The Roll of the Dice in Warhammer 40,000

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Abstract

In this article we discuss the role that the physicality of dice has in the experience of the non-digital tabletop strategy game *Warhammer 40,000*. Numerous previous approaches towards the digital augmentation of non-digital games have considered dice rolling a menial or tedious computational task to be designed away. We disagree. In this article we argue that the physicality of dice has a positive effect on players' experience and enjoyment of the game. This occurs through their tangibility, their role as a representational object (situationally, imaginatively and audibly), and through enabling shared experiences. Thus, while digital augmentation of physical games has the potential to make strong contributions to game play experiences, more careful consideration should be given to what might be lost through such efforts.

Keywords

Warhammer 40,000, tabletop, war-game, non-digital, dice, game design.

Introduction

Warhammer 40,000 (*W40K*) is the most popular tabletop war game worldwide. First released in 1986 as the sci-fi, *Dungeons and Dragons*-esque, strategy system *Rouge Trader*, *W40K* and its fictional universe have been continually developed and expanded. Much like games in the real-time strategy (RTS) genre (e.g., *Starcraft* or *Age of Empires*), *W40K* involves the tactical maneuvering of an army, composed of differently abled units, in an attempt to destroy an opposing player's army. Though the number of players of *W40K*

would be eclipsed by most digital games, and even many non-digital games (e.g, *Settlers of Catan*), the cost to play *W40K* is uniquely high; both in terms of financial cost and time cost. Each individual soldier or unit in a player's army has to be carefully assembled and painted – a process which can take several hours – and many armies necessitate hundreds of soldiers. Further, due to the material cost and detail, an individual soldier can cost almost USD$10 and some larger models are priced at over USD$100. Given the increasing 'casualisation' of games – in the sense of the reduction of barriers to entry and moving towards freemium payment models (see Juul 2009; Kultima 2009) – *W40K* is a remarkable phenomenon. Players will literally spend thousands of dollars on small figurines, paint and player manuals and devote hundreds of hours assembling and painting their models in preparation to engage in the occasional 1-2 hour tabletop battles.

Despite the pervasiveness and ubiquity of computing technologies, *W40K* has strongly resisted digitisation. Our research set out to study the attraction of *W40K* given its prominence and the enormous competition from the digital games market for the leisure time of players, seeking to find lessons for the broader study and understanding of digital games. In this article, we report results from interviews (n=36) at numerous *W40K* tournaments (large amateur competitive gaming and social events, not dissimilar to computer game LANs; see Jansz & Martens 2005) on the role that the physicality of *W40K* plays in its enjoyment and experience.

Though its physicality has many impacts, in this article we focus specifically on the role of dice in the *W40K* experience. Dice are pervasive in the tabletop and board game genres; they are an essential computational tool ubiquitous in games involving chance or luck. In *W40K*, they are used throughout the game play to determine the results of nearly all in-game actions. To date, however, there has been no focused study or consideration of the role that this omnipresent tangible tool has on the game play experience. Expanding our understanding of the role of dice has significant wider relevance in regards to recent focus on the relationships between the material and immaterial in all kinds of game play (see Apperley & Jayemane

2012). In addition to contributing to our understanding of physical play, this analysis thus also contributes to the body of work seeking to better understand the relationship between specific design choices and the holistic player experience (see Klastrup 2008).

Dice have been chosen in particular as the focus of this research because, while numerous smart phone applications are available which allow for the virtual rolling of dice (seeking to alleviate players the 'burden' of this 'arduous' form of computation), we never observed players using these applications and when questioned, their use was always denied and strongly objected against. As we are interested in the way that *W40K* has so strongly resisted digitisation, and in the context of a body of academic research preoccupied with digitising non-digital games, we felt that furthering our understanding of the impact of dice on the *W40K* experience would glean novel insight into the complex interplay and differences between physical and digital play.

Literature Review

Within modern game studies, the beginning of the 21st century is often taken as being the beginning of the discipline of game studies (Aarseth 2001). Although problematic, this view does capture the way in which the discipline has principally emerged in tandem with the rise of computer games as one of the chief entertainment mediums in the developed world. Accordingly, the interdisciplinary game studies predominantly focuses on digital game experiences, which has resulted in a dominant paradigm of "treating digital games as the standard of games" (Stenros & Waern 2011). It is worth considering how this history has impacted the development of theories and research, and in particular, what may have been overlooked. Jaakko Stenros and Annika Waern refer to this dominance of digital games in game studies as the *digital fallacy* (Stenros & Waern 2011).

While many important and frequently cited works in game studies are 'B.C' to this notion (Huizinga 1938; Caillois 1961; Suits 1978; Fine 1983), overwhelmingly non-digital games[1] as subjects of study are

nearly entirely overlooked in the modern discipline of game studies. This is despite tabletop games (encompassing board and strategy games) having had an essential, fundamental influence on the development of the modern digital game (see Crogan 2011). Stewart Woods, whose research focuses on Eurogames (a genre of board game), argues that this is "perhaps due to the inaccurate perception of the genre as a niche in decline" (Woods 2009). The economic and cultural reality of modern gaming illustrates that tabletop games in the modern era are not just an established game form that has resisted obsolescence, but one continuing to grow. Take, for example, the pervasive descriptive term 'traditional' game, implying not modern. The latest version of *W40K* was released in 2013. The widely popular Eurogame genre of board game has only emerged in the past decade. Through rhetoric like this, the study of non-digital games is often marginalised as outdated – rhetoric troublesome in modern academia. A result of this inaccurate perception is few examples of modern research which engage solely with non-digital games as artifacts worthy of study in their own regard (some exceptions being Crogan 2011; Woods 2009; 2012, Xu et. al. 2011).

