

# Pie-Eyed: Adapting MtG Elements to Create a New Card Game Called Dogs of War

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## Abstract

Contemporary serious game development remains largely improvised and haphazard. Many hindering aspects are to blame for this, including: project scope, available resources, stakeholder makeup, subject expert consultation(s), etc. Most significantly for this paper, however, game designers typically struggle to imbue philosophical depth into their projects. The popular trading card game “Magic: The Gathering” (Wizards of the Coast, Hasbro) offers remedies to this issue in the form of a central nucleus: the colour pie. The purpose of this research was to investigate the merits of the game design of MTG and to adapt it for our own use in a new card game. A similar framework has been devised for a history-for-education trading card game currently in development called “Dogs of War” (DoW). The research has up until this point only focused on designing DoW, but once the game is complete, a research project will be conducted to study its efficacy. This research reports on the extent to which tangible results (mechanically, and otherwise) can be accrued by formulating and implementing such a philosophical design foundation. Results include giving examples of Dogs of War and how it was adapted from MTG.

## Keywords

Trading Card Game, Magic the Gathering, Game Design, Dogs of War, Player Type, Balancing, Randomness, Gamification

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## 1. Introduction

*Dogs of War* (DoW), the game that this article wishes to report on, is directly inspired by Magic: The Gathering (MTG). Collectible Card Games (CCG), also called Trading Card Games (TCG), are games played with specially designed sets of cards. The modern concept of CCG was first presented in “Magic: The Ga-

thering”, designed by Richard Garfield and published by Wizards of the Coast in 1993 (Garfield, 2013). MTG is possibly the most complex game ever devised. From intricate rules to multifaceted turn order, the popular trading card game (TCG) has garnered attention from game players, designers and researchers since its launch in the early nineties.

One of the most intriguing aspects of the card game is its underlying philosophical and mechanical framework: the colour pie. Five distinct factions (White, Black, Blue, Red and Green) are playable and constitute this system. Each colour represents a slice of this pie and functions as the core of the game itself; driving mechanics, setting boundaries, governing playstyles and defining game features in the process. This system can therefore be described as axiomatic and is so essential that the TCG would not operate without it.

Each game of MTG is stochastic, in that it is difficult to predict and has a random probability distribution (Churchill et al., 2019). Players typically play with predetermined [pre-constructed], physical decks of cards and take turns playing “spells” (cards) in a fantasy duel with other players. The attributes and goal of the game, however, are established by one of many game formats (i.e. constructed, limited or online). Furthermore, these formats are characterised by a range of play variants (i.e. standard, modern, commander, etc.). The ways to play MTG thus echo the vast assortment of cards (20,000+) in existence.

Ominously, the variability of a single game (namely, MTG) mirrors the work of serious game designers (Braad et al., 2016). Stakeholders in this realm devise experiences which intend to do more than merely entertain (Laamarti et al., 2014); often with small budgets and smaller human capital (Sawyer & Smith, 2008). In planning the design for this new game, it was important to consult inspirational games like MTG to see if some or all of the elements we would like to adapt would be suitable for our context.

Magic’s influence extends beyond its present popularity and stature in the cultural zeitgeist. Accordingly, Magic is widely accepted in popular culture and other media. Magic Online (MTGO) offers PC players a nearly 1:1 replica of the paper collectable card game (CCG; or trading card game, TCG), while Magic: Duels of the Planeswalkers and Duels games are playable on Kindle, iPad, Android smartphones, Xbox360, Xbox One, PS3, and PS4 (Crutcher, 2017). As of September 2018, Magic Arena launched on PC and expanded to both Android and iOS devices to a large and thriving player base. Cosplayers assume the role of their favourite Magic planeswalkers at conventions around the globe, while Wizards of the Coast produces limited-edition cards in the form of Secret Lair drops. Magic, moreover, is played all over the world, with cards produced in English, Japanese, Chinese, Russian, Korean, Portuguese, Italian, and Spanish. In the Magic universe, Wizards of the Coast produces print and online books, comics, and other literature. Funko Pop! also sells Magic toys and action figures. Magic players, for example, can participate in local, regional, national, and worldwide competitions with prizes and monetary rewards. Magic may, furthermore, be blamed for the invention and success of succeeding CCGs, in terms

of game design and mechanics (Crutcher, 2017). The Pokémon Company's "Pokémon" and Konami's "Yu-Gi-Oh!" are two of the most popular CCGs, although there are additional CCGs based on DC, Marvel, World of Warcraft, Star Wars, and The Lord of the Rings. Both Blizzard's World of Warcraft-based "Hearthstone" and CD Projekt Red's "Gwent", based on its Witcher video games, have received critical praise—and both are available as digital CCGs (Crutcher, 2017).

Magic necessitates frequent decision-making and analysis (Alvin et al., 2021). Players are constantly confronted with a variety of critical decisions, such as which cards to include in a given deck (from a selection of options in certain formats) and/or whether to mulligan at the onset of a match. Such strategic choices lead to the wellspring of potential the game has for research; as well as for teaching and learning as a whole. Studies exploring intelligent systems such as Alvin et al.'s (2021) attacking/blocking algorithm, Zilio et al.'s (2018) neural network analysis, Dodge's (2018) literacy examination, and Pawlicki et al.'s (2014) economic investigation of Magic's game pieces all showcase the wide reach of the game and the breadth of possibilities it affords academic inquiry and game design procedures. The colour pie, as the focus of this paper, is but one facet of this content-rich game.

No previous literature could be found which specifically looked at the adaptation of Magic the Gathering game elements in order to make a new card game. Therefore, the authors wish to make a contribution in this regard.

Therefore, this research sought to answer the following research question:

How can the game elements of Magic the Gathering be adapted in order to create a new card game, called Dogs of War?

However, it is also important to understand the theoretical foundation upon which this research is framed in. To that end, a literature review was conducted to examine the most recent trends in serious game/game science design.

## 2. Literature Review

### The Role of Games for Educational Purposes

It's a difficult task to prove that games and other forms of interactive learning are effective. It's important to keep this in the perspective of how we learn (De Freitas, 2018). Consequently, it's important to investigate how game science relates to other disciplines. Because of its digital character, the concept of "game science" is generally put inside the subdiscipline of Technology-Enhanced Learning when evaluated from this educational viewpoint (TEL). However there is a lot of important work to be found in a variety of different areas, such as: human-computer interaction (e.g., Barr et al., 2007; Papastergiou, 2009; Bergeron, 2008), health education and research (e.g., Papastergiou, 2009), neuroscience research (e.g., Kühn et al., 2011; Colzato et al., 2013; Lewis-Evans, 2013), and across other literatures such as business and management (e.g., Pasin & Giroux, 2011; Hartevelde et al., 2007), school education (e.g., Hainey et al., 2016),

and advertising and marketing (e.g., [Chen et al., 2008](#)).

