Exploring Meaningful Hybridity in Hybrid Digital Boardgames

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Abstract

As modern tabletop play becomes more hybrid through the integration of digital tools, hybrid digital boardgames (HDBs) – games which mix physical and digital components – can be seen as "gimmicky". Previous work has explored the use of technology in hybrid play settings, but relatively little work exists on what makes hybridity meaningful in HDBs. In this paper, we present a model for understanding how meaningful hybridity is constructed through the relationship between the technology, game, and player. Over twelve months, we convened a monthly Critical Play Reference Group of 21 local players to play and discuss a curated selection of HDBs. We analysed 37 semi-structured group interviews for qualities of meaningful hybridity across 25 unique published HDBs. This model identifies what players assess in their HDB experience and how that maps to their overall perception of hybridity, informing the design and evaluation of meaningful hybrid game experiences.

CCS Concepts

• **Human-centered computing** → *Empirical studies in HCI*; **HCI design and evaluation methods**; *HCI theory, concepts and models*; • **Software and its engineering** → **Interactive games**.

Keywords

Hybrid, Boardgames, Player Experience

ACM Reference Format:
Sasha Soraine and Melissa J. Rogerson. 2026. Exploring Meaningful Hybridity in Hybrid Digital Boardgames. In *Proceedings of the 2026 CHI Conference on Human Factors in Computing Systems (CHI '26), April 13–17, 2026, Barcelona, Spain.* ACM, New York, NY, USA, 19 pages. https://doi.org/10.1145/3772318.3791168

1 Introduction

Modern tabletop play is becoming increasingly hybrid through the integration of digital tools and components. Previous work explores how novel (e.g. smart digital tabletops [43], biofeedback mechanisms [92]) and existing (e.g. soundtracks [33], AI-powered gamemaster tools [51]) technologies augment physical games; and the ways players appropriate technology to afford distanced play [85]. Comparatively, there is scant work on Hybrid Digital Boardgames (HDBs) — boardgames which *necessarily* require both physical and digital components *during* gameplay [77]. Opinions on HDBs are mixed [34, 54], with ongoing concerns that digital components can be 'gimmicks'[1] [76]. The message from these works is that digital components must be meaningful, thus leading to multiple design guidelines for the creation of digital tools [50, 76]. This spotlight on the digital components belies the truth — we do not have a clear understanding of meaningfulness in the context of hybrid boardgame player experience (HDB-PX). Taking a constructivist perspective, we consider that players construct an intuitive understanding of meaningful HDB-PX through their interactions with HDBs. By tapping into these latent meaning-making processes we derive a better sense of meaningful hybridity.

In this paper, we explore how players construct a meaningful HDB-PX and by extension, what they consider *meaningful hybridity*. We convene a monthly Critical Play Reference Group (CPRG) [74], where local boardgame players participate in HDB-focused play sessions and are then interviewed about their experience. We use reflexive, constructivist grounded theory [19] to analyse 37 semi-structured group interviews, covering 25 unique published HDBs, played over twelve months by 21 different players. From this dataset, we identify three categories of hybridity and eight ordered processes that players use when assigning an HDB to one of these categories. We present these results as a grounded theory of meaningful hybridity, which illustrates the processes underlying how a player interprets HDB-PX after playing a new HDB.

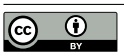
Our work contributes to understanding players and what they value in their HDB-PX by constructing a theory of meaningful hybridity grounded in empirical observation and interview data. This theory articulates the relationships between technology, game, and player as indicators of meaningful HDB-PX in the context of playing a new HDB. Thus, our theory is valuable for informing the design and evaluation of meaningful hybrid game experiences. Furthermore, our work serves as evidence for the benefits of running a CPRG to generate deep insights into PX.

2 Background

To investigate how players construct meaningful hybridity, we first need to establish our understanding of relevant work around hybrid games, player experiences (PX), and meaningful play. We begin by exploring existing hybrid games research; defining hybridity, highlighting the broader work on non-HDBs and players' attitudes towards technology, before focusing on HDB specific literature. We then summarise existing work on PX, focusing on its applicability to tabletop gaming experiences. Finally we touch on work about

*Both authors contributed equally to this research.

[1] Lacking substance or value.



CHI '26, Barcelona, Spain

ACM ISBN 979-8-4007-2278-3/26/04
https://doi.org/10.1145/3772318.3791168

meaningful play, outlining both its definition(s) and connection to gaming literacy. Through this review we find there are no established consensuses on what is a hybrid game, what constitutes PX (in videogames, or boardgames), and what defines meaningful play. However, the existing work provides evidence that exploring meaningful hybridity requires understanding of how players perceive hybridity relative to both potential experiential constructs (e.g. immersion, materiality) and their existing gaming literacy.

