

# Games as Blends: Understanding Hybrid Games

Ville Kankainen\*, Jonne Arjoranta†, Timo Nummenmaa‡

\*UTA Game Research Lab

Faculty of Communication Sciences  
33014 University of Tampere, Finland  
email: ville.kankainen@uta.fi

†Department of Music, Art and Culture Studies

University of Jyväskylä  
PO Box 35, FI-40014  
email: jonne.arjoranta@jyu.fi  
www: jonne.arjoranta.fi

‡UTA Game Research Lab

Faculty of Communication Sciences  
33014 University of Tampere, Finland  
email: timo.nummenmaa@uta.fi

## Abstract

The meaning of what hybrid games are is often fixed to the context in which the term is used. For example, hybrid games have often been defined in relation to recent developments in technology. This creates issues in the terms usage and limitations in thinking. This paper argues that hybrid games should be understood through conceptual metaphors. Hybridity is the blending of different cognitive domains that are not usually associated together. Hybrid games usually blend domains related to games, for example digital and board games, but can blend also other domains. Through viewing game experiences as blends from different domains, designers can understand the inherent hybridity

in various types of games and use that understanding when building new designs.

**Keywords:** Augmented reality games; conceptual blending; conceptual metaphor; games; hybridity; hybrid games; mixed reality games; pervasive games.

## 1 Introduction

Hybrid games, often described as games combining physical and digital elements into a single product, are an exciting new category of games. While research projects have explored the possibilities of different hybrids for several decades, commercial products have been rarer. Recently, this has started to change [TKN<sup>+</sup>16], so understanding the nature of hybridity helps in evaluating existing games out on the market as well as producing new ones.

Recent advances in technology seem to have made, for example, the creation of physical-digital hybrid tabletop games an interesting and feasible prospect, with such examples as *Beasts of Balance* [BF16], *XCOM: The Board Game* [Lan15] or *World of Yo-Ho* [Vol16]. However, combining traditional card-board games with electric devices is not a new phenomenon. There were already games, such as *Code*

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*Name: Sector* [Doy77], using microchips with physical board games released in late the 1970s, and during the eighties such games as Milton Bradley's *Dark Tower* [BCE81] gained some popularity. Even prior to microchip technology, since 1910s, there seem to have been board games which had electric devices, such as small lamps, merged with physical game boards, e.g. *Electra* [Sal10]. These games can be considered as ancestors to modern hybrid board games, which utilize the ever increasing computing power of mobile devices [KT14].

Another example of non-digital hybrid games, VHS-games such as *Nightmare* [CT91], were popular during the 1980s. As the VHS technology became outdated, DVD's were used for similar purposes, and some of the old VHS-titles were adapted to use the up-to-date technology. Similar trajectory can be seen with the *Stop Thief!* [Doy79] board game, which was originally released in 1979 with a simple hand-held digital device, and as a revised version in 2017 ([DDJ17], this time using a mobile app). The hybrid element in these examples is not tied to a specific technology, but to the experience that the technology offers.

Although it is common to view hybrid games as a combination of digital and physical elements in a single product, viewing them through this lens can be seen as a limiting factor in their design and analysis. This type of definition also allows for problematic cases, as most digital games use physical input methods. Furthermore, games exist to players as experiences, more so than as technological compositions. Experience in turn is not a simple phenomenon. According to [Has10] "experience emerges from the intertwined works of perception, action, motivation, emotion, and cognition in dialogue with the world (place, time, people, and objects)". He further argues that experience should come before the product in the design process, even if it is easy to think the other way around. This is apparent in many studies on hybrid games concentrating on the technical aspects of hybridity. Before starting to design a product one should outline the desired emotional and cognitive content of the experience [Has10]. Thus, to be able to design and analyze hybrid games, it is important to view hybrid games through the experiences they provide and not only through their technology.

Different technologies can shape the gaming experience, or act as building blocks of it, but it is hard to understand the experience purely through the technological perspective. The gaming experience is not

tied to the game artifact or fully contained in the actual gaming situation [Mäy07]. For example, T. L. Taylor [Tay09] argues that social connections, collective knowledge and group actions happening in the physical world form an important part of the online gaming experience. On the other hand, Rafael Bienia [Bie16] has studied role-playing materials through the actor network theory, and argues that even material elements, like the amount of light or the table that game is played on, have an effect on the gaming experience. In this sense games are experience goods, where the experience is the actual thing sold to the customers [Tsc05]. Playful experiences themselves can also be used as a tool when evaluating games, as has been done using the Playful Experiences (PLEX) Framework [LHO<sup>+</sup>13]. Thus, to be able to design and analyze hybrid games, it is important to view playful hybrid products, such as games, through the experiences they provide and not only through their technological composition.

While our approach gives the designer tools for analysis, design and communications, we can not make claims that using our approach automatically results in better games being created. The view we have about using our method for developing better games is similar to that of Björk and Holopainen [BH05], who describe their game design patterns as a language for discussing games, but remind the reader that understanding a language does not guarantee that one uses the language to say something interesting. Similarly in our case, we give the designers and researchers tools and options, but do not guarantee that better games will be created. The quality of a game and it's features is also subjective and can change over time [BH05]. As such, it is better to distance our approach from evaluating game quality and to not make statements about if certain games are better than others, and focus on the blends themselves and their properties.

## 2 Previous research

The focus of the studies concerning hybrid games has been mostly on augmenting traditional board games with digital technology, like RFID-sensors [HLMR07, HKJL10, DB13], or the possibilities of digital tabletops like Microsoft Surface [HFK<sup>+</sup>10]. Some studies [CLCL13] have also explored how to better implement the social dimension of board games in augmented games. Another aspect explored under the broad label of hybrid games is often called location-aware or

pervasive games, where the focus is tracking players in various locations, often on the streets [MCMN05]. It is notable that almost all of the studies are concentrated on research prototypes and articles looking into hybrid games out on the market are almost non-existent.

Most definitions of hybrid games are limited in their nature, and mostly refer to technological aspects. According to Mora et al. [MFM<sup>+</sup>16]: "In hybrid games, large interactive surfaces recreate the social affordances typical of board games, whilst the use of active or passive playing pieces preserve physical affordances similar to traditional game pieces." Streitz et al. [SMPR05] have recognized five qualities which characterize typical hybrid games: social quality, haptic quality, multimodal stimulation, real world parameters and virtual attributes of physical artifacts. According to Magerkurth [Mag12]: "in contrast to traditional computer entertainment, hybrid gaming applications define game elements from the physical and the social domains as integral parts of the gaming experience". He presents a hybrid games model containing three domains: physical, social and virtual. These are connected with interfaces, and the information flow between them during the game creates the hybrid experience. This model approaches understanding hybridity more as an experience than as a technology based phenomenon, but it is still tied to the interplay of various technologies. Coulton et al. [CBG<sup>+</sup>14] use the term *phygital* in describing physical-digital hybridity. They consider understanding the different affordances of physical and digital elements important in hybrid game design.