There has been an increase in the amount of research in the field of “game science,” or “serious games” as evidenced by the results of several studies that were scrutinized ([De Freitas, 2018](#)). More solid conclusions from quantitative randomised controlled trials and more data-driven longitudinal research give us more robust findings to construct and improve the design of learning experiences, integrating gamification and game-based components and increasing student achievement ([Alvarez-Rodríguez et al., 2014](#)). Using both qualitative and quantitative measurements together is critical, as we discovered during the literature review (e.g., [Kato et al., 2008](#)).

The field of game science is rapidly expanding and redefining the breadth and research concerns that overlap with learning effectiveness and design, bridging multiple academic boundaries ([Alvarez-Rodríguez et al., 2014](#)). Subfields of education technology, such as simulations, serious games, and gamification may have a bright future together ([De Freitas, 2018](#)). Two issues of interdisciplinarity and methodology will be critical in establishing lines of the discipline: randomized controls, meta-analyses and large dataset analyses will be integrated with qualitative methods like content analyses, case studies, and ethnographies, and with other approaches like neurological studies and social network analyses to provide a level of detail that supports better learning design and an understanding of how people interact with each other.

Research shows that games can be a powerful tool for learning, and the findings are overwhelming. Researchers have found that game-based learning is more effective than traditional methods, and this is bolstered by blended approaches that combine game play with in-person instruction. Educators now face the problem of figuring out the best methods to use game-based approaches in their classrooms, according to the promising results of RCTs ([Alvarez-Rodríguez et al., 2014](#)). Gamification has been shown to increase student motivation, however more active design studies must be conducted to guarantee that the well being of learners are fulfilled in a wide range of circumstances. For example, it will be fascinating to watch whether the principles learned from instructional games can be incorporated into everyday practice ([De Freitas, 2018](#)).

One issue having the literature being dispersed is that not all scholars understand the breadth of the topic and variety of applications, and so overlook crucial academic contributions by focusing too exclusively at the literature-base. The situation is exacerbated by rifts between US and European research in serious games and between simulation and games literature, and often one could see researchers will simply disregard critical papers from one “side” of the Atlantic or the other leading to misconceptions and partial starting points ([De Freitas, 2018](#)). Despite a number of unique concerns on games bridging numerous areas, the continuance of fragmentation of the field has yet again occurred with the separation amongst academics in serious games and the emerging domain of “gamification”. Gamification here is used to denote the use of components of game-mechanics and/or

game-design processes (Alvarez-Rodríguez et al., 2014).

While it is undeniably difficult for educational institutions, legislators and professionals, progress in quality and overcoming difficulties of privacy and design may be expected as more evidence is gathered over time. Online learning has been met with some skepticism, but it is only a matter of time before the benefits outweigh the drawbacks, and we can see the full scope of what this research has to say. It is expected that game-based learning would become more integrated into practice, personalized, and conceal the curriculum in more fluid forms as the old learning paradigm shifts to new learning and subsequently future learning approaches (Alvarez-Rodríguez et al., 2014). In order to ensure that the benefits of these 4 disciplinary perspectives are properly distilled, researchers, legislators, managers, and professionals in the field must work hard to ensure that the literatures are joined together, the methods are harmonised across disciplines, and a common terminology is developed (De Freitas, 2018).

### 3. Methodology: Elements Adapted from MTG

The most crucial component drawn from the MTG game is the colour pie. The distinctive cluster of five coloured pips may be seen on the back of every paper MtG card (Barker, 2021). The colours in the game are represented by these signs. White (\*), blue (♠), black (♣), red (♠), and green (♣) are ordered from top to bottom in a clockwise circle. The colour pie depicts how the various colours interact with one another (Barker, 2021).

Each colour is “allied” with its neighbouring colours, whereas the colours opposite each other are “enemy”. Colours that are allies function well together and have similar mechanics and play styles, while enemy colours have opposing values and mechanics (Rosewater, 2016). These colours, moreover, give each card in the game a distinct, tangible and conceptual identity. Such identity-building is what we sought to convey in DoW.

#### 3.1. The Colour Pie, Explained

The 5-colour approach in MTG is one of the game’s core design principles. Not only does each colour have its own mechanics and effects on their cards, they are also linked to concepts or ideas represented by each colour. The categorisation of card pictures by colour is a natural option since there is a visual link between the images of cards of the same colour—the tonality of an image tends to be connected to the colour of its card (Sabien, 2018). As a result, red cards tend to contain images with a lot of red tones in them, etc. Card pictures are generally made to appear like other cards in one colour and create a type of visual identity for each colour via the visuals on the card.

The interactions between these colours have been depicted in **Figure 1**, that show some natural links between each colour, as well as their symbolic representation.

A similar idea was taken for DoW. The similarities between a card of a specific colour can also extend to the card rules language—as for each type of card, the



**Figure 1.** MTG colour wheel categories and interrelationships—per colour, adapted from Sabien (2018).

words used, and even the way the card's effect is organised, generally varies for each card type, as the mechanical and gameplay separation are obvious (Sabien, 2018). Each colour has a distinctive aesthetic theme for its visuals, but the mechanisms of gaming and the effects of each colour also tend to be diverse, meaning that there is a mechanical identity or gameplay identity in each colour that is generally present in the card. As a result, this part will provide a brief description of each of the game colours in terms both of card-art and game mechanics from a series of articles by a game developer directly related to the topic, given that this definition will stay applicable to the rest of this work.

The mana symbols pulled from the colour pie also represent the main resource managed in-game: mana (Garfield, 2013). Only the associated colour of mana may be used to pay for coloured mana in card prices. The symbols in a mana ability indicate which colour of mana is added to your mana pool. Generic mana is also present, indicating that any combination of colours can be used to meet the required cost. The successful management of this resource—and the effective distribution of cards (types, combinations, etc.), luck of the draw, and other mitigating factors (play format, number of cards, etc.)—typically leads to victory when playing with others. This makes the mana system an integral part of the game and an essential characteristic of MTG as a whole (Barker, 2021).