2.1 Hybrid Games Research

Arjoranta et al. [7] experientially frame hybridity as a blending of separate conceptual domains. In the context of games, this construction of hybridity focuses on how individual game elements relate, both literally (at the level of interactions) and metaphorically (at the level of conceptual models), to create a novel PX.

In Human-Computer Interaction (HCI), hybrid games research tends to focus on a literal level of hybridity by exploring the design and use of technology to augment tabletop games and play. Numerous works explore the design of novel interfaces and modes of interaction, such as smart digital tabletops [8, 43, 64], biofeedback mechanisms [36, 92], electrochromatic game tiles [48], digital deformable playing cards [53], capacitive game pieces [3], virtual dungeon masters [5, 45], and personal fabrication tools [87]. Adjacent work explores how players integrate technologies into their broader play practices, such as using large-language models as assistive game master tools [51] for tabletop roleplaying games (TTRPGs), adding soundtracks to their gaming sessions [33], or leveraging other software for distanced play [85]. These works give us insight into game design and playability, but do not often deeply engage with PX.

This is problematic because players express complex attitudes towards technology in their tabletop play, including concern about the *digital augmentation fallacy* — the contested idea that technology inherently improves an experience [18]. While there is evidence that some TTRPG players, particularly Game Masters (GMs), embrace assistive generative technologies [89], work targeting boardgame players suggests generally negative attitudes towards hybrid games [54]. Particularly, Kosa and Spronck [54] noted that for app-augmented games, players have major concerns around the "obsolescence/incompatibility of technology" and dislike the "presence of electronics/screens". Rogerson et al. [76] found boardgame industry professionals shared similar concerns about the longevity of digital tools, the effect of screens on player sociality, and the perception of technology as a 'gimmick'—a flashy selling feature, lacking intrinsic value—but were potentially more open than players to the possible benefits of technology.

2.1.1 Hybrid Digital Boardgames. Existing work on HDBs concerns design and ideation, such as Kankainen and Paavilainen design guidelines [50], the SMeFT Decks [75], and the Analogue-Digital Hybrid Board Game Ideation Deck [34]. We highlight below the works we see as relevant to HDB-PX.

Rogerson et al. [77] developed the *Hybrid Digital Boardgame Model* (HDB-Model) which describes eight domains of functionality found in existing digital components: timing, randomising, housekeeping, informing, teaching, calculating, remembering, and storytelling. The HDB-Model provides valuable insights into the types of labour digital components, particularly apps, afford. Each domain has multiple individual functions, which correspond to the work done by the digital component that was observable by players. Given the lack of player agreement on what makes a hybrid game [76], this model serves as both an analysis tool and vocabulary for exploring meaningful hybridity.

Working with the HDB-Model, we [84] explored the PX impacts of hybridising Timing and Randomising functions by conducting a mixed-methods study of a commercial off-the-shelf and custom hybridised version of *Spy Guy: Fantasy* [63]. The results suggest that apps need to provide more than just functionality to be accepted by players, and that existing PX measurement tools may be insufficient for capturing HDB-PX.

Silva and Jucá [82] explore HDB-PX and playtesting through the evaluation of their HybridGamePX framework. This framework outlines seventeen perspectives, with related guiding questions, for researchers to evaluate the playability and PX of an HDB. The perspectives incorporate all of the HDB-Model domains except Calculating, and add artificial intelligence, personalization, longevity, digital device flow, app-as-support, privacy and individuality, dispensability, player-game interaction, player-player interaction, gameplay, and environment.

Given this existing context, we understand that exploring meaningful HDB-PX needs to account for these design-level elements and the higher-level metaphors.

2.2 Player Experience in Boardgames

PX is generally understood as the personal experience of playing a game based on the qualities of the player-game interactions, and so ought to be measured during or directly after play [96]. There is no consensus on the constructs underlying PX, however it is generally accepted to be multi-dimensional and context-dependent [11, 83]. Common constructs include fun [60, 61], immersion [13, 32], flow [20, 25], engagement [66, 95], involvement [17], and presence [47, 88]. There are multiple popular PX measurement tools, such as the *Player Experience Needs Satisfaction* (PENS) [78], *Games Experience Questionnaire* (GEQ) [46, 71], and *Player Experience Inventory* (PXI) [1]. However, existing measurement tools are criticized for being convergent [27], poorly validated [49, 59], and limited in the types of experiences they capture [83, 93].