Although *pervasive games* refers to a different, although partly overlapping, phenomenon it has also been used as a synonym for augmented board games [KvGC<sup>+</sup>09]. Magerkurth [Mag12] draws a line between hybrid and pervasive games in that the first are not usually tied to any given location while the latter are. In a study Hinske et al. [HLMR07] use the term *mixed reality games* as a synonym for hybrid games. Another related category is *transmediality*. While it is not limited to games, it also tries to describe phenomena that combine or share media [Har15]. Although many of the terms above point to smaller elements of the larger phenomenon of mixing physical and digital in games, there seems to be no rigid hypernym enclosing them all. This suggests that finding such a definition is not an easy task.

Many studies on physical-digital hybrid games share what Carter et al. [CHG14] call the *digital aug-*

*mentation fallacy*, the observation that these studies may have overlooked the unaugmented appeal of these games. Material elements, such as dice, are often seen as an unnecessary evil, which can be easily augmented away with digital technology. However, as Carter et al. [CHG14] argue, this is not the case. Dice and other material game elements form an important part of the player experience, and also induce new kinds of social interaction [XBR<sup>+</sup>11], thus actually supporting the main source of enjoyment in board games [Woo12]. Recently, the importance of material elements for the game experience in hybrid games has been noted in several studies. For example, Mora et al. [MLD15] have taken an approach of digitally modifying physical game pieces on a regular game board instead of using a digital tabletop, in order to minimize the effect hybridization has on the traditional social affordances of board games. In turn, Linderoth [Lin11] argues that division to digital and non-digital is in many cases a blunt instrument while discussing games. Instead, he suggests they should be examined through the affordances they offer.

Although hybridity is often used to describe a mix of physical and digital elements, this does not need to be the case. According to Heljakka [Hel12] hybridity refers to a situation where something already existing is developed into something novel. She discerns five dimensions of hybridity in playful products: conceptual hybridity, technological hybridity, artefactual hybridity, thematic hybridity and functional hybridity. Her approach is not limited to a technology, but also takes into account various forms of play and play products related. On the other hand, as Lindtner et al. [LNW<sup>+</sup>08] argue, hybridity can also be seen as a multi-dimensional environment. In their example, a mix of multiple technologies and real-life interaction around online gaming together form a hybrid cultural ecology. As such, their example supports the view that hybridity is more of an experiential than a technology-based phenomenon.

### 3 Problematic hybrid cases

Many discussions of hybridity rely on a notion that it somehow involves the mixing of analogue and digital technology. Some early examples are pre-digital, so they replace digital with some related concept, like electrical. Often, the relation is one where the digital is seen to augment the analogue in some way [CHG14]. These definitions view the issue of hybridity mainly

through the lens of technology. However, when examining actual examples with these definitions in mind, one quickly runs into problems. A technology-based definition is easily invalidated by changes in technology, as is shown by the early examples with non-digital technology. It also assumes that categories like analogue and digital are stable and coherent, when it might be that the distinction grows less useful over time.

An analogue board game with digital components is sometimes considered a prototypical example of a hybrid game [MMI02, MFM<sup>+</sup>16]. This seems to lead to the conclusion that mixing some kind of analogue components with digital components would be sufficient to create a hybrid game. However, this is problematic because the prototypical digital (non-hybrid) game also requires both analogue and digital components in order to be played: digital games are played with physical controllers with analogue parts.

In addition to multi-purpose dedicated controllers (e.g. the Xbox 360 controller) games also have single-purpose controllers (e.g. the *Rock Band* [HP07] guitar). If we are to argue that games played with these controllers are not hybrid, we would need to be able to make distinctions between these controllers, and the custom pieces used in games usually deemed hybrid. In both cases, physical objects are manipulated in order to play a digital game – both are “dedicated tangible interaction devices” [Mag12]. Some games blur the boundaries further by appropriating objects made for other purposes for use in games, like *Rocksmith* [Ubi11] that uses a regular electric guitar and a special adapter to control a digital game.

Another game type that evokes hybridity without fitting neatly into labels is digital board games (e.g. *Hitman Go* [Squ14]). They mimic the layouts, interfaces and actions of analogue board games. They are fully digital, so definitions of hybridity relying on mixing different technologies do not seem to apply to them. However, they are often discussed in relation to hybrid games, and seem to experientially mix categories. The technology is digital, but the feel of the game is analogue.

## 4 A cognitive theory of hybridity

Instead of defining hybridity through technology, we suggest understanding hybridity as an experiential and cognitive category. This also enables the inclusion of hybrid games outside of technological compositions,

where the hybridity is not a result of new technology.

Our work is based on the theory of conceptual metaphors, established by Lakoff and Johnson [LJ80]. Furthermore, we use the theory of conceptual blending [FT96, FT08] to examine hybrid games as a case of cognitive blending. According to this framing hybrid games’ connection to analogue and digital games relates to prototypical ideas of what analogue and digital games are like, and blending those categories into the category of hybrid games. The categories relate to technology, but only accidentally: other types of hybrid games could be conceived by blending other types of categories. Furthermore, when looking at the successful hybrid games out in the market, it might very well be that the defining element for the success is not the technology, but the blend of experiences that the technology conveys.

### 4.1 Conceptual metaphor theory

One of the basic tenets of conceptual metaphor theory is that cognition is deeply metaphorical and based on our bodily experiences. Metaphor is not simply a linguistic expression, but a fundamental feature of cognition. Linguistic metaphors are based on metaphorical thinking, and not the other way around. In conceptual metaphor theory, metaphor is defined as a cross-domain mapping in the conceptual system [Lak93]. This is often expressed more plainly as *thinking about one thing in terms of another thing*.

How the metaphorical mappings happen is a complex matter, but there are typical ways metaphorical relations are mapped, learned and categorized [FT08, LJ80, Lak93]. They are learned through bodily experiences, usually as children. More basic categories are learned first, and the more complex categories are built by using these simple metaphors. Typical low-level metaphorical mappings are, for example, “categories are containers” and “more is up, less is down” [Lak93]. Conceptual metaphors can become conventionalized, thus working as building blocks for further metaphorical thinking.