Colours are also associated with fictional elements, with white denoting holiness, blue denoting water, black denoting death, red denoting fire, and green denoting nature (Barker, 2021). With this in mind, it is important to note that no single colour is fundamentally good or bad. Certain creature archetypes make up the majority of distributions for each colour (Garfield, 2013). Angels are a subset of white creatures, Merfolk are a subset of blue creatures, Undead are a subset of black creatures, Goblins are a subset of red creatures, and Elves are a subset of

green creatures. Knights for white, Wizards for blue, Assassins for black, Barbarians for red, and Druids for green are some examples of classes that fit within the colours of the pie (Barker, 2021). (Table 1)

Each MTG card is associated with one or several card types. The major card types—Land, Creature, Instant, Sorcery, Artifact, Enchantment, and Planeswalker—are rather succinct: Land cards are representations of locations or environments. Creature cards are depicted as living things like animals or people, Sorcery and Instant cards are represented as magical spells, Artifacts are lifeless entities, Planeswalker cards depict individual named wizards who are essential to the game’s plot (Garfield, 2013). Enchantments are lengthy alterations to the battlefield or other improvements. There are other supplementary card types, however every card in the game corresponds to at least one of the previously stated card types (Barker, 2021).

There is no end to how colour-based mechanics and psychology combine to produce a wide and varied variety of play styles and distinct decks. Many gamers enjoy building decks based on particular characters or concepts (Barker, 2021). It is generally obvious how they come to life via the psychology and philosophy embedded in the mechanics of the cards (Garfield, 2013). One may begin from a chosen point and work their way through a complex web of gaming design and human psychology to discover what best suits them and build an experience that is entirely unique. In DoW, card types include production points, units (either land, sea or air units with different abilities) as well as special event cards that can boost or diminish other cards. The aim of DoW would be to defeat the opposing player’s general. (Figure 2)

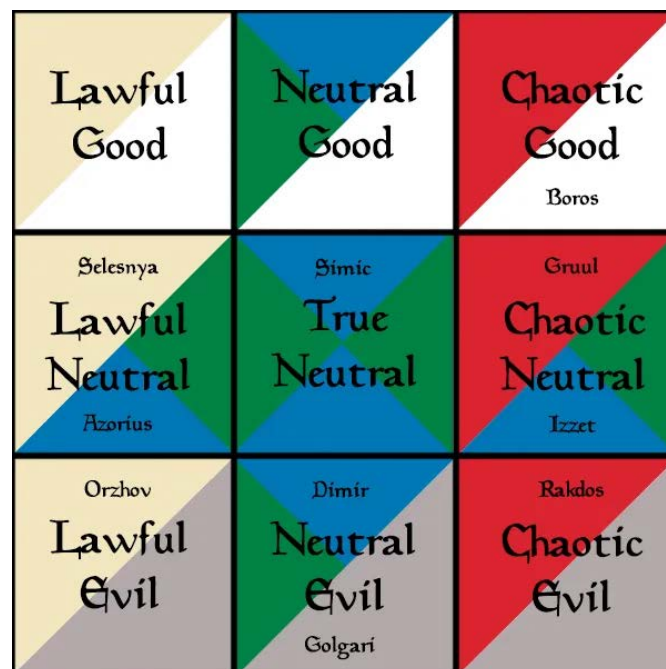


Figure 2. MTG colour combinations and alignment chart, adapted from Barker (2021).

**Table 1.** MTG colours, associated attributes and common elements, adapted from Garfield (2013).

Colour	Attributes	Common elements
White	Order, Structure, Law	Soldiers, Angels, Clerics, Light, The Sun
Blue	Intellect, Manipulation, Cold, Water, Air	Books, wizards, Clouds, The Sky, Bodies of water, Birds, sea creatures
Black	Ambition, Amorality, Sacrifice, Death	Zombies, Demons, Vampires, Darkness
Green	Nature, Life, Growth	Animals, Plants, Elves
Red	Impulse, Chaos, Earth, Fire, Lightning	Fire, Aggression, Lightning, Dragons, Goblins

It is fascinating to observe how these colours fit into an alignment chart. Moreover, it is possible that one would consider it while choosing what type of colour(s) to play. That being said, one may understand the gist of each colour theory, but the distinctions remain hazy. DoW was designed with a theme in mind, mainly World War 2 (WWII) (Author, retracted for review). For DoW, colours were adapted to represent nations. Players of DoW will be able to control one of 6 factions or nations that were involved in WWII, namely Nazi Germany, Imperial Japan, Fascist Italy, United States of America, Great Britain or the Soviet Union. Once a faction is chosen, the player can control the military forces of that nation using similar trading card game mechanics, such as amassing some form of power in which cards can be placed according to their cost (Author, retracted for review).

### 3.2. Player Type

The Bartle taxonomy of player types is a categorization of video game players (gamers) built on Richard Bartle's 1996 article reporting on their preferred activities within the game. The categorisation was initially used to characterise players of multiplayer online games (such as MUDs and MMORPGs), but it is now also used to characterise gamers of single-player video games (Bartle, 2004). A character theory underpins the taxonomy. Achievers, Explorers, Socialisers, and Killers are the four types in this character theory. This is visualised using a quadrant paradigm, with the X axis representing desire for engaging with other players vs. exploring the world, and the Y axis representing preference for interaction vs. independent action.

#### 3.2.1. Achievers

These are players that prefer to earn "points," levels, equipment, as well as other tangible measures of success in a game (Lvin et al., 2021). They are also known as "Diamonds" (♦) (Bartle, 2004). They may go to tremendous efforts to obtain just aesthetic benefits.

#### 3.2.2. Explorers

Explorers, sometimes known as "Spades" (♠) because of their proclivity to burrow about, are gamers that like finding new places and immersing themselves in the game environment (Bartle, 2004). They are frequently irritated by time-limited tasks since they do not permit them to travel at their own speed. They like dis-



covering bugs or concealed easter eggs (Bartle, 2004).

### 3.2.3. Socialisers

A large number of players prefer to play games for the social component instead of the game alone (Lvin et al., 2021). These players are referred to as “Socialisers” or “Hearts.” (♥) They get the most out of a game by engaging with other gamers and, occasionally, computer-controlled avatars with personalities (Bartle, 2004). The game is just a medium they use to find friends in-game or offline.