Indeed, much of the research which does engage with non-digital games reinforces this implicit assumption that 'traditional' tabletop games are inferior or unequal to modern digital games. For example, previous work which has dealt with *Warhammer 40,000* specifically has focused on the digital augmentation of *W40K* battles (Hinske & Langheinrich 2008; 2009). In this research, Hinske & Langheinrich have experimented with the use of RFID chips to determine the position, and orientation, of figurines in battle. Though valuable, this research channels a tradition in modern game studies involving non-digital games, research which principally attempts to improve them through digital augmentation of the non-digital experience, without first considering their unaugmented appeal.

1. Though technically all games with dice are 'digital' games; dice are digital tool. However, in this article we use the phrase 'non-digital' to refer to games which do not involve electronic computer technologies in their play, which is its most common usage. This has been criticised as presenting problems for game studies because of the ambiguities it creates (see Björk, 2013).

For example, Peitz et. al. (2005) explores the genre of augmented board games, auspiciously taking into consideration the "possibilities and limitations put on game design by technology and the social environment in which the games are played". In their digitally augmented board game, *Augmented Kingdom*, this entails "automating the numerous additions and multiplications required to calculate score after each round"; practices they understand do "not provide interesting choices, or produce interesting experiences" (2005). Similarly, Leitner et. al. (2009) presents the implementation of an augmented tabletop game, *Comino*, arguing that it is "the logical consequence" to merge the real and virtual to create (ostensibly) better gaming experiences. Indeed, Leitner et. al. (2009) make an implicit assumption found quite frequently in academic research involving non-digital games which seemingly reduces the advantages of non-digital games to their increased capacity for social interaction, ostensibly as a result of the collocation of players (e.g., Björk et. al 2001; Magerkurth et. al. 2004; 2005; Mandryk 2002; Lundgren 2002; 2006).

A larger proportion of research is more mindful in its consideration and application of non-digital elements in gaming experiences, although still somewhat being proprietors of the digital fallacy. For example, in *Electronic Augmentation of Traditional Board Games*, Clim deBoer and Maarten Lamers (2004) explored "what value modern technology can add to the social-interactive character, the excitement and/or entertainment value, and also to the useability and flexibility of boardgames" (p. 441). They argue that "innovations should have a clear added value to the game concept and introduce new elements" (p. 442), and that "the existing physical elements of the game [should be] preserved as much as possible" (p. 442). Echoing Berland et. al. (2007) and Xu et. al. (2011), de Boer and Lamers also argued that the transparency of the rules of non-digital games is an important element of their enjoyment. So while de Boer et. al. approach 'traditional' board games with the potential of being improved by digital elements, they are attributed with some advantages over 'modern' digital games.

Similarly, in some significant depth, Sus Lundgren (2002; 2006) has explored the design possibilities for the digital augmentation of non-digital games. Like Mandryk et. al. (2002), Lundgren considers the benefits of non-digital games more broadly, expanding them to include their interactivity, mobility, flexibility and proclivity to social interaction. Meanwhile digital games are attributed with enabling more complex simulations, evolving environments, interacting and reacting parts, impartial judging, increased immersion (also see Watts 2007) and the ability to easily save the state of the game. However, the contributions of simple simulations, static environments, partial judging etcetera to the experience of digital games is left ignored. Further, Lundgren categorises the computation of in-game events (using dice or other counters) as being "tedious" (2006, p. 70) and prone to game-ruining mistakes and suggests (like Peitz et. al 2005) that game mechanics "suitable for computer augmentation are the ones that are information-related" (2006, p. 111). As we will demonstrate, we believe this to be incorrect in the case of *W40K*.

In contrast to this, Yan Xu et. al. (2011) closely examine *how* non-digital games afford social play *before* designing an augmented experience; a deep consideration and analysis missing from many of the papers discussed earlier in this literature review. Based on a series of observations of board game play sessions, Xu et. al. (2011) identify five categories of social interactions based on how the social interactions are initiated; chores, reflecting, strategising, non-game and reacting to the game itself. Of these, the categorisation of chores – interactions arising from *"bookkeeping activities"* – is worth particular note. They argue that chores "which at first appear to be merely functional" are "critical" for supporting social interaction and encouraging enjoyable experiences (p. 1). The maintenance of these physical items "(e.g., dice, tiles and score keeping tokens) direct player's attention to other's current action and status" (p. 14), and through doing so "increase player's awareness of each other, assist their communications, and help players engage with each other" (p. 14). Xu et. al. conclude that while "most of these chores can be automated using technology … this is often not the best choice when designing social interactions with digital media" (p. 1). The

turn-based structure of non-digital games (a "techno-historical limit" (Hutchison 2008) due to the limited computational abilities of players) has the effect of creating "time and space for players to synchronize with each other's game play and emotional experience, which is universally important for digital and non-digital games." (Xu et. al. 2011, p. 13). Downs et. al. have made similar findings with turn taking in co-located console gaming and levels of engagement, enjoyment and anticipation of turns (Downs, Vetere, & Howard 2013; Downs, Vetere, Howard, Loughnan & Smith 2014).

We argue that Yan Xu's approach, beginning with non-digital games and their distinct experience as worthy of study in their own right, is an important step necessary when conducting research involving the design of augmented games. This is not to discredit the research discussed so far in this literature review; it is of excellent quality and contribution. Rather, it is to suggest the possibility that elements of the game experience *may* have been overlooked. The limited number of studies which solely focus on the attraction and experience of non-digital games presents the possibility that without a firm foundational understanding of the non-digital game experience, and the role that the physicality of this experience plays in the enjoyment of the game (highlighted as being important), essential elements of the experience may be overlooked or diminished in digital augmentation. Consequently, our research attempts to fill this gap.