Research has shown, for example, that thinking about time is tied to conceptions of space [Bor00]. Experiments have revealed that there are two ways of conceptualizing time: ego-moving, where we move in relation to time and time-moving, where time moves in relation to us. In an experiment, people flying into the San Francisco International Airport were more likely to use the ego-moving perspective than people wait-

ing to fly or waiting for other people to fly to them [BR02]. Moving in space made travelers conceptualize time from an ego-centric point of view.

A game-related experiment has shown that bodily actions can be used in place of mental simulation. Players of *Tetris* [Paj84] rotate differently shaped blocks on the screen in order to see what would be the optimal way of placing the block [KM94]. Instead of solving the problem through cognitive simulation (going through the options in their head), they use the game itself for thinking.

## 4.2 Conceptual blending

Conceptual blending is a theory of some specific cases of conceptual metaphors. Fauconnier and Turner [FT96] define blending as follows:

In blending, structure from two input spaces is projected to a separate space, the "blend." The blend inherits partial structure from the input spaces, and has emergent structure of its own.

This is similar to a conceptual metaphor, where one thing is understood in terms of another thing, but in this case the two things form a third, mixed area, called the blend. This new cognitive category has qualities corresponding to both of the source domains, but also qualities explained by neither of the source domains, the blend [TKN<sup>+</sup>16, cf. "hybrid design space"]. There is also a fourth domain, the generic space, which includes features shared by the source domains (see Figure 1). Some of the qualities are inherited from the first source domain, some from the second source domain and some will be unique to the blend.

Conceptual blending can be exemplified by linguistic examples. For example, it is easy to show that words like "safe," "dolphin," "shark" and "child" do not have simple meanings that always follow the same logic [TF95]. If we think a beach is "child-safe", presumably it means that the beach is safe *for* children. "Dolphin-safe" on a can of tuna probably means that fishing for the tuna is not harmful for dolphins. However, a "shark-safe" beach is probably not safe for sharks. In the last example, sharks are the danger that need to be guarded against. There is nothing in the words itself that mandates that these are the relations that they portray. It is our blending of the domains of children, dolphins, sharks and other related domains

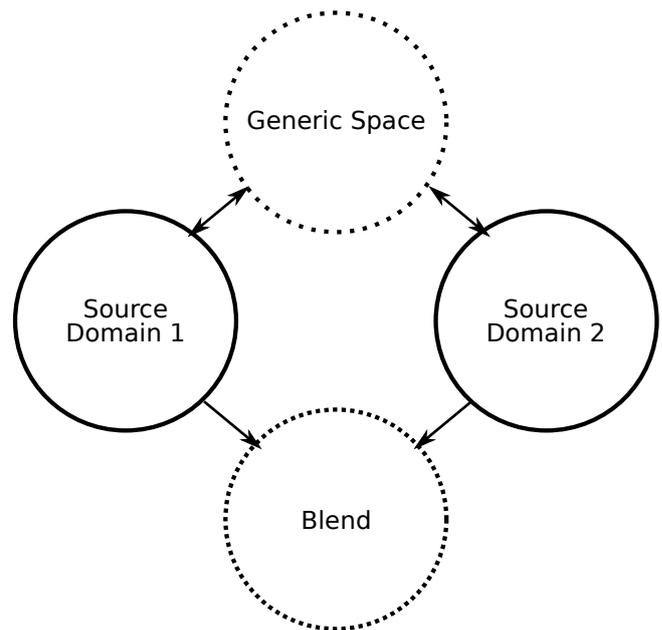


Figure 1: A simplified illustration of conceptual blending, adapted from Fauconnier and Turner [FT96]

that allow us to interpret the word-combinations the right way.

We can analyze the above example more closely in terms of generic space, source domains and blends (see Figure 2). The generic space in all of the examples contains ideas related to danger from some source. How that danger manifests differs in each example, but the idea of being threatened with harm relates to all examples. In the first example of a **child-safe** beach, the source domains are children and beaches. When combined with the generic space of safety, the blend then contains things that are related to children, beaches and danger. Since the primary focus in the word-pair is on children, the blend ends up relating to things that threaten the safety of children on beaches. What these are differ slightly from context to context, but presumably relate to dangerous fish, the threat of drowning and so on.

Understanding a **dolphin-safe** can of tuna requires knowledge of domains related to dolphins and fishing. A person knowing what a dolphin is probably knows that they live in different water areas, including oceans and rivers. If they also know something about fishing, they might know that it includes capturing fish and other aquatic animals in different ways, like netting, spearfishing or trapping. Even if one does not know the details of these different types of activities for catching aquatic animals, it is possible to imagine

some of them being more harmful for dolphins than others. The blend of a dolphin-safe can of tuna includes ways of catching tuna that are safe for dolphins.

**Shark-safe** relies on the same concept of safety, but the danger is not aimed at the sharks. The domain of beach is the same as in the child-safe example, but because the other domain relates to sharks, safety is framed differently in the blend. Sharks are not the ones being threatened; they are the source of the threat. There is nothing explicit about it in the words themselves, but the target of the threat is probably humans. Therefore, a shark-safe beach ends up meaning a beach where sharks do not threaten humans.

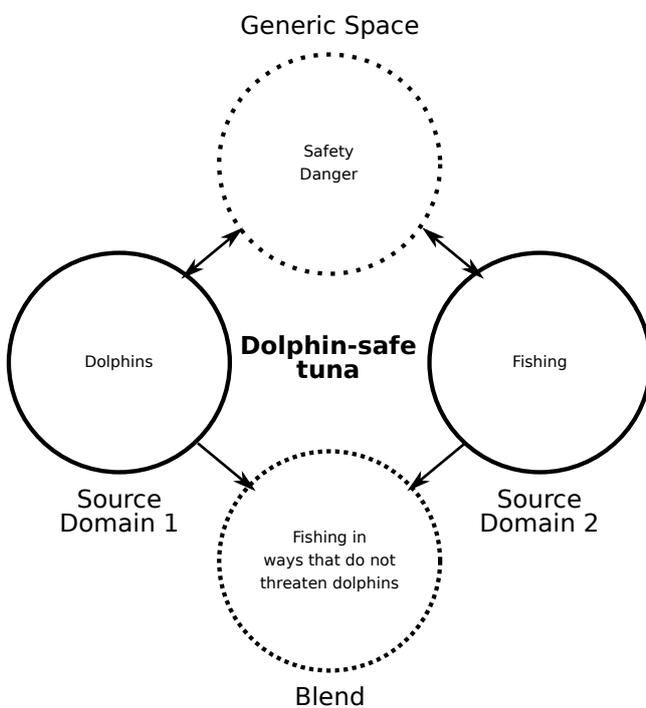


Figure 2: *Dolphin-safe* analyzed in terms of blending

## 5 Hybrid games as blends

Blending theory is able to account for the problems mentioned above that result from understanding hybridity only in relation to technology. Hybrid games are not defined by their relation to technology, although this may in some cases and certain contexts be important. Rather, **hybrid games are blends of different conceptual domains related to games** (cf. [Gee08]). The broad array of things that are included under the concept of hybrid games exemplifies the different domains that make up the concept. Hybrid

games include things ranging from electronic board games to pervasive street games. The common denominator seems to be a domain not usually associated with a certain type of playing blended with a familiar type of game domain. Looking at hybrids as blends avoids fixating on the viewpoint of technology.