More importantly to us, PX work is grounded in videogames. It is unclear how or even *if* its constructs and measures apply to tabletop PX. Existing PX work does not account for the importance of materiality [73], or the inherent sociality expected in tabletop play [98, p. 167]. Farkas et al. [35] find that players experience immersion[2] in boardgames, but this differs from videogame immersion. Liapis and Denisova [62] argue that some PX constructs, such as Immersion and Agency, reasonably apply to TTRPG settings. However, they acknowledge that existing PX questionnaires do not apply wholesale due to differences in medium, terminology, and experiences (e.g. videogames do not have a GM). Barbara [9] suggests that the Core and Social GEQ modules are reasonable for measuring boardgame PX, but does not sufficiently address the aforementioned validation concerns. In the context of HDBs, we [84] suggest that the PXI, particularly its shortened counterpart the

[2] As defined by Brown and Cairns [13].

miniPXI [40], may not be reasonable for boardgame experiences due to differences in terminology and experiences.

2.3 Meaningful Play & Gaming Literacy

Meaningful play is an overloaded term that can refer to the purpose of play, the emotions and experiences engendered by play, and the game design. We particularly focus on the game design perspective that "meaningful play occurs when the relationships between actions and outcomes in a game are both discernable and integrated into the larger context of the game," [79, p.34]. While this is a common understanding in game studies and game design, it is criticised for not considering play can have meaning beyond the game [81]. However, our focus on HDB-PX necessarily restricts discussion to the gameplay context. From this perspective, "meaningful play" is a sense-making process through which players construct their understanding from both their interactions in this game and their larger gaming history. Understanding "meaningful play" therefore requires understanding a player's gaming literacy.

Gaming literacy is generally understood as the set of competencies a person needs in order to decode (i.e. play), analyse (i.e. understand), and create (i.e. design) games [6, 100, 101]. Broadly, well-developed play literacies are what make gameplay actions and outcomes discernable to players when encountering a new game, and are used in contextualising gameplay amongst other games and gaming experiences. Work on gaming literacy is sparse; there are a handful of loose descriptive models but no underlying agreement on its constructs and competencies, nor how they are developed, and, by extension, there are no measures of gaming literacy. Descriptive models generally agree that some amount of play literacy is developed through playing games and being a member of gaming communities [6, 100], though these models are quick to point out that playing and community engagement alone do not translate to analytical literacy [100]. In response to the lack of clear constructs, a player's gaming histories, habits, attitudes, preferences, and motivations are often used as proxies for gaming literacy despite these proxies also being poorly defined, lacking measures, and having no agreed upon underlying structure.

It is important to note that while gaming literacy is generally under-researched, existing work has predominantly focused on videogames as an extension of *digital literacy*, meaning there is even less work on boardgame-specific game literacy, let alone for HDB-literacy.

3 Methodology

We conduct this "Big-Q" [52] qualitative research under a constructivist paradigm [19, p.24]. For integrity, we focus on transparent and reflexive reporting, and on explaining how our approach is methodologically congruent [12].

We start by situating our research in context. We outline our research values in order to clarify our specific methodological choices, and discuss our positionality to draw connections between it and our research design. We then describe our method of data generation covering details about its logistics, formation, and values.

3.1 Situating Our Research

We aim to clarify and interrogate the processes behind *how players construct meaningful hybridity* so that we can theorise about the boundaries of meaningful HDB-PX. We know these latent processes will be at work during and after playing an HDB, implying that the best way to study them is through facilitating HDB play. Considering how existing PX measures are not necessarily applicable to tabletop play (Sec. 2.2), and that meaning-making is as much a *social* process as it is a reflective process, we decided that our primary data would be qualitative semi-structured group interviews. We must also consider that players' construction of meaningful hybridity may change with experience. Ergo, to get a robust understanding of meaningful hybridity we need to cultivate HDB experience in a group of players. This required hosting multiple in-person opportunities to *play* a variety of HDBs, and supplying a range of games congruent with our research interests. Thus, our full data generation process involved running series of in-person play sessions, with supplied games and a set of returning players, where each play group was interviewed about their experience after their game.

We see several benefits to this approach. Firstly, by hosting play sessions, we curated the available set of HDBs and could provide devices for play. This ensured players were exposed to a variety of hybrid mechanisms without the barrier of requiring access to devices capable of running the games or having to purchase or source the games themselves. We think this affords players the opportunity to develop a more robust and nuanced concept of meaningful hybridity for us to interrogate. Secondly, running in-person sessions enabled us to observe the play experience before interviewing players. This also allowed us to ask players about these behaviours, providing deeper insight into the connection between observed behaviour and meaning-making. Finally, by having players return across multiple sessions, we could trace how their concept of meaningful hybridity changes over time and so observe more closely their constructive processes.