Along with this contribution, we also believe that concerned study of individual elements of the experience of games is a worthy focus of study in its own right. Numerous game studies scholars, such as Lisbeth Klastrup (2008), have argued that game studies should place more emphasis on analysing "particular and salient elements of game world experiences in order to better comprehend the relationship between design choices, a specific game world culture and the player's world experience" (2008, p. 144). This has been well illustrated as fruitful in the context of non-digital games (see Bakker et. al. 2007; Heijboer & van den Hoven 2008), and argued as being facilitated by the increased transparency of game mechanics (Zagal et. al. 2006). As such, in this article we narrowly focus on the impact

of one physical element of the *W40K* experience – dice – in order to understand this specific element of the game's design in more detail. Though holistic understandings of player experience are often fruitful, we felt this specific analysis was a more keen contribution to the literature, particularly due to the numerous instances in the literature where dice have been denigrated to menial or tedious task, eager for digitisation (e.g., Leitner et. al. 2009; Mandryk & Maranan 2002; Lundgren 2002; 2006; Peitz et. al. 2005).

Method

This research emerged from an ethnographic investigation of competitive *W40K* tournament play (see also, Carter, Gibbs & Harrop 2014). We followed (and played with) a small hobby group in their preparation for Australia's largest competitive *W40K* tournament – Arcanacon – and conducted over 40 semi-structured interviews prior, during and after the event. Though these tournaments are competitive, they are primarily social and leisurely activities; e.g., the core goal for most players is an enjoyable game experience rather than winning. A common phrase used to describe *W40K* tournaments is as '*festivals of the hobby*', as all dimensions of the *W40K* pastime (painting, modelling, the fiction) are involved in the event. See Carter et. al. (2014) for a thorough account of a *W40K* tournament experience and Harrop et. al. (2013) for a discussion of how players who lost tournament matches rationalised their failures into narratives of success by emphasizing their previous decisions and tournament preparation. Due to the number and variety of attendees, tournaments consequently present an excellent opportunity for investigating the player experience of *W40K*.

The majority of participants in this study were male (only two participants were female), reflecting the demographics of *W40K*. Audio recorded interviews were transcribed manually by the researchers. Informed by Glaser and Strauss' (1967) grounded theory techniques, these interview transcripts were then coded for relevant themes. These themes were used and refined in the analysis of subsequent interview responses. The themes that emerged around the

use of dice form the structure of this report having provided the basis for conceptual development.

Warhammer 40,000

Typically involving two players (though it is possible to play with more), a *W40K* battle involves the deployment of two armies (each belonging to one player) on one side of a 6' by 4' (1.82m x 1.22m) tabletop covered in 'terrain'; buildings, hills, trenches, exploded tanks, rivers and bridges around which a player must attack their opponent. Though modern play is most similar to historical and strategic wargaming, *W40k* first emerged out of the role-playing movement of the 1970's and 80's (see Carter et. al. 2014, p. 127). The objective of a *W40K* battle can vary; some involve the complete obliteration of the opponent while others involve capturing the majority of battle objectives (typically a location in the map) before the end of the battle. Each player takes turns manoeuvring and attacking with their army, and the game ends after 5-7 rounds.[2]

The size and composition of a player's army is limited by 'points'; each unit is given a points value in the rule books based on its comparative power. A weak foot soldier may only be worth 6 points, while the powerful tank it fights beside may be worth 200. Armies are typically limited to between 1000 and 2000 points. At a tournament (where a player must fight each new opponent with the same army) selected armies tend to be adequately balanced to be able to deal with potential range of compositions their opponent can bring. Each unit has a different stat-line (numerical values representing their strength, toughness, ballistic skill etc). As a result, the selection of what units to include is a complicated, in-depth tactical and strategic decision (for an in-depth discussion on this process, see Carter et. al. 2014).

We will now briefly (and simplistically), for the benefit of the reader

2. At the end of the 5th round, a dice is rolled, and on the roll of a 5 or 6, the game ends. On a 4 or below the game continues for another round, at the end of which a dice is rolled again, but this time needing higher than a 3. If a 1 or 2 is rolled, the game continues for a 7th round, at which point it must end.

who has not played *W40K*, describe a clash between two units – a squad of Ork Boyz and a troop of Space Marines – and the processes of play. Any single turn could involve half a dozen or more similar encounters, and their outcome is overwhelmingly determined by the roll of 6 sided die.

The Ork player, having completed the movement and shooting phase of their turn, declares that his squad of 19 Ork Boyz (with an Ork Nob leader) will attempt to charge his opponent's squad of Space Marines. The Space Marine player is able to declare 'Overwatch', allowing her squad to fire at the Orks as they charge. This particular Space Marine unit has 10 models; 8 Space Marines with 'Boltguns', 1 with a 'Missile Launcher' and the Sergeant who carries a Pistol and 'Chain Sword' (a powerful and iconic close-combat weapon). As the Ork figurines are within 12 inches of the Space Marines, the rapid-fire Bolters can shoot twice. To determine if this volley of shots hits any of the charging Orkz, the Space Marine player rolls 18 dice; 16 blue Boltgun shots, a red pistol shot and a white dice from the missile launcher. The use of different colored dice is a common practice by players to differentiate these different strength weapons and roll all dice at once. Overwatch shooting is under a 'snap fire rule'; gunfire quickly unloaded in the face of a charging enemy is unlikely to be accurate, so shots are only considered to have hit if the dice rolls a 6. She rolls, and picks out the dice showing less than a 6; only 2 remain. These two dice are picked up and re-rolled to determine if these two shots that hit 'wound' the Orkz, a calculation contingent on the strength of the Boltgun (4) and the toughness of the Orkz (4) – a result of 4 or more ('4+') is required. Luckily, both shots wound the Orkz, and the dice are passed to the Ork player who rolls a 'save throw', needing a 6+ to 'save' the unit. Both fail and two Ork Boyz are removed from the table to indicate their demise.