Hybrid games draw from many different domains. A significant number of domains are not related to technology, while technology does play an important role in many of them. Our analysis lists only some of the components of the generic space and blend, and only some of the domains used in the blends. The analysis is not exhaustive of all of the features, as the goal is to introduce a certain approach to analyzing hybrid games.

One could use the domains described in the following examples to generate new hybrid game products. By analyzing the cases and separating the domains that make up a hybrid game it becomes easier to recognize which elements form the resulting experience. By using those elements designers can design for those particular experiences and apply the features that best fit the desired product.

### 5.1 Where do the source domains come from?

Analyzing source domains is a process of interpretation. They are cognitive categories, and therefore dependent on the interpreter. This does not mean that they are arbitrary: cognitive categories are highly stable and intersubjective. The domains reflect the cognitive categories of the interpreter, which means that expert interpreters are going to have more fine-grained categories than people not familiar with the topic [CC04].

Interpreters use the categories available to them, so in order to get the best results, one should use interpreters familiar with the object being analyzed. In the case of hybrid games experienced designers have the most fine-grained cognitive categories available to them and will do the best job at analyzing the examples. The following analyses reflect our understanding of hybrid games. See 6 for a breakdown of source domains.

The analyses in the next section follow a simple heuristic for recognizing domains.

1. We chose cases that are somehow exceptional or interesting. This is not necessary, but makes the analysis easier and more fruitful.

2. We examined the cases to identify other examples that are close to, but not identical, to the cases under review. These comparisons allowed us to recognize what made our cases different from the baseline we were comparing them to. Here is where our experience as games researchers helped, since we had extensive background knowledge of games.
3. After recognizing the domains that set our cases apart from other, similar cases, we focused on the domains themselves. Instead of an exhaustive list of domains, we focused on domains that make the cases in question exceptional. For example, most board games contain cardboard pieces, so the presence of cardboard pieces is not exceptional. The material side of the game is only important if it is specific to the game in question.
4. Once we had recognized the important domains for analyzing a certain case, we analyzed the domains in question in terms of blending. This lets us recognize which features are specific to a certain domain, which belong to the generic space and which are specific to the blend.

We do not list all phases of the analysis for all of the following examples for the sake of brevity.

## 5.2 Examples of hybrid games with digital computing

While a significant number of domains are not related to technology, technology is a common as a component in many recent commercial releases. This section describes examples of releases which include digital computing (see Table 1).

### 5.2.1 XCOM: The Board Game

*XCOM: The Board Game* [Lan15] is a prototypical blend of board games and digital games. It has a board with physical objects as tokens that are moved according to the events of the game. However, it also requires a smart device app that controls some aspects of the game, like determining the resources available on a particular round, the amount and type of enemies encountered and, importantly, the time available for players to act. After the time is over, the app forces the game to proceed.

*XCOM: The Board Game* blends **resource management board games** with features of **digital games**.

The game is still heavily material with playing cards, tokens, and dice, thus separating it from a fully digital board game adaptation. Some aspects of the game, like randomly determining events, could be easily achieved through board game mechanics. Keeping time could also be done with an hourglass, but that could not enforce the time limits, like the app does. In a purely physical board game players could simply ignore the hourglass, but blending elements of videogames changes the experience to a one externally controlled. This also allows for **dynamic time limits**, not limited to the amount of sand in the hourglass. The app also uses music and other sounds as a cue for the dwindling time, which **heightens the tension of the atmosphere**.

Further, the app has some power over the flow of the game and in this sense it acts as a virtual game keeper. This allows players to concentrate more on the co-operative gaming experience, as the app minimizes the human players' need to control how the system acts against them. By taking some control over the game, with an atmospheric audio, and forced time limits, the digital element also **intensifies the dynamics of social interaction** between the players.



Figure 3: *XCOM: The Board Game* (photo by Frans Mäyrä)

### 5.2.2 Keep Talking and Nobody Explodes

*Keep Talking and Nobody Explodes* [Ste15] is a collaborative game where one player defuses a bomb seen on a screen or through VR-glasses, and other players give instructions based on a bomb defusal manual. The experience of certain players is confined to be purely material (in the case of players reading a printed manual), or digital (in the case of a player defusing the bomb). The players with the manual are not supposed to see the bomb the player looking at the screen is interacting with. Talking is the only form of interaction between players. This forms what could be called a

*hybrid space*, which is a **blend of physical space and the digital space** ([dSeS06, dSeS17, cf.]).

The resulting game is a **blend of a blindfold game and a puzzle game**. In blindfold games some players are not allowed to modify the game state, but need to inform the players who can do this. The puzzles have preset elements (the manual), but because part of the game is digital, it can also **generate new puzzles procedurally**. Playing the game requires reading the manual, as if learning to operate a new machine or tool. As is usually the case, many levels and variations of blends can be realized in a single product. As such, *Keep Talking and Nobody Explodes* can also be considered a **blend of reading a manual and playing tutorials**. Players reading the manual have the experience of reading a manual, while the one defusing the bomb uses them as her tutorial through the game.

### 5.2.3 Hitman Go

*Hitman Go* [Squ14] is a digital board game and part of the *Hitman*-franchise of digital games. In *Hitman Go*, the player controls the series' usual protagonist, Agent 47, in puzzles that evoke the feel of board games. Agent 47 tries to reach a preset goal while moving along lines occupied by enemies. Everything happens in turns, and when a character is removed from the game, the token is knocked over like a board game piece and set beside the playing area. The rules are simple and straightforward enough that the game could be implemented as a traditional board game.

*Hitman Go* **blends board game aesthetics with digital puzzle games**. The game is completely implemented on a digital platform, but the look, feel and mechanics are borrowed from board games. It would be possible to play the game on a board, making *Hitman Go* a digital board game. Even progress in the game blends practices from digital games and board games. To open up new levels, players must reach a certain score on the previous levels. When new levels are opened, they are presented as board game expansion boxes (see Figure 4).