### 3.2.4. Killers

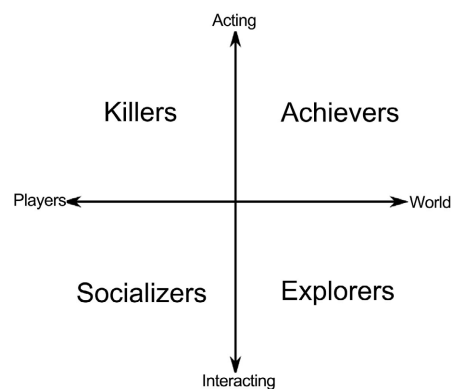
“Clubs” (♣) is an apt term for what the Killer enjoys doing (Bartle, 2004). They delight in rivalry with other gamers and enjoy confronting them over computer-controlled programmed adversaries. (Figure 3)

## 3.3. Rarity Scale

Rarity denotes a card’s distribution; there are four (4) rarities in MTG: Common, Uncommon, Rare, and Mythic Rare (Çetiner, 2021). The rarity determines how frequently cards are obtained while unpacking card sets, with Common being the most common and Mythic Rare being the least prevalent. The colour of the set emblem of a card indicates its rarity.

In DoW, a rarity scale was also utilised. Common cards (○) uncommon cards (□), rare cards (◇) and hyper rare (☆) cards were designed to reflect the collectible aspect(s) of the game itself. The exact nature of how this system was linked to content was explained in a previous paper by the authors (Author, retracted for review). As DoW employs this approach as well, it essentially means that when players construct decks, the rarer the card, the less likely a player will use it while playing. (Figure 4)

With that said, just because a card is “rare” does not imply it is inherently valued (Çetiner, 2021). Rarities do influence how helpful or powerful a card is, but they are just one aspect/dimension of the card game itself. An uncommon card, for example, may be a good match for many decks when it rapidly increases in price, while other rare cards do not perform as well (Lvin et al., 2021).



**Figure 3.** Taxonomy of player types, adapted from Bartle (2004).



**Figure 4.** MTG rarity system, adapted from [Barker \(2021\)](#).

### 3.4. Balancing and Randomness

In multiplayer competitive games, such as MTG and DoW, optimising for balance is essential. Fairness in player-versus-player games is critical to the success of any game that includes this type of gameplay ([Gold, 2010](#)). This is a notably pressing issue in MTG. Cards that are excessively powerful are prohibited or have their economic worth exaggerated, prohibiting most players from accessing them. As a result, the weaker cards are not selected to make up the decks of several players. As a result of this occurrence, many cards are not visible ([Ham, 2010](#)).

At some time in the game, one player will be on the verge of triumph, while the other(s) will be on the verge of defeat. It is not enjoyable to lose. A sense of fairness is little consolation generally provided to losing players. While the winner may have been unlucky (if the game included an element of random chance), the rules did not favour one player over another fundamentally and arbitrarily ([Salen, Tekinbaş, & Zimmerman, 2004](#)). A major amount of the game development process is devoted to play testing and “balancing” the rules to ensure fairness ([Ham, 2010](#)).

DoW generally utilises a rock, paper, scissors mechanic to allocate resistances and weaknesses to the various units in the game (Author, retracted for review). This is the form of balancing worked into the mechanics of play. The basic premise is that air units > sea units > land units.

### 3.5. MTG Philosophical Underpinnings

MTG’s fundamental ideas are straightforward: utilise land cards to produce mana, utilise mana to cast a spell and conjure creatures, and creatures to attack and destroy the other opponent ([Garfield, 2013](#)). Furthermore, the complexity stems from the emergent strategy created by both these fundamental principles and the approximately ten thousand distinct cards that might theoretically comprise a deck presently.

Physical games may influence serious game designers by providing insight into teaching and mediating the rules that are typically obscured by their digital counterparts. MTG, on the other hand, can provide more than others because to its sophistication in balance, restricted resource control, and variable reinforce-

ment. Aside from gaining design knowledge, there are lessons to be learned in marketing, visual design, and community administration (Ham, 2010).

### 3.6. Emergent Strategy

Chess is a game design classic because of its emergent strategy (Dormans, 2011). The game's basic principles are very straightforward and uninteresting by modern standards, but the intricacy that develops from the motion and counter-motion of two players is beyond what a lifetime might grasp (Zilio, Prates, & Lamb, 2018). Because the human brain cannot fathom the complexities of causality in chess, it seeks trends to model and comprehend. Whenever the mind employs these models to implement a plan that results in a win condition, it offers a sensation of fulfilment and excitement as a consequence (Luton, 2012).

It is difficult, if not impossible, to design for the type of emergent strategy observed in chess (McDermott & O'connor, 2002). Alternatively, like with MTG, you are considerably more likely to find it in an early version and subsequently expand on it. Chess has developed to its present form over the course of 1500 years (Zilio, Prates, & Lamb, 2018). Players in MTG command creatures with two figures: "power" and "toughness." When they are in play, their masters can designate them to attack and defend from assault. This basic rule underpins most of MTG's primary basis (Luton, 2012).

Various additional considerations, such as the other cards in play, their hand, their deck, and creature abilities, are likely to influence a player's judgment in any attacking circumstance (Zilio, Prates, & Lamb, 2018). Given the possibility of using "tricks," the remaining mana and cards in each player's hands are also taken into account. Such second-guessing of an opponent's moves and card choices is referred to as the *metagame*, and it is an important element of all tournament play (Luton, 2012). The variety of abilities associated with creatures, spells, and lands provides every player with hundreds of possibilities in any game (Dormans, 2011). Each set, which comes out four times a year, generally adds one or more new abilities to the game, creating a continuously altering terrain for players. Below is a diagram illustrating the variety of decisions that can be made in a turn: (Figure 5).

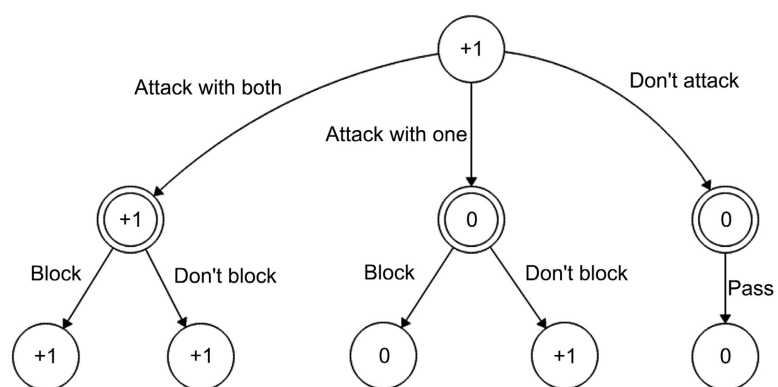


Figure 5. Possible choices a player can make in a turn.