Figure 1: A Warhammer 40,000 battle underway.

The remaining 17 Boyz and Ork Nob continue to charge at the unit of Space Marines, depicted by the models being put into 'base contact' with the Space Marine squad (i.e., with their bases touching, see Figure 1). The assault phase proceeds in accordance with the 'initiative stats'; the higher a unit's initiative, the quicker they can strike in close combat. In this example, the Space Marines have an initiative of 4, the Boyz 2 and the Ork Nob 1, thus the Space Marines attack first. Each Marine has 1 close combat attack, while the Sergeant has 3. The Marines' player correspondingly selects 9 blue dice and 3 black dice, and calculates they need a 4+ to hit the Orkz. Again, the marine player picks out all the rolled dice showing a 1, 2 or 3 and discards them. This leaves 6 blue dice; 6 Marines hit the Orkz but the Sergeant missed all 3 of his hits. Once again needing 4+ in order to wound, these 6 dice are rolled again, with 4 wounds caused on the Ork Boyz, only one of which the Ork player successfully saves against; 3 more Orkz are removed from the table.

The surviving 15 Ork Boyz strike; they have 3 close combat attacks each and an additional attack as a result of charging; 60 dice are collected and rolled at once, covering a large section of the table in dice. Similar to the Marines, his Orkz need 4+ to hit, and after picking out all the 1s, 2s and 3s, approximately 3 dozen remain. Due

to the higher toughness of the Marines, a 5+ is needed to wound; the successful dice from the previous round are scooped up and rolled again, with failures once again discarded and successes collected and passed to the Space Marine player, who now needs to roll 13 save throws to determine how many Space Marines survive the brutal assault..

In this example of 15 Ork Boyz striking at the hardy Space Marines, 60 dice are required to determine the outcome of the first round of this combat. 60 dice is *a lot* of dice; approximately enough to fill two cupped hands (see Figure 2). Oftentimes, an in-game action can require over 100 dice be rolled all at once. Each time a unit engages an enemy unit, these dice have to be rolled up to three times (to find out if the shots hit, if they wound and if they are saved). This 'arduous' process takes up a significant portion of the time a player spends playing *W40K*. Finding space on which to roll these dice can also be frustrating; stray dice may knock over models or be lost underfoot. At the peak of engagement, where each turn may involve the rolling of literally hundreds of dice, this 'laborious' computational process can slow down the game. Further, humans are fallible (and sometimes dishonest); often making mistakes in counting dice (potentially on purpose) that have huge impact on the outcome of actions. Consequently, numerous Smartphone applications and computer programs exist tasked with removing this roadblock to an enjoyable experience. However, in our ethnography of *W40K* tournaments and in our collective years of playing we have *never* met a player who actively used these applications. Why?

We argue that the physicality of these dice play an important, enhancing role in the experience of *W40K*. In the following section we will tease out the multiplicity of ways that dice, as physical tools, impact the play experience in manners that a virtual application could not satisfactorily mimic. In the subsequent section, on the basis of this discussion, we will argue that this exemplifies how focused study of individual elements of games are necessary for better comprehending the relationship between design choices and the player's experience,

an understanding which makes essential contributions to further research on the future relationships between physical and digital play.

Results

Driven by interviews and participant observations, we have identified three key ways in which dice impact the player experience of *W40K* players; through their tangibility, their role as a representational object, and through enabling shared experiences. We further explicate their role as a representational object into situational representation, imaginative representation and audible representation. We now present these results, combining interview quotes with our observations of common player practices to illustrate their importance.

Tangibility

Recall again the Ork Boyz and their flurry of attacks against the Space Marine troops. To resolve these 60 attacks, 60 dice are used *at once*. The sheer volume of 60 dice replicates the volume of attacks in a meaningful, tangible and relatable way, and the player's clumsy interaction with this overflowing handful of dice reinforces perceptions of the power of a particular action in the game. The Space Marine player turned to using specific colors for each shot of different strength in order to also be able to roll all dice at once. This common (nearly universal in our sample) practice ensures this tangibility is still present in the experience, despite it potentially being easier to roll dice separately. If the players were to replace this dice rolling with a Smartphone application the meaningful feedback given through the tangibility of this computational tool would be lost.

A typical unit in a race like the Orkz (which deploy hundreds of weaker troops) may have 3 attacks per turn in close combat, an additional attack if they charged and the units can be up to 30 Boyz. It is therefore typical to have a single attack involving the roll of over 100 dice. One interview participant whose Ork armies featured many of this type of unit said,

It's just ridiculous how much dice you can roll. Like if I can hit with a full squad of boys and they get all their attacks, I think it's upwards of 100 dice or die or whatever it is. So to me that's a lot of fun.

Figure 2: A handful of approximately 50 dice.

For this participant, the comically large volume of attacks (though they are weaker) is also a source of amusement and enjoyment; something translated and made real through the tangibility of the dice.

Representational

As outlined in the literature review, dice are often considered simple computational tools. However, we noted several ways in which they became representational objects and subsequently impacted the experience in ways difficult to recreate through a smartphone dice rolling application.