The aesthetics involved and the tactile nature of the pieces are considered important for a board game experience. Some players specifically mention opening the game box in this context [Woo12]. The visual aesthetics of *Hitman Go* evoke the experience of playing with tangible toy-like miniatures, although the miniatures are only virtual. Still, it can be seen as one of the building blocks that makes the experience novel.



Figure 4: Opening a new level in *Hitman Go* (Square Enix)

### 5.2.4 Anki Overdrive

*Anki Overdrive* [Ank15] is a remote controlled car racing game where each player uses a mobile phone app as a controller. The players create a custom track from physical track pieces for small toy cars to race on. It is also possible to race against AI opponents. In addition to controlling the cars, the app also enables the players to collect items and use special features and power-ups while racing in a similar fashion as in kart racing video games such as *Mario Kart 64* [Nin96].

Originally electronic, slot cars were commercially introduced in 1912. They were able to run a track specially made for that purpose. *Anki Overdrive* **blends slot car racing with digital kart racing**. The cars follow a specially made track, but can run off-course, and elements from the digital game can influence the physical running of the cars through power-ups or AI. On the other hand, upset players can just grab their opponents' cars and remove them from the game. However, in this case the blend could also use source domains of **mobile gaming and slot car racing, or mobile gaming and toys**. As noted earlier, there can be more than one blend in a single product.

While playing, players must understand the game as a blend of physical elements (seeing the cars on the track) and digital effects (power-ups that affect the way their car behaves). When they lose control of their car because an opponent used a power-up, they blend digital effects with the running of the physical car.



Figure 5: *Anki Overdrive*

### 5.2.5 Rocksmith

In *Rocksmith* [Ubi11] the player uses a regular electric guitar to play songs according to on-screen instructions created by the game. *Rocksmith* gives simplified instructions to less experienced players, while experienced players can follow the original songs.

*Rocksmith* blends concepts from two sources. First, there is the **domain of music**, more specifically the already complex domain of playing an electric guitar. An electric guitar is turned into a game controller through the use of a specialized connecting cable that turns the signals from the electric guitar into a format suitable for *Rocksmith*. Second, there is the source **domain of videogames**: the game is portrayed in a traditional manner on a screen. However, the videogame context that is part of playing *Rocksmith* is built on the tradition of certain rhythm games which imitate the playing of physical instruments, started by *Guitar Hero* [Har05] and continued by *Rock Band* [HP07]. The plastic controllers used in these games are simply replaced by an electric guitar. Therefore, *Rocksmith* blends **playing an electric guitar with rhythm games** that are themselves blends of playing videogames and playing instruments.

Because *Rocksmith* uses game elements, like difficulty, scoring and analyzing performance, it can evaluate and guide a player learning to play guitar. *Rocksmith* includes a game mode called Guitarcade, which combines playing the electric guitar to arcade games. For example, one of the game modes called Ducks is similar to *Galaga* [Nam81] (see Figure 7).

### 5.2.6 Pokémon GO

*Pokémon GO* [Nia16] is a location-based augmented reality game where players gather virtual monsters

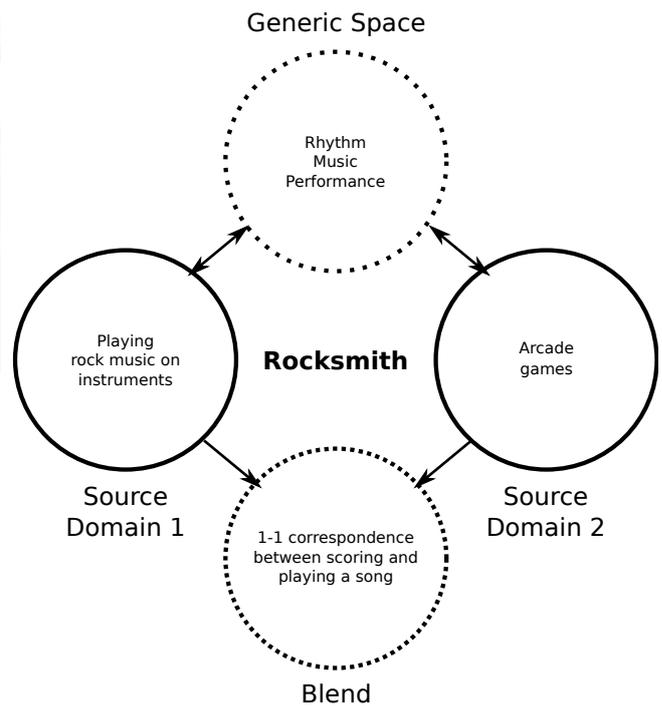


Figure 6: Blending in *Rocksmith*

and compete to control gyms located in physical locations around the world. It is based simultaneously on a smart phone screen and in the physical location, decided by the phone's location services. While the player moves in physical space, their avatar moves in virtual space. Proximity to Pokémon is required to catch them. When catching a Pokémon the player can use augmented reality to display their physical surroundings on the phone's screen, with the Pokémon shown as an augmented reality overlay. The game also contains a social element with other players present in both virtual and physical worlds, and allows players to work collaboratively in either of these. *Pokémon GO* is played in what [dSeS17] calls a *hybrid space*.

*Pokémon GO* demonstrates what is true of all augmented reality games: they are necessarily hybrid, requiring players to blend different spaces into one ([Sta15, cf.]). One of those spaces is virtual, while the other is physical. In order to navigate the virtual space, the player has to map their physical space and their own location to the avatar on the screen. It is similar to reading a map, but with augmented elements that are tied to physical locations, interactive only in the virtual space. The act of finding Pokémon using a digital map also has similarities to the traditional game of treasure hunt, where participants use a map or other clues to find hidden treasures. As such this game can



Figure 7: *Rocksmith* with a base guitar playing Ducks

also be considered a **blend of treasure hunts and digital mapping**.

### 5.3 Examples of hybrid games without digital computing

As most games discussed as hybrid games contain a digital component, this section demonstrates examples which do not include a component based on digital technology, and act to strengthen our position on hybrid games as blends (see Table 1).

#### 5.3.1 Nightmare

*Nightmare* [CT91] is a VHS board game, which revolves around a gate keeper that players see on a TV screen. The campy aesthetics of the video are similar in style to old horror shows, such as *Elvira's Movie Macabre*[Tho81], where a host(ess) presented b-grade movies of the evening for the audience. The game itself is similar to *XCOM: The Board Game*, described in 5.2.1, in that the VHS tape acts as a time keeper and as a source for certain events. The difference here is that the VHS tape is not interactive.