Creating mental models and using them to achieve victory, similar to chess, causes the brain to offer a sensation of fulfillment (McDermott & O’connor, 2002). Yet, in contrast with chess, MTG’s emergent strategy is partially driven by the publishing of these sets—expanding out the possibilities for a player that the community would determine to be the best ones as a hive mind (Zilio, Prates, & Lamb, 2018). As new sets are published, players construct, play, and perfect their decks over the course of several months. The strong thrive, thanks to supply and demand dynamics that make several rare cards (dubbed “chase rares”) lucrative. The economics change when another player constructs a stronger deck or a combination of cards that beats the best decks.

MTG shows us how to create a game that is simple at its heart yet provides players with a plethora of significant alternatives in play, even if it is slightly enforced. This results in a game with a learning curve, which will keep players trying as they find and implement new approaches (Zilio, Prates, & Lamb, 2018).

### 3.7. Game Players and Context

Realising you are about to get something but not knowing what it is creates an exhilarating situation. This is known as *variable reinforcement*, and it results in a far more reliable recurrence of an activity than a set equivalent.

Each turn in MTG, each player draws a card from his or her deck. It is feasible that entire matches might be won or lost just on a solitary draw (Ham, 2010). This offers the game an addictive aspect in the short term, which combines with the deck-building strategy and the game’s aims in the long run. It also gives the game the somewhat endearing moniker “Cardboard Crack” (Luton, 2012).

This similar notion may be extended to the compelling nature of booster packs, which are sealed packets of 15 semi-random cards. Boosters include a predetermined number of common, uncommon, and rare (or legendary rare) cards, as well as a land and tip card or token. When you buy a pack, you know how many cards you’ll get, but you don’t know which cards you’ll get (Ham, 2010).

The scarcity of each card is actually printed on it, and the ratio of cards in boosters breaks down as follows: (Table 2).

Each purchase has the potential to provide an “epic pull”—a card so strong that it may shift games to the player’s benefit—but the odds are stacked against it, pushing players to repeat the process (Luton, 2012).

**Table 2.** Rarity of MTG cards.

Rarity	Makeup
Common	71.4 percent
Uncommon	21.4 percent
Rare	6.3 percent
Mythical rare	0.9 percent

Magic even has its own tournament structure that makes use of the urge to unpack booster packs. Players bring three booster packs to booster drafts (Ham, 2010). Every person opens one at a time, choosing a card and transferring it to the following player, who chooses a card and passes it on as well (Luton, 2012).

This process is repeated until the pack is empty, at which point the following one is unsealed, and so on. When all boosters are gone, each player gets a stack of cards from which to construct a tournament deck.

MTG may be one of the greatest instances of variable reinforcement in both play and retail. The rarity possibilities for every purchase, as well as the excitement of the draw at each turn, make it an immensely addictive game (Luton, 2012).

### 3.8. Retention through Goals

Variable reinforcement isn't the only method Magic encourages long-term commitment and expenditure from a large number of players. It accomplishes these goals through a set of stated and implied goals that fulfill and sustain a variety of player types (Bartle, 1996).

These mechanics can be applied to offering possible appeasement through play to the four Bartle Types of Achievers, Explorers, Killers, and Socializers.

#### **Explorers: World, Strategy, and Theory**

Explorers enjoy exploring and charting new worlds. While the Magic cards are tied into a story centered on the "Multiverse," and there are books and other literature available, the bulk of MTG explorers love gathering and discussing their explorations of the game itself (Bartle, 1996).

#### **Killers: Tournaments**

Killers like the rush of victory over an enemy. MTG, being a zero-sum (one winner, one loser) game, gives this pleasure around the dinner table, but the appeal of casual and formal tournaments carried on by DCI, Magic's tournament governing body, provides considerably greater opportunities for the offensive Killer (Bartle, 1996).

Wizards of the Coast promote competitive games by awarding financial prizes and prestige to champions of the sanctioned Pro Tours, who become game superstars. This validates any serious player's long-term aim of becoming a Pro Tour winner, motivating them to stay committed to the game.

#### **Achievers: Planeswalker Points and Collecting**

Achievers want to see concrete indicators of their success (Bartle, 1996). Planeswalker Points are a mechanism given by Wizards of the Coast for players in DCI-sanctioned events. The points accumulate for doing auxiliary actions like entering guilds, but the majority of them come from competing in tournaments. DCI monitors league tables of top players, thus encouraging them to participate in competitive play on a regular basis, remain in the Magic community, and develop their decks by acquiring new cards.

Furthermore, each set comes with a player guide that identifies each card in

print on a checklist. This is aimed at a subset of MTG players that aren't necessarily players at all: collectors.

Collectors remain focused on their self-imposed goal of completion, and the checklist serves as a gauge of their progress (Bartle, 1996). The human mind naturally concentrates on a scarce resource or deficit (usually money or friendship, but sometimes an empty tickbox) and then devises solutions to address this shortage.

Collecting is a common aim in many games, ranging from different outfit unlocks to gamification badges. It may be used with either finite (cards) or unlimited (Planeswalker Points) resources.

### **Socializers: Building a Network of Friends and Teams**

Socializers like connecting with others. While Magic requires all players play with at least one other individual, dedicated players often seek out a wide pool of possible contenders (Bartle, 1996).

The Magic community is very active at the regional, national, and worldwide arenas. The activity of Wizards of the Coast begins with local organized play events like Friday Night Magic, which are held in collaboration with community stores (typically comic shops) and also over the internet. Several sites, along with several other games, offer forums, chat, and articles, but Wizards, as a development company, provides an exceptionally significant level of community encouragement.

Additionally, tournament level players (Killers) need teams of individuals performing diverse roles, such as collectors (Achievers) and deck designers (Explorers), to succeed. This improves the social aspect and develops a network surrounding a game, transforming it into a center for a player's life (Bartle, 1996).

Players who have numerous friends in a game are more likely to remain with it for a prolonged period of time than those who do not have a social connection, making it an essential option for marketers and designers. If the game helps connect individuals and bring them together to have fun, you will most probably have a devoted and engaged fan following.