Imaginative Representation

An impact of dice in *W40K* emerges through a common 'best practice' by *W40K* players employed when counting the results of their actions. The rule book from the 'Assault on Black Reach' (AoBR), a boxed game that acts as a starter kit for many players, makes the following suggestion in the face of the computational complexities of the game:

Speed rolling

> You'll soon get used to the system of rolling to hit, wound
> and to save. We find it quickest to pick up the dice that
> rolled a successful result at each stage and roll them again.
> (Games Workshop 2009, p. 19).

Through employing this practice, each dice that is rolled to 'wound'
was also a dice which had successfully rolled a 'hit'. The 'best
practice' we observed in most instances of tournament play was
slightly different to that recommended by the AoBR rule book.
Typically, the player would pick out the unsuccessful dice, (i.e.,
those with 1 or 2 facing on a 3+ roll) rather than picking out the
successful dice. Those dice which had been unsuccessful would then
be cast aside, and the dice remaining (those that hit) rolled again to
find out if they wounded the Space Marines. One of the advantages
of this practice is that it gives both players the opportunity to see
the dice, however one participant explained that by picking out the
unsuccessful dice, "*if you were to be making a mistake, then you
would have taken away an attack of yours, not giving yourself an
extra attack, so that's a fairer way of doing it*".

While players can never be as accurate as a computer application,
this exemplifies the ways that players have developed strategies to
minimise the potential impact of human fallibilities. Many
competitive tournaments also allow players to score each other on
'sportmanship' and being able to audit the actions of an opponent is
one part of this. Participant Kyle, noted good dice practices as being
important when asked about sportsmanship scoring:

> *Yeah, you know, were they friendly? Did they introduce
> themselves? Did they talk me through their* [army] *list? Did
> they let me know things? You know. Did they let me look at
> dice before they removed them, those sorts of things. Did I
> have fun? All those sorts of things*

What both of these practices ensure is that a significant, physical

association between the fictional actions of the attack and the physical dice is developed. The same dice that 'hits' is re-rolled to 'wound'; these dice do not simply replicate the complex statistical capacity of machines, but each dice becomes imagined as a physical representation of the fictional action it seeks to resolve; each dice represents a bullet, and the result of the roll represents that bullet's performance. The bullets which miss are discarded, and those which hit are re-rolled to determine if they wound. Those that wound are then again pulled from the field, and those same dice are handed to the Space Marine player,[3] who rolls the physical dice which both hit and wounded, attempting to see if his units successfully shrug off the attack that has been represented by that dice through each round of dice rolling.

Andrew Hutchison has introduced to game studies the notion of techno-historic limits; "the technical limits at the time of a game's production" (2008). He argues that these limitations have enormous impact on the aesthetic and consequent experience of digital games. If we extend the concept of techno-historical limits to not just the technological limits present at the time of production, but also the limits of the game medium,[4] these 'best practices' identified can be understood as emergent responses to a techno-medium limit of the tabletop genre. It is through this emergent response that dice rolling becomes more meaningful; through being a physical representation of an in-game action, the fictional undertaking are embodied in our own realm, which enhances the player experience. In addition to making more meaningful the tangibility of dice overviewed earlier,

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3. At the end of the 5th round, a dice is rolled, and on the roll of a 5 or 6, the game ends. On a 4 or below the game continues for another round, at the end of which a dice is rolled again, but this time needing higher than a 3. If a 1 or 2 is rolled, the game continues for a 7th round, at which point it must end.

4. As the latest edition of W40k was released in 2013, it would not be fair to say that the limitations of dice rolling are something present at the time of production. Thus, an extension to Hutchison's original definition (2008) is required. However, it can be understood as a techno-historical limit of the first edition of W40k which supports Hutchison's original argument regarding the impact that techno-historical limits can have on subsequent games un-restricted by those same limitations.

this facilitates player imaginations of the fictional conflict. This reiterates how the dice are more than just a computational tool, but physical representations integral to the play experience.

Situational Representation

In observing players, we also noted another practice that suggests the existence of a meaningful relationship between player and die, which was player's preferred surface upon which to roll their dice. Again, 60 dice is *a lot* of dice, and when rolled they take up a large surface area. However, rather than rolling in a contained box next to the tabletop, dice are almost *always* rolled on the tabletop itself, in flat areas as clear of troops as possible. This despite suggestions from the rule book, which states;

> *Of course, if your gaming surface is very textured and results in a lot of cocked dice (or simply if you prefer a tidy battlefield) you can make all your rolls in a tray or box lid.* (Games Workshop 2009, p. 19).

When pressed *why* they always rolled on the tabletop, an interview participant simply said "*it'd have to be a very special circumstance where there wasn't space on the table to roll that many dice*"; it wasn't conceivable to this player that dice would be rolled away from 'the action', as it were. This is despite us observing numerous occasions where stray dice were missed, or hit and moved the static figurines further disrupting play.

What further indicates the existence of a meaningful representational relationship between player and die, however, is *where* on the tabletop they choose to roll. Regulated by the practicality of doing so, if a unit was shooting at another unit, the players would almost certainly roll those dice *between* two units; the dice would fill the gulf between units like the fictional volley of shots would. As noted, this practice can have its causalities; stray dice frequently knock over the units they are being intentionally rolled near. However, this physical reality is often playfully re-appropriated – players will often

remove those models ('real' casualties of the dice) before removing any others, after all, they were actually hit!