The game blends rather simple board game mechanics with a type of game master, controlling the events of the game in video form. This adds another person to the game, although that person cannot be interacted with at all. Additionally, **the game blends the experience of playing a board game with friends to the**

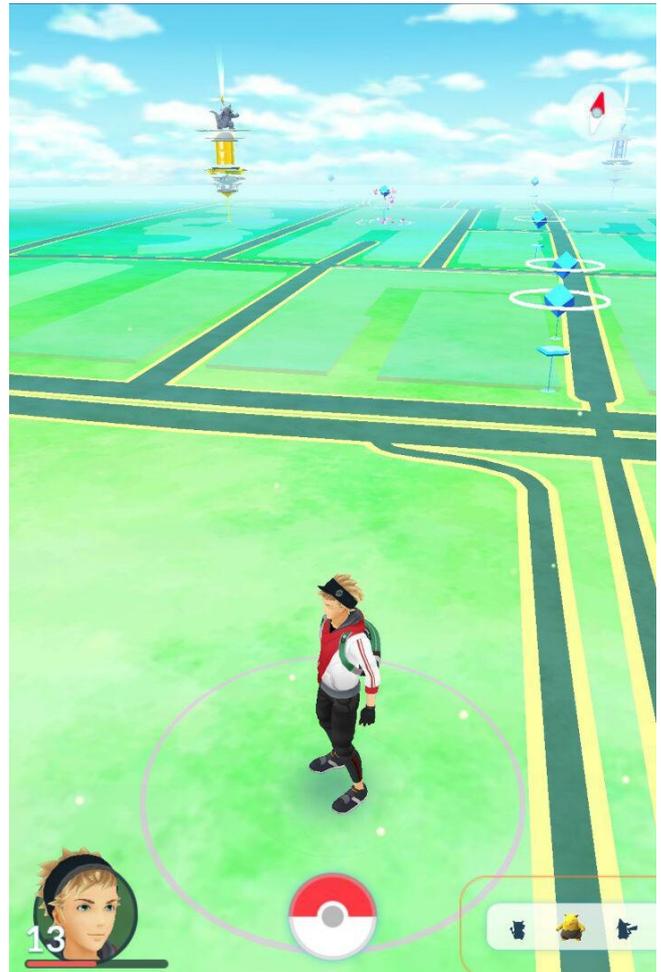


Figure 8: *Pokémon GO* (Niantic)

**experience of watching a movie using a VHS player at home.** The effect is heightened by the fact that the VHS cannot be controlled in an interactive way. As noted above, there are also similarities to TV horror shows which could be considered one domain of a blend, especially if a single gaming session is compared to a single episode of a series.

#### 5.3.2 Spot Bowler

When pinball machines with flippers were first introduced, they created a blend which contained features of billiards and bowling games and also features of games which featured constant action, such as shooting galleries. This particular game of pinball also blends in bowling specifically, in the form of the game theme and certain game actions. Interestingly, pinball games have common origins to the game we know as bowling today. This is somewhat similar to

how *Rocksmith* blends playing real instruments with playing rhythm games, where rhythm games are themselves based on playing instruments.

*Spot Bowler* is a bowling-themed mechanical pinball game known for being the first pinball game with flippers positioned to the, now common, position and orientation at the bottom of the field. In addition to the flippers, the game contains bumpers and bowling pins which light up. The game blends a type of **arcade action gaming**, where the player is required to have fast reflexes and respond to game events, to the experience of **playing a billiards or bowling type game**, where the game is passive after the first thrust of the ball.

### 5.3.3 Dungeons & Dragons (D&D)

When *D&D* [GA74] was published in 1974, it assumed knowledge of a separate set of rules from another game, *Chainmail*. *Chainmail* focused the gameplay to individual characters. Previously, similar games had focused on battles of opposing armies in a hobby scene that was known as wargaming. *D&D* added fantasy elements to *Chainmail* and focused the game further to deal with individual warriors, continuing a trend where those individuals are much more central to the game. Later role-playing games are less about wargaming and more about storytelling, forming a separate hobby usually called table-top role-playing.

When created, *D&D* combined the previous hobby of wargaming to storytelling inspired by the participants' interest in fantasy literature. One might also see some relation to the tradition of campfire storytelling. Rules derived from war games handled some of the interactions between the individual characters played, but the rest were up to negotiation between the person adjudicating the game (Dungeon Master) and the other players at the table.

Development of *D&D* did not stop there. Later editions have taken influences from other media, with the fourth edition (2008) borrowing game concepts and conventions from massively multiplayer online role-playing games (MMORPG). While the original *D&D* was a **blend of wargaming and storytelling**, the fourth edition blends table-top role-playing and MMORPGs. In turn, *D&D* has acted as a source domain for multiple blends, like computer role-playing games and live-action role-playing games, which are now rarely thought of as mixes of something else.

## 5.4 Hybrid games analysis summary

The subsections above, we have analyzed different game examples through blending. The games using digital computing, presented in 5.2, are modern examples of blends, and were chosen for analysis as they represent various approaches to blending physical and digital elements in a single product. Those examples were followed in 5.3 by historical examples of games that can be considered as blends when they were first created, although today they reside fully in their own domains, and can act as a source domains for new blends. In each case, we focus on few examples of blending, without trying to analyze all of the possible variations or domains related to the case.

However, there are also more general types of blends highlighted by our analysis. In Table 1, we present a list of example blends which relate to the examples of games we have presented. The table, in addition to showcasing certain blends and which games relate to those blends, also highlights how certain blends can be found in various games, and how one game can be composed of several blends. It also highlights how the blends we have described in 5.2 and 5.3 were by no means an exhaustive list, and many other blends can be connected to the example games. For example, **hybrid space** is a general type of blending present in at least all games that happen in both virtual and physical spaces. **Cross-media aesthetics** are present in *Hitman Go*, but could also inspire different types of aesthetic hybrids. In the table, some of the example games are present in more than one blend. This shows how there can be various different blends from multiple domains in a single product. For example, *Anki Overdrive* uses the hybrid space above, but also contains **slot cars with digital power-ups**, which is much more specific to this game. Although there are not many similar games out on the market, the blend is in no way limited to only this game.