With this context, we situate this work as an act of constructivist grounded theory [19]. As a research method, constructivist grounded theory fits our research aim (theory generation) and focus (how players construct meaningful hybridity). Its fundamental process of constant comparative analysis fits well with our process of cultivating HDB experience over time and examining how this relates to the construction of meaningful hybridity. It also affords us the flexibility of thought and reflexivity to examine how and why connections may emerge from the data.

3.1.1 Our Positionality. As constructivists, we understand that our positionality affects how we construct our research, interact with our players, and interpret meaning in our data. As part of our reflexive practice, we take a moment to outline relevant background context about us as academics and gamers. The goal of this is to contextualize our work in our experiences, and reflect on the ways these could enhance and bias our findings.

Academic background. We have multiple years of experience with qualitative research methods, including previously published constructivist grounded theory work. This experience helps us to know when and how to follow up in data generation, as well as

how to effectively analyse qualitative data. Our academic interests lie in understanding player experiences, play practices, and game designs. So we come to this work already familiar with sensitizing concepts in games HCI and game studies. This inherently informs our research questions and design, the concepts we draw from to follow up with players in interviews, and how our findings relate to broader games and play research. More importantly, we have a strong academic interest in HDBs as a research area. Our prior work on HDBs and knowledge of the literature has particularly informed the details of this work. Finally, as academics we have significant experience in teaching (board)game design. This impacts how we interpret and discuss design choices in HDBs, and by extension how we interpret comments on the design from other players.

Gamer backgrounds. We both identify as boardgame hobbyists, described by Stebbins [86, p.70] as indicating a level of seriousness around our enjoyment of boardgames. We both attend boardgame-related community events and have coordinated and volunteered at these events as official boardgame teachers. We follow boardgame industry news and game releases. Melissa is a published game designer. These elements indicate our deep familiarity and insight into both boardgames and the boardgaming community. This impacts who we can reach in player recruitment, as well as the perceptions we bring in about games. Notably, we admit we are unlikely to choose an HDB for our own play. This particular disconnect between our personal and academic interests is the driving force behind this work on meaningful hybridity. We believe it also adds to the integrity of our interpretations as we are able to empathise with player skepticism around this medium, and bring that criticality to our work.

3.2 Data Generation: The Critical Play Reference Group

In June 2024, we convened a CPRG — a group of local individuals with an interest in boardgames [74] — to play HDBs. Our CPRG meets in person monthly for three-to-four-hour sessions at The University of Melbourne (Parkville), with the date selected by member vote over our private Slack workspace. To date we have hosted ten CPRG sessions (one a month with a break for holidays in December 2024 and reconvening in May 2025) and generated 37 unique semi-structured group interviews. We currently have over 21 CPRG members on our roster, with consistent attendance of 8-12 regular members per session. Our CPRG method is approved by The University of Melbourne Ethics board (Ethics ID 29470).

3.2.1 Contextualizing this approach: We follow the CPRG approach [74] as it fits our need for recurring play sessions. This mixed-methods approach incorporates quantitative survey data collected alongside the semi-structured group interviews. While our research focuses primarily on the qualitative interview data, we thought that having players[3] complete the survey would help initiate self-reflection about their PX which could inform their interview. This would be helpful in guiding players in the early sessions, though we assume over time players would not need the survey to assist their reflections. Therefore, we collect the quantitative data submitted, but do not use it in this work.

3.2.2 How it works: During a session, attending CPRG members form groups and select a game from our HDB collection. Once finished their game, the players individually complete a custom survey which includes the eleven validated Likert-items from the miniPXI [40], seventeen additional Likert-items examining sociality, materiality, and hybridity, and an open-ended question for further comments. After all players have completed their survey, they participate in an audio-recorded semi-structured group interview. The interviews start by following a basic guide exploring their experience of the game and its hybrid components, and comparing this experience to other games they have played. Ad-hoc questions are added as concepts emerge. The final part of the interview asks players to identify which functions of the HDB-Model [77] they felt the digital component performed, and to pick which three functions seemed to be the most important to their experience. If there is still time left in the session, members can choose another game to play, repeating the play-survey-interview process for every game completed. All attending CPRG members are provided a low-value supermarket gift card as a token of appreciation for their time. As well, members who have attended more than three sessions are allowed to borrow games from our collection for a one-month period (i.e. until the next session).

3.2.3 Member eligibility and recruitment: To be eligible for the CPRG, individuals only need to be over 18 and have an interest in joining. As such, our CPRG membership ranges from casual to serious [86, p.68] boardgame players, each with diverse gaming literacies [6, 100, 101]. Recruitment for the CPRG is