Players act similarly when their units are in close combat; one participant stated, "*I try generally to roll as close to the combat as I can if there is space.*" Note in Figure 1 the proximity of the dice to the units engaged in close combat. However, they did not articulate this (as can be expected) as being due to a meaningful relationship between in-game attacks and the dice, but due to the practicality of rolling the dice as near as possible to the action,

> *Because that way, it's kind of, your results are right next to the battle and it makes it a lot clearer both to me and the opponent, uhm, so you can see what's happened. And the same thing goes whenever you roll movement for a character. I always try and do it as close to the character as I can just for a matter of clarity just in case you do get distracted by something else in the room and it's there next to your characters and you're aware what's going on.*

So, similar to the practice of 'counting' successful rolls, players' emergent strategies in their dice rolling – to minimize the impact of human fallibilities – reinforce the way in which dice become tangible representations of in-game actions in a fashion difficult to mimic with a computer application.

Audible Representation

A participant in our interviews also drew our attention to something we had initially overlooked; the noise that a large number of dice create when rolled at once. One of the central squads in this participant's army could potentially have close to 100 attacks when they charge into an enemy unit in close combat. To this participant, the rolling of this many dice creates a cacophony of clattering sounds which mimic the "*clash*" of two units meeting for close combat. The audible difference between this roll and the roll of say, 2-3 shots from an elite sniper unit, similarly makes real and perceptible the

fictional undertakings. This is also an element of the game experience lost if using a smartphone application. In our ethnographic study of *W40K* tournaments, we also felt that the way in which the background noise of chatting and laughter in tournament halls was permeated by the sound of dice rolls was an important immersive element of the tournament, indicating the carnage going on around each player.

Shared Experiences

Were it not for some meaningful physicality of the practice, players might simplify this computation. Rather than having to collect and count out 100 dice (it can take some time), a player could roll 50 dice twice, or extrapolate based on the statistics of large dice rolls (for example, 10 die, representing 10 attacks each). Emphasizing how it would be inaccurate to characterize dice rolls as arduous or simply computational, we never observed a player doing this.

We suspect that one of the reasons for this is that player's participation in the computation as a shared experience was also important. The following quote from an interview captures this sentiment well,

> Interviewer: There are a lot of apps for resolving dice rolls. Do ever use one of those?
>
> Participant: *No. I like to roll the dice. I think it's fun. For me.*
>
> Interviewer: What makes it fun for you?
>
> Participant: *Oh I don't know! like I guess, just to be told a number and then you're like, oh okay, … so for me actually rolling the dice, actually doing the math, and counting out the ones (not really that much math) but you know just actually looking and… that's a big part of what came to be the game for me like as much as it is moving my models around and thinking tactically it's also, you know, about rolling the dice and see what happens. It's a bit of an*

experience between the two of youse because you're both looking over, seeing what the dice rolled, working out what it meant, constantly adjusting your strategy but if it's just kind of like this, you press a button and 'oh that's the number' and you're kind of like, aww, okay.

So while rolling of large numbers of dice could be conceived as being arduous or time-consuming, for the majority of players whom we spoke with reiterated this sentiment; by involving players in the computational process, the experience becomes more meaningful both socially and tactically. Dice are rolled together, in that one player watches while the other does their rolling. Consequently, dice enable *shared experiences* as players work together to determine the results of game events. This is similar to Xu et. al.'s (2011) finding that the turn-based structure of non-digital games allows players to synchronize with each other's game play and emotional experiences (p. 13). Often these shared experiences can be humorous, particularly when a player rolls a hilariously unsuccessful turn.

This hesitance towards changing the dice rolling in *W40K* even extended to the use of physical dice rolling contraptions, which help manage large numbers of dice. One participant explained;

Participant: *I'd never use a machine because that's half the fun, you do it yourself. But sometimes I am tempted to build myself a dice tower. Just to help so you don't have to actually roll a lot of dice.*

Interviewer: A what?

Participant: *Dice tower. It's like this towery shape which has got several slants in it and you put the dice in and it just bounces it and it helps with a lot of dice.*

Interviewer: To make sure they don't go everywhere?

Participant: *Yeah. But never really* [got around to] *making a model myself because it takes too much of the personality*

out of it. Which I find is a lot about Warhammer. It's personality, it's doing it yourself with your opponent.

We will note that the non-digitised status of *W40K* is an element of its attraction to some players, thus the resistance to digital applications is not entirely associated with what is removed, but also a resistance to what is added. However, this participant's resistance to a physical change to the dice rolling experience is indicative of a relationship that goes beyond any default resistance to computing technologies by players.

Discussion and Conclusion

In the literature review, we established that dice are frequently understood as mere computational tools and an ideal element of the game's design which should be digitally augmented. We contextualized this within game studies recent critical turn against the dominance of the digital in research, suggesting that, like the "digital fallacy" (Stenros & Waern, 2011), there was a *digital augmentation fallacy* predominant in many investigations of the intersections between physical and digital play.

Based upon interviews of players of the non-digital tabletop strategic war game *Warhammer 40,000*, and observations of play in tournament and non-tournament sessions, we identified a number of ways in which the physicality of dice played an important role in the experience. The physicality of the loudness and chaoticness of rolling large numbers of dice simulates the chaos of war in a tangible way, an effect pronounced by the tangibility of the dice, the imagined representation of dice as being embodiments of fictional undertakings and the situational representation of dice as occurring next to these events. As a physical tool, they do this in a fashion difficult to emulate with a virtual application. Thus, similar to Bakker et. al. (2007) and Heijboer et. al.'s (2008) studies, the extent to which players are able to enhance their own experience by creating imaginative

emotional links with symbolic (rather than iconic) pieces should not be underestimated.