## 6 The evolution of domains

One way to understand how blends work is to examine how blends become established as stable domains that can then be used for further blending. Any new game that innovates in some way is a blend of new elements, but as those elements become common in design, designers stop seeing them as blends. We examine this process through one example. Figure 9 shows the evolution of games from wargaming to *World of Warcraft*

Examples of blends			
Blend	Source Domain 1	Source Domain 2	Example Game(s)
External control, Dynamic time limits, Theatrical tension, Intensified social interaction	turn based resource management board game	tactical real-time digital game	<i>XCOM: The Board Game</i>
Hybrid space	physical space	virtual space	<i>Keep Talking and Nobody Explodes, Anki Overdrive, Pokémon Go</i>
Procedural puzzle generation	puzzle games	blindfold games	<i>Keep Talking and Nobody Explodes</i>
Human as a tutorial	reading manuals	playing tutorials	<i>Keep Talking and Nobody Explodes</i>
Cross-media aesthetics	board game aesthetics	digital puzzle games	<i>Hitman Go</i>
Slot cars with digital power-ups	slot car racing	karting games	<i>Anki Overdrive</i>
1-1 correspondence between scoring and playing a song	playing an instrument	rhythm games	<i>Rocksmith, Guitar Hero, Rock Band</i>
Digital map based treasure hunt	treasure hunts	digital mapping	<i>Pokémon Go</i>
Combination of evening pastimes	playing board games	watching movies	<i>Nightmare</i>
Pinball games	mechanical arcade game / carnival game	billiards	<i>Spot Bowler</i>
Role-playing games	wargaming	free-form storytelling	<i>Dungeons &amp; Dragons</i>

Table 1: Examples of blends

[Bli04]. The figure does not present all possible influences, as that would too complex to to show in one picture. Instead of listing each intermediate step, the figure shows prototypical examples.

Wargaming worked as a starting point for what eventually became *D&D*. An earlier miniatures game, *Chainmail*, focused the gameplay to individual characters. When *D&D* introduced fantasy elements, role-playing games were born. At this point, *D&D* was understood as a blend of wargaming. Later, it has been the prototypical example of role-playing games.

There are at least two different paths how elements have been blended into the games derived from wargaming. When computing was introduced to role-playing games, a tradition of single-player role-playing games was created. There are too many to name, but one prototypical example is *Baldur's Gate* [BB98]. It tried to emulate the experience of playing *D&D* on a computer, for example by using the rules and a published setting from *D&D*.

Another path of influence is through *Colossal Cave Adventure* [CW76]. It combined it's creator's love for caving to elements of *D&D* and computing. A few years later *Multi-User Dungeon* [TB78] emulated *Colossal Cave Adventure's* text interface, but introduced real-time multi-playing and borrowed both fantasy elements and game mechanics from *D&D*. Later, *Habitat* [LQF86] added a graphical interface to what had previously been text-based multiplayer games. Finally, *World of Warcraft* [Bli04] combined MMORPG elements developed in MUDs to fantasy elements built in the rich tradition of fantasy games since *D&D*.

As can be seen from this example, advances in technology play a crucial role in the development of games from wargaming to *World of Warcraft*. However, other crucial influences come from fantasy literature, caving and table-top game mechanics. As this example shows, developing good games requires more than advances in technology.

Figure 9 shows a series of blends starting from

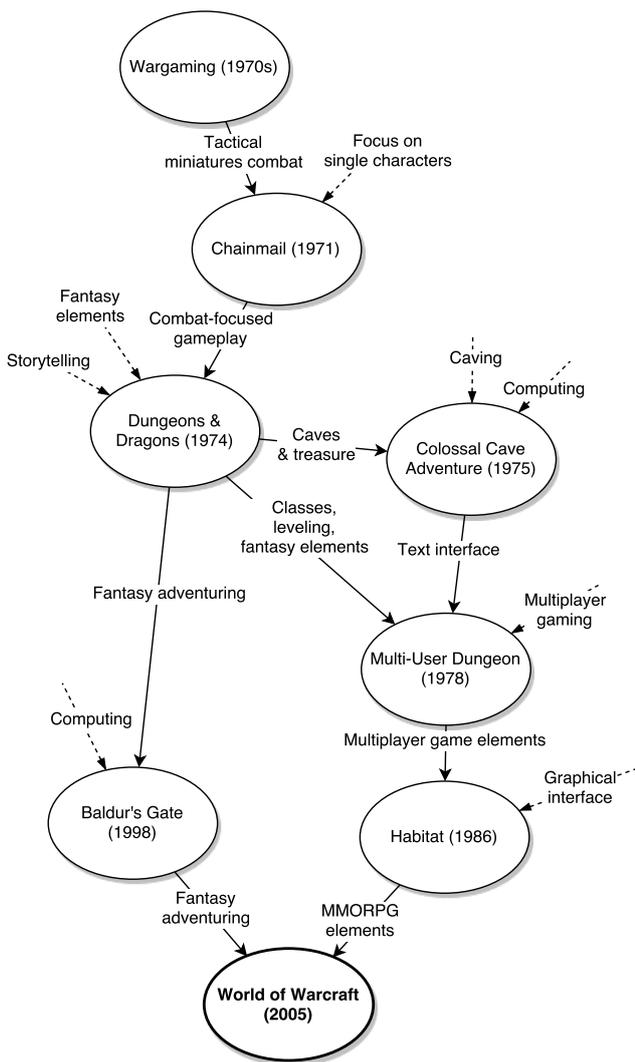


Figure 9: A simplified family tree from wargaming to *World of Warcraft* [Bli04]

wargaming and ending in *World of Warcraft*. However, the purpose of the figure is to show an overall picture of the development, so the figure lacks a lot of details. Figure 10 shows one of the steps in more detail, showing how *World of Warcraft* combines features from two previous source elements. It also shows the generic space shared by these domains.

