association* (ToDiGRA), 3(2) 143-174.

Ryan, M. L. 2009. “From narrative games to playable stories: Toward a poetics of interactive narrative”. *Storyworlds: A Journal of Narrative Studies*, 1(1), 43-59.

Schelling, T, 1971. “Dynamic Models of Segregation”. *Journal of Mathematical Sociology*, 1(2). pp 143-186.

Sicart, M. 2013. *Beyond choices: The design of ethical gameplay*. Boston: The MIT Press.

Sunshine-Hill, Ben, 2013. “Emergent Play in Game AI”. Accessed August 2018. https://www.youtube.com/watch?v=WEeKXx5Byxc

Sweetser, P. 2008 *Emergence in games*. Boston: Cengage Learning.

Teuber, K. 1995 *Catan* (a.k.a. The Settlers of Catan), Franckh-Kosmos Verlag

TV Tropes, 2019. *Chekov’s Gun*, Retrieved Mar 9, 2019 from: https://tvtropes.org/pmwiki/pmwiki.php/Main/ChekhovsGun

Walsh, R. 2001. “Fabula and fictionality in narrative theory”. *Style*, 35(4), 592-606.