This article also contributes to our previous work (Carter et. al. 2012; Carter et. al. 2014; Harrop et. al. 2013) on the multitude of factors involved in the development of *W40K* army lists. The fashion in which many dice enhance, rather than diminish, the player experience provides players an additional resource for choosing what units to deploy in their army; those which receive as many dice as possible.

This perspective is distinct from approaches articulated elsewhere (e.g., Mandryk and Maranan 2002; Lundgren 2002; 2006; Peitz 2005), in which dice rolling is assumed to be a tedious process, eager for simplification and digitisation. Like Bergström et. al. (2010), we believe there are physical aspects of dice that are worthwhile and aught be retained when digitising. It is worth noting this is contradictory to the findings of de Boer & Lamers (2004) who implemented a digital dice version when testing an augmented version of *Settlers of Catan*. They found that suggesting this points towards the transparency of dice, but potentially also a minor role that the physicality of dice has on the *Settlers of Catan* experience. Consequently, we warn that the observations made within this article may not be generalisable to other non-digital games. This could both be because of the slightly more conceptual level of dice-events in *Catan* but also due to the small but consistent number of dice rolled each turn.

Our findings demonstrate that understanding the appeal of unaugmented non-digital games is an important step that game studies projects must take before being able to conservatively and rigorously explore the potential benefits of digitising board games. It is not the case that these results indicate that *W40K* should not be digitised, just that any digital augmentation should consider the broader impacts that dice have on the game play experience, and seek to retain them in some fashion. We would speculate that this could primitively be accomplished through recreated the sound of many (or few) dice rolling, or developing strategies to continue to enable

the shared experience of computation. More complex augmentation could even project events onto the tabletop to embody the representational effects of dice. However, even in these scenarios, the tangibility that dice brings to *W40K* would be removed, thus demonstrating how considerations about what non-digital games bring to the experience of play (beyond their facilitation of social interaction) should be considered in more depth. It may be the case that digitisation should be avoided all together. We do, however, acknowledge the possibility that due to the misconceptions outlined in this article, it is often easier to get funding for technology development work, which may have played a role in the dominance of augmentation studies.

We also believe that further research is warranted investigating the appeal of dice use in other non-digital games. In addition to the emergent practices that we have identified in this article, we also noted a broader range of rituals and superstitions that surround dice us in *W40K*, as well as precautions against cheating and the ownership of particular kinds of dice as way gamer identity was performed. As a central tool in non-digital game design, we argue that concerned study of these rituals and superstitions and the impact that they have on the experience of non-digital games may provide further insight into the role of dice and other tangible game tools have in the experience of physical games.

Bibliography

Aarseth, E. "Computer Games Studies, Year One." *Game Studies* 1, no. 1, 2001.

Apperley, T. H. and D. Jayemane. "Game Studies' Material Turn." *Westminster Papers in Communication and Culture* 9, no. 1, 2012: 27-46.

Bakker, S., D. Vorstenbosch, E. van den Hoven, G. Hollemans and T. Bergman. "Tangible Interaction in Tabletop Games: Studying Iconic and Symbolic Play Pieces". In *Proceedings of the International*

Conference on Advances in Computer Entertainment Technology, 163-170, Salzburg, Austria, 2007.

Bergström, K. "Undercurrents: A Computer-Based Gameplay Tool to Support Tabletop Roleplaying." In *Proceedings of DiGRA Nordic 2010*, Stockholm, Sweden, 2010. http://www.digra.org/wp-content/uploads/digital-library/10343.50118.pdf

Berland, M. "Understanding Strategic Boardgames as Computation Thinking Training Machines." In *Tabletop*. Eds. G. Costikyan and D. Davidson. ETC Press, 167-173, 2011.

Björk, S., J. Falk, R. Hansson and P. Ljungstrand. "Pirates! – Using the Physical World as a Game Board." In *Proceedings of the IFIP TC.13 Conference on Human Computer Interaction – Interact*, 423-430, Toyko, Japan, 2001.

Björk, S. "On the Foundations of Digital Games." In *Proceedings of the 8th International Conference on the Foundations of Digital Games*, 1-8, Chania, Greece, 2013. http://www.fdg2013.org/program/papers/paper01_bjork.pdf

Caillois, R. *Man, Play and Games*. Chicago: University of Illinois Press, 1961.

Carter, M., M. Gibbs, and M. Harrop. "Metagames, Paragames and Orthogames: a new Vocabulary." In *Proceedings of the 7th International Conference on the Foundations of Digital Games*. 11-17, Raleigh, USA, 2012.

Carter, M., M. Gibbs and M. Harrop. "Drafting an Army: The Playful Pastime of *Warhammer 40,000.*" *Games and Culture* 9, no. 2, 2014: 122-147.

Crogan, P. *Gameplay Mode: War, Simulation and Technoculture*. Minneapolis: University of Minnesota Press.

de Boer, C., and M. Lamers. "Electronic Augmentation of Traditional

Board Games." In *Proceedings of the 3rd International Conference Entertainment Computing*, 441-444, Cambridge, UK, 2004.

Downs, J., F. Vetere and S. Howard "Paraplay: Exploring Playfulness around Physical Console Gaming." In *Proceedings of INTERACT 2013* 682–699. Presented at *the 14th IFIP TC13 Conference on Human-Computer Interaction*, Cape Town, South Africa, 2013.

Downs, J., F. Vetere, F., S. Howard, S. Loughnan and W. Smith "Audience Experience in Physical Videogaming." In *Proceedings* of *CHI Conference on Human Factors in Computing Systems*, Toronto, Canada, 2014.