## **3.9. Resource Control**

Controlling restricted resources is a crucial skill for designers, as little changes can have far-reaching consequences (Mahlmann et al., 2012). Building decks in Magic imparts these abilities to players through continuous iteration of bringing cards in and out, rendering them fluent in these skills as players rather than designers (Zuin & Veloso, 2019).

Five different types of mana are generated by colour-specific lands once they are in action. If a player wants to put a land down, they can play it from their hand once each round. A player's mana cost must be provided before a spell card can be cast from his or her hand (Zuin & Veloso, 2019).

Despite the fact that a deck must have at least 60 cards, the player can select how many or how few lands to include, which leads to an unexpected amount of

strategy and deliberation (Luton, 2012).

It is possible that the player has a lot of spells, but not enough lands to use them (this is known as being “mana screwed”) When a player has too many lands, he or she can cast more spells, but their odds of drawing those spells are reduced (this is known as being “mana flooded.”) (Luton, 2012; Mahlmann et al., 2012).

A card’s efficacy (or power) is meant to be inversely proportional to its mana cost (or how many lands must be used to cast the spell). It is possible to play low cost cards early on before your opponent has a chance to defend, while high cost cards can be played later in the game to maximum effect (Zuin & Veloso, 2019).

It is possible to play several cards in the early stages of the game by using just low-cost cards, but when the player’s deck depletes and they run out of cards in their hand, they will only be able to use low-cost cards that have almost no effect on the game’s result (Mahlmann et al., 2012).

Consequently, when creating a successful deck, a player must take into account their mana curve (the number of each card they have at each mana cost). Because powerful alternatives are constantly accessible, this deck will typically perform well if it contains enough of the best cards at each mana cost during the first five turns of play (Zuin & Veloso, 2019). (Figure 6)

As a deck designer, there are several websites and smartphone applications that can help you evaluate the mana base and curve. While they are beneficial, statistical analysis alone cannot balance complicated systems. When they begin to interact, seemingly little features and nuances can have a profound impact (Luton, 2012).

A strategy known as “goldfishing” has been developed by Magic players, in which they play against an imagined opponent that does not react (such as a goldfish) and tally how many rounds is required to win the match (Luton, 2012).

With this knowledge and a grasp of the fundamental ideas of mana screw, mana flooding, and mana ramps, the player will begin improving by adding and deleting cards, changing their land-spell proportion and mana ramp for the most efficient play (Luton, 2012).

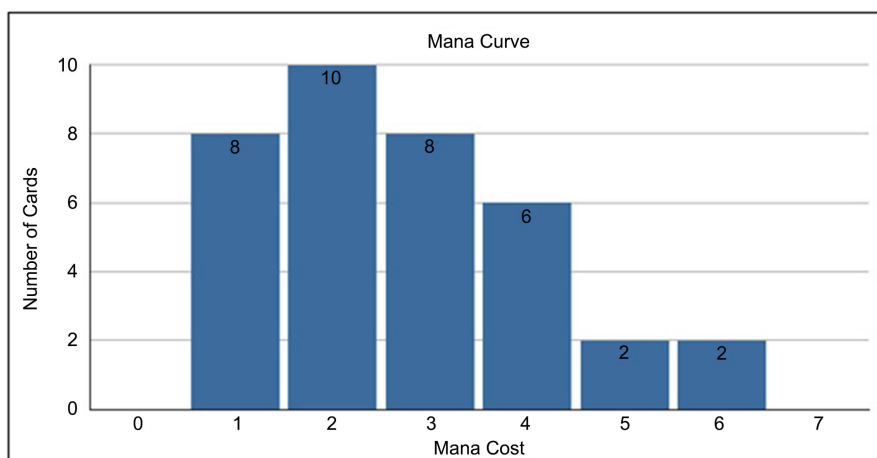


Figure 6. Mana curve and associated cost and number of cards.

## 4. Findings and Discussion

### Adapting the MTG Elements into DoW

The following **Table 3** illustrates the various attributes assigned to each faction within DoW, akin to the colour pie of MTG.

In following **Table 3**, the German faction is outlined. This faction aligns itself greatly with the MTG colours of Green and Black. MTG assigns black the attribute of sacrifice, and green the attribute of growth. This links with the Germans in DoW, as they gain power through sacrifice and their units grow in strength.

In following **Table 4**, the Japanese faction could be considered to be aligned with the MTG colours black and blue. The reason for this is that the sacrificing element relates to black, while the idea behind drawing cards links to blue, which focuses on intellect, or knowledge of your deck of cards.

In following **Table 5**, Fascist Italy can be considered to align with the MTG colour red. This is due to Italy's use of aggressive abilities as opposed to units, as red in MTG links to impulse and aggression.

In following **Table 6**, the United States of America can be considered to align with the MTG colour white. This is due to white in MTG being associated with protection and healing, as the USA were seen as saviours in WW2.

**Table 3.** German faction.

Main mechanic(s)	Unit types	Generals and powers	Card rarities	Events	Chief form of Production Power
Powerhouse. Expensive, but all units have highest "bite" in the game	Air units: Luftwaffe Land units: Wehrmacht Naval units: Kriegsmarine	Adolf Hitler (Sniffler) Herman Goring Heinrich Himmler	Common (○) Uncommon (□) Rare (◇) Hyper rare (☆)	Blitzkrieg Death camps German efficiency	Black "Pupper Power". Can sacrifice units to generate PP

**Table 4.** Japanese faction.

Main mechanic(s)	Unit types	Generals and powers	Card rarities	Events	Chief form of Production Power
Sacrificing units either to boost attack power or deal damage or draw cards	Air units: Zero Land units: Banzai! Naval units	Emperor Hirohito Hideki Tojo Isoroku Yamamoto	Common (○) Uncommon (□) Rare (◇) Hyper rare (☆)	Pearl Harbour Kamikaze! Bushido	Yellow "Pupper Power"

**Table 5.** Italian faction.

Main mechanic(s)	Unit types	Generals and powers	Card rarities	Events	Chief form of Production Power
Less emphasis on units, more on abilities or "bark abilities"	Air units Land units Naval units	Benito Mussolini Pietro Badoglio Rodolfo Graziani	Common (○) Uncommon (□) Rare (◇) Hyper rare (☆)	Roma victor! Pax Romanum Cult of personality	Green "Pupper Power"



**Table 6.** USA faction.

Main mechanic(s)	Unit types	Generals and powers	Card rarities	Events	Chief form of Production Power
Standard set, can focus on healing units	Air units Land units: Abrahams tank	Franklin Roosevelt Douglas MacArthur Henry H. Arnold	Common (○) Uncommon (□) Rare (◇) Hyper rare (☆)	Hiroshima and Nagasaki D-Day Capitalism	Blue “Pupper Power”

In following **Table 7**, Great Britain can be considered to align with the MTG colour blue. This is because MTG views blue as intelligent and using clever tactics to beat your foe. The British created technological marvels to beat their enemies, and also used fake units to trick the Nazis in the Battle of Britain.