## 7 Design implications

Examining games as blends puts the focus on the experiences within games, providing the designer with a tool for designing particular combinations of experiences. However, this tool does not guarantee that each combination results in a good game, or that they

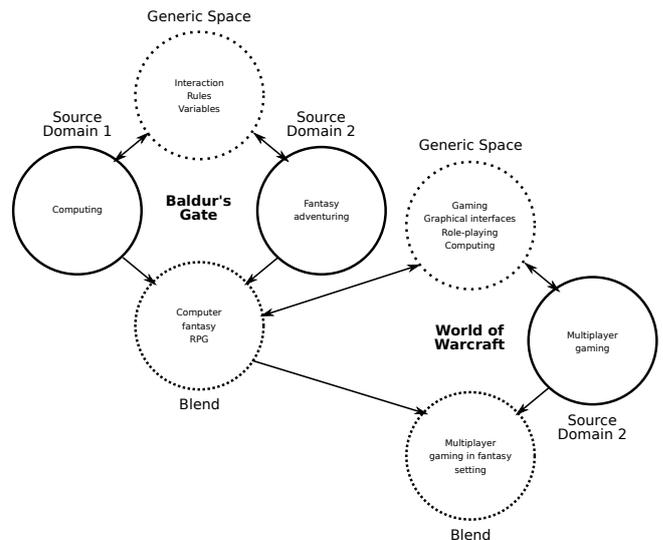


Figure 10: An example showing *World of Warcraft*'s [Bli04] relation to *Baldur's Gate* [BB98]

fit together. It also does not state that all previous blends are good, although those blends that have become established (such as role-playing games), and are source domains for many other games (like computer role-playing games, or live-action role-playing games), most likely have favorable attributes. However, using our approach as a tool alters the thinking space of the designer and gives input into the current design situation based on historical blends.

In some cases established domains can be similar to or closely aligned to design conventions that designers are used to looking for in existing games. Design conventions are features that are popular in certain types of games, such as collecting coins in platformers. Collecting coins is one of the defining features of platformer game domain in a similar way as collecting power-ups is one feature of carting game domain. This way the domains are recognizable by looking at the design conventions and the types of earlier games those are related to. This allows the designer to reverse engineer games in order to understand where the influences of a certain game lies. This can aid in connecting the domains in novel ways, borrowing features from existing games.

In table 1, we have listed some examples of blends and source domains found in games we analyzed. Although there is only limited amount of examples, it already shows the potential as a tool set for coming up with novel game ideas. For example, by blending slot car racing with rhythm games one could create a game

where players need to control the slot cars by playing a certain rhythm. On the other hand by using domains of blindfold games and watching movies, one could come up with a game where one player is blindfolded and needs to use audio cues to guess what is happening on a TV-screen.

The tool also works as a way to communicate with others on the team, and works to make written documentation more understandable. This is because the tool gives a method for describing experiences and their relations. This method does not impose many formal requirements for such descriptions, and is designed not to do so, as the description of experiences is intended to be kept only semi-formal, in order not to create obstructions for the designer, but only to act as a support.

## 8 Discussion and future work

Previous research in hybrid games has been very technology-focused. Understanding hybridity in this manner makes comparing different hybrid projects difficult. Is hybridity mostly about digital tabletops [HFK<sup>+</sup>10], pervasive games [HLMR07] or augmented board games [DB13]? If we follow the logic of earlier research, all kinds of digital games end up looking like hybrid products simply because they have always included new and interesting user interfaces (e.g., The Power Pad for the NES in 1986). Using controllers for digital games always requires moving your body in physical space, even if it is only your thumbs that move.

Cases of hybrid games are not limited to the cases described in Section 5.3. For example, one could conceive of a biological hybrid game that could use the input of a growing tree to affect a game. This is not related to technology, but would blend domains not usually associated together. Another nature-based blend could use the surrounding weather to affect game states. A less outlandish example is the difference in traditions related to cultural differences in European and American board games. Board games that bridge that gap by combining features from both traditions (e.g. *Eclipse* [Tah11]) could be seen as blends of both, and are generally called hybrids by board game hobbyists. Some fully physical board games use features usually seen in the digital games. In the most popular game on the website BoardGameGeek, *Pandemic Legacy: Season 1* [DL15], the physical elements of the game are modified after each game, for example

by putting stickers on them or ripping some cards in to pieces. This approach is rare in the board games, but resembles the way campaigns progress in digital strategy games. *Pandemic* can be considered a blend of the two.

One often used way of categorizing games is whether the outcome of a game is determined by skill or by chance. The presence and importance of this type of categorization is related to gambling legislation. For example, there has been much debate worldwide on whether the game of Poker is predominantly a game of chance or a game of skill, and what the meaning of that distinction is in terms of the law [KDV07]. Regardless of which feature is predominant, we can say that it contains both, and is thus a blend of skill-based games and chance-based games. This type of blend has become so common that it is rarely talked about out of the context of legislation. This example also acts to show that technology is central, but not essential, to understanding hybrid games, and that there are more properties to consider than just technological ones.

Our definition also has the consequence that the concept of hybridity changes over time. As different domains are no longer seen separate, one can no longer create hybrid experiences by combining them. We see this as a strength: as our surroundings change, so must the theory that describes it. This understanding of hybridity is closely related to what Wittgenstein [WA01] calls family resemblance and language-games. Concepts must necessarily be understood in their social and linguistic contexts. As the context changes, so does the concept.

One possible future step that enables new and concrete possibilities for using our approach in the analysis of games, is to create a large network as a searchable database. The database should describe multiple blends and their connections, as is exemplified in Section 10. The source domains of a blend are a combination of its direct source domains, but also of a subset of their source domains, and so on. This type of database could provide designers with a tool to explore blends and how they relate to other blends. The key to a working process would be to allow duplicates, e.g. some blends may be the same as others, but may not connect directly to the same source domains. In time, when the database develops, it would be possible to identify information about alternate paths from blends to their source domains, including more detailed paths which include a more fine-grained set of blends. Through

traversing such a network, one would be able to learn meaningful information about how blends have developed. While we do propose the creation of such a network, executing the process itself is beyond the scope of this paper.

Another avenue for the future work would be to apply this model to a wider analysis of existing games, hybrid and other kind, in order to find more source domains that are widely used. This process would work towards recognizing blends in current games and creating a set of common blends similar to ones described in Table 1. This kind of list would help designers to identify some of the source domains of blends appearing in current games and work as a starting point for them to generate novel ideas by mixing different domains into new kinds of blends. Such a list is hardly ever exhaustive as there are numerous ways to generate blends depending on the point of view and expertise of the analyst. However, such set could work as a basis for the network described above.

## 9 Conclusions

We suggest that more attention should be paid to how hybrid experiences are created. Hybridity is an example of blending, mixing of two different domains that are usually separate. With hybrid games, these domains usually involve one from (digital) games and some other domain. However, this conceptualization of hybridity allows for hybrids that are not dependent on any specific type of technology.

Consumers are usually interested in new experiences hybrid products can offer, not the hybridity in itself. Game designers should therefore pay attention to what domains they are working with, and what assumptions those domains draw from. Understanding how those domains interact is paramount to designing hybrids. In order to create interesting hybrid products it is more important to understand what the actual experiences users are enjoying in these domains are, and how the experiences can be melded together in the hybrid product. Further, by understanding hybridity as a larger phenomenon it becomes easier to come up with novel ideas for hybrid games.

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