Fine, G. A. *Shared Fantasy: Role-Playing Games as Social Worlds*. Chicago: The University of Chicago Press, 1983.

Games Workshop. *Assault on Black Reach.* Nottingham: Games Workshop Ltd. 2008.

Harrop, M., Gibbs, M. & Carter, M. "Everyone's a Winner at Warhammer 40K (or, at least not a loser)." In *Proceedings of DiGRA 2013*, Atlanta, USA, 2013. http://www.digra.org/wp-content/uploads/digital-library/paper_169.pdf

Heijboer, M. and E. van den Hoven. "Keeping up Appearances: Interpretation of Tangible Artifact Design." In *Proceedings of the 5th Nordic conference on Human-computer interaction: Building Bridges*, 162-171, Lund, Sweden, 2008.

Hinske, S. and M. Langheinrich. "Using a Movable RFID Antenna to Automatically Determine the Position and Orientation of Objects on a Tabletop." In *Proceedings of the 3rd European Conference on Smart Sensing and Context*, 14-26, Zurich, Switzerland, 2008.

Hinske, S. and M. Langheinrich. "W41K: Digitally Augmenting Traditional Game Environments." In *Proceedings of the 3rd International Conference on Tangible and Embedded Interaction*, 99-106, Cambridge, UK, 2009.

Huizinga, J. *Homo Ludens: A Study of the Play Element in Culture*. Boston: Beacon Press, 1955. Original publication 1938.

Hutchison, A. "Making the Water Move: Techno-historic Limits in the Game Aesthetics of Myst and Doom." *Game Studies* 8, no. 1, 2008.

Jansz, J. and L. Martens. "Gaming at a LAN Event: the Social Context of Playing Video Games," *New Media & Society*, 7, no. 3, 2005: 333-335.

Juul, J. *A Casual Revolution: Reinventing Video Games and Their Players*. Cambridge, Mass: MIT Press, 2009.

Klastrup, L. "What makes World of Warcraft a World? A note on Death and Dying." In *Digital Culture, Play and Identity: A World of Warcraft Reader*. Edited by H. G. Corneliussen and J. W. Rettberg, pp. 146-166. Cambridge, Mass.: MIT Press, 2008.

Kultima, A. "Casual Game Design Values." In *Proceedings of the 13th International MindTrek Conference: Everyday Life in the Ubiquitous Era*, 58-65, Tampere, Finland, 2009.

Leitner, J., C. Köffel and M. Haller. "Bridging the Gap between Real and Virtual Objects for Tabletop Games." *International Journal of Virtual Reality* 7, no. 3, 2009: 1-5.

Magerkurth, C., T. Engelke and M. Memisoglu. "Augmenting the Virtual Domain with Physical and Social Elements: Towards a Paradigm Shift in Computer Entertainment Technology." In *Proceedings of the International Conference on Advances in Computer Entertainment Technology*, 163-172, Singapore, 2004.

Magerkurth, C., A. Cheok, R. Mandryk and T. Nilsen. "Pervasive Games: Bringing Computer Entertainment Back into the Real World." *Computers in Entertainment* 3, no. 3, 2005: 1-19.

Mandryk, R. and D. Maranan. "False Prophets: Exploring Hybrid

Board/Video Games." In *CHI '02 Extended Abstracts on Human Factors in Computing Systems, 640-641, Minneapolis, USA, 2002.*

Mazalek, A., B. Mironer, E. O'Rear and D. van Devender. "The TViews Table Role-Playing Game." Journal of Virtual Reality and Broadcasting 5, no. 8, 2008.

Lundgren, S. Joining Bits and Pieces – How to make Entirely New Borad Games using Embedded Computer Technology. Master's Thesis: IT University of Gothenburg, 2002.

Lundgren, S. *Facets of Fun: On the Design of Computer Augmented Entertainment Artifacts*. PhD Dissertation: IT University of Gothenburg, 2006.

Peitz, J., D. Eriksson and S. Björk. "Augmented Board Games: Enhancing Board Games with Electronics." In *Proceedings of DiGRA 2005*, 223-241, Vancouver, Canada. http://www.digra.org/wp-content/uploads/digital-library/06278.47142.pdf.

Stenros, J. and A. Waern. "Games as Activity: Correcting the Digital Fallacy." In *Videogame Studies: Concepts, Cultures and Communication*, edited by M. Evans, pp. 11-22. Oxford: Interdisciplinary Press, 2011.

Suits, B. *The Grasshopper: Games, Life and Utopia*. Ontario: Broadview Press Ltd, 1978.

Watts, C. and E. Sharlin. "Save 'Em: Physical Gameplay Using Augmented Reality Techniques." In *Proceedings of the 2007 Conference on Future Play*, 160-165, Toronto, Canada, 2007.

Woods, S. "Last Man Standing: Risk and Elimination in Social Game Play." *LeonardoElectronic Almanac: Special Issue from perthDAC* 16, no. 2-3, 2009: 1-14.

Woods, S. *Eurogames: The Design, Culture and Play of Modern European Board Games*. London: McFarland & Company, Inc, 2012.

Xu, Y., E. Barba, I. Radu, M. Gandy and B. MacIntyre. "Chores are Fun: Understanding Social Play in Board Games for Digital Tabletop Game Design." In *Proceedings of DiGRA 2011*, Utrecht, The Netherlands. http://www.digra.org/wp-content/uploads/digital-library/11307.16031.pdf.

Zagal, J. P., J. Rick and I. His. "Collaborative Games: Lessons Learned from Board Games." *Simulation and Gaming* 27, no. 1, 2006: 24-40.