In following **Table 8**, the Soviet Union can be considered to align with the MTG colour green. This is due to the soviet army being vastly larger than any other army during WW2, and green in MTG focuses on a lot of creatures being summoned and controlled, focusing on swarming opponents.

The DoW faction wheel has drawn direct inspiration from MTG’s colour wheel. It represents the principal goal of each faction, the vehicle through which it intends to reach it, the relationships between each faction, as well the interrelationships amongst/amidst them. Moreover, key tenets determine these relationships (e.g. resourcefulness between Britain and Italy). These are represented above in **Figure 7**. It is the designers’ intent to have these represented in-game during gameplay and manifest in interesting ways mechanically. Meticulous, intentional decisions, consequently, have to be made in order to have this become a reality.

Akin to adding a sixth colour to MTG, an additional faction has been added to DoW’s philosophy. Doing so differentiates the game’s DNA from that of MTG in interesting ways; requiring further balancing and development. For one, adding a new element means carving out a unique and historically-accurate identity in relation to the other divisions. This process has been, by-and-large, informed by **Table 9** below.

The concretisation of ties between the factions is done to solidify the relationships between them for mechanical, flavour and thematic purposes. Abstraction and problematisation only serve the designers in so far as they can relate the factions and underlying gameplay philosophies to them. A certain level of commitment is required to exemplify the abstract and translate it to a tangible, real-world medium. The practice is evident in many game designs, as developers endeavour to translate the esoteric into digestible, physical forms. Relationships and interrelationships, therefore, require a measurable degree of substantiation and quantification.

Keyword abilities for each faction in DoW—capable of affording unique identity and play mechanics—is now possible. *Grrmany* (Germany) employs an ability called “Ruthlessness”, which cares about a unit card’s power (or “bite”)—tying

**Table 7.** British faction.

Main mechanic(s)	Unit types	Generals and powers	Card rarities	Events	Chief form of Production Power
Special cards that allow player to search library	Air units: RAF Land units Naval units	Winston Churchill Hugh Dowding Bernard Montgomery	Common (○) Uncommon (□) Rare (◇) Hyper rare (☆)	OSA Spies Battle of Britain (fake units) Tally ho!	White “Pupper Power”

**Table 8.** Soviet faction.

Main mechanic(s)	Unit types	Generals and powers	Card rarities	Events	Chief form of Production Power
Small, cheap units, can amass large amounts of small units quickly	Air units: Yak and MIG Land units Naval units	Josef Stalin Rodion Malinovsky Nikolai Vatutin	Common (○) Uncommon (□) Rare (◇) Hyper rare (☆)	Gulags Great Purge (destroying cards) Communism	Red “Pupper Power”

**Table 9.** DoW factions as they relate to their primary goal, historical relevance and interrelationships.

Faction(s)	Primary goal	Interrelationships
Barktain (Britain)	Peace through <i>ingenuity</i> . Historically, Britain during WWII, was seen as the peacekeeper. They tried their best to deter Hilter from invading France and Poland. During the war, they invented new technologies, such as sonar, as well as decrypting Germany’s secret messages.	Barktain → Yipaly: Resourcefulness Barktain → Ruffia: Authenticity Barktain → Arferica: Patriotism Barktain → Yelpan: Loyalty Barktain → Grrmany: Technology
Yipaly (Italy)	Dominion through <i>persistence</i> . Mussolini sought to unify Italy again in order to solidify his dominion, harking back to the glory days of Rome. This persistence was evident in the alliances formed with Germany and Japan to perpetuate fascism into the future.	Yipaly → Barktain: Resourcefulness Yipaly → Ruffia: Practicality Yipaly → Arferica: Bravado Yipaly → Yelpan: Cunning Yipaly → Grrmany: Tenacity
Ruffia (Russia)	Revolution through <i>unity</i> . Russia, as a nation, unified behind the communist ideals of Marx. This sparked a nation-wide revolution, which lead to the formation of the USSR.	Ruffia → Barktain: Authenticity Ruffia → Yipaly: Practicality Ruffia → Arferica: Brotherhood Ruffia → Yelpan: Sacrifice Ruffia → Grrmany: Industriousness
Arferica (America)	Freedom through <i>liberty</i> . The founding of the United States of America was grounded on the principles of freedom, equality and fraternity. America sought to liberate the world from the Axis powers.	Arferica → Yipaly: Bravado Arferica → Barktain: Patriotism Arferica → Ruffia: Brotherhood Arferica → Yelpan: Creativity Arferica → Grrmany: Work ethic
Grrmany (Germany)	Power through <i>ruthlessness</i> . Hitler’s rise to power was through sheer mercilessness, eliminating enemies he deemed unfit. During WWII, this was exemplified in the conquering of Europe and the annihilation of the Jews.	Grrmany → Yipaly: Tenacity Grrmany → Barktain: Technology Grrmany → Arferica: Work ethic Grrmany → Yelpan: Pride Grrmany → Ruffia: Industriousness
Yelpan (Japan)	Perfection through <i>discipline</i> . The emperor—as a god—saw his land of the rising sun as a “perfect” realm. During WWII, he disciplined an order of Japanese forces by way of instilling the principles of honour (or bushido); even going so far as to sacrifice their own lives.	Yelpan → Yipaly: Cunning Yelpan → Barktain: Loyalty Yelpan → Arferica: Creativity Yelpan → Grrmany: Pride Yelpan → Ruffia: Sacrifice

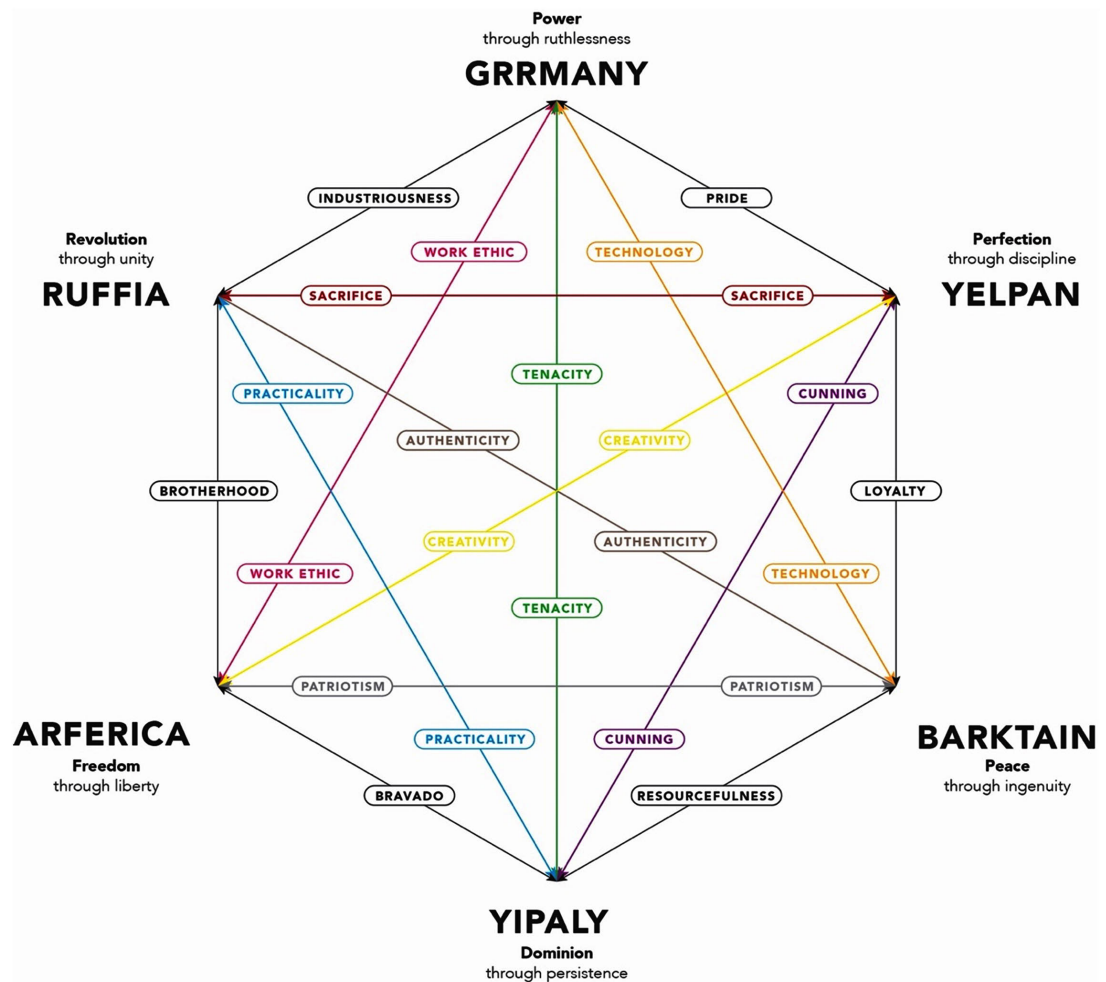


Figure 7. The faction alignment and philosophy wheel for DoW; inspired by the MTG colour wheel.

mechanically into the historical behaviour of the nation. *Ruffia* (Russia) utilises an ability called “Unity”, which considers faction and tie-in with fellow faction members. *Yelpa*n (Japan) prefers shared unit types, embodied in an ability called “Discipline”. *Arferica* (America) seeks “Liberty” by way of keeping “Strong Vs” cards in mind. The *Yipaly* (Italy) faction cares about the exact opposite—“Weak Vs” cards—in the form of the “Persistence” ability. Finally, *Barktain* (Britain) utilises “Ingenuity” by considering the cards in a player’s hand. Such abilities grant each faction a particular essence and gameplay focus. Unit cards with these abilities are depicted below in Figure 8.

The makeup of a DoW unit card has been explained in a prior paper based on the conceptualisation of the serious game itself (Author, retracted for review). Minor adjustments have since been made to better reflect the development status of the game thus far. For example, faction flags have been included on the top left of every card to represent the related nation (i.e. stars and stripes for Arferica/America). The rarity is also indicated on the top right of every unit card. A filled in paw denotes the level of rarity; ranging from common, uncommon and rare cards. Other iconography, such as unit power (bite), name, art, ability, re-

sistance (bottom left) and weakness (bottom right) remain on the face of cards. Stamina (health) has since been removed to focus gameplay on tactics and strategic thinking—beyond resource management. Another novel adaptation is the introduction of so called “lanes” in DoW. Three lanes are outlined below: (Table 10).



Figure 8. DoW unit cards, depicting the Grrrman, Ruffia, Yelpn, Arferica, Yipaly and Barktain (left to right) keyword abilities.

Table 10. Lanes in DoW.

Lane 1: Home turf	Lane 2: Deployment	Lane 3: Battlefield
Resource-based, concentrated on defence, advantages if played early on. Can be “bolstered” for greater defence.	Event cards played to affect either right or left lane. Limited to one play per turn.	Expenditure-based, concentrated on attack, advantages if plays later on. Can be “bolstered” for greater offence.
E.g. Play X cards in this lane to add X Pupper Points.	E.g. Bite/Bark increased for ↔ lane.	E.g. Play X cards in this lane, at the cost of X Pupper Points.

Lane 1 is the home turf, which centres around resource collection and defence of cards. Lane 2 focuses on event cards that can affect either lane 1 or lane 3, and is limited to one event per turn per player. This could lead to some complex strategic plays that could turn the tide of the battle. Lane 3 is the battlefield, which is expenditure based and focuses on offensive abilities.

## 5. Conclusion

This paper outlined the process taken by the researchers of adapting a new historically themed trading card game called Dogs of War. Previous research in the fields of game design and serious games was elaborated upon, as well as the central research question. The various game elements adapted from Magic the Gathering were discussed and analysed, upon which links were made to DoW, as well as the various novel additions to the game were discussed. The researchers believe that this type of approach to game design will be useful to new scholars in the game-based learning field, and this process can be easily adapted for any content area. Unfortunately, DoW is still in development, and cannot be used for research as of yet. A research project is under way that will use the DoW card game by the end of 2022. Future findings will examine whether this game can lead to improved understanding of historical content through a fun and engaging card game.

## Declarations

### Availability of Data and Materials

The data is not available at this time, as the DoW game needs to be finished first.

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## Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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## List of Abbreviations

DoW—Dogs of War

NtG—Magic the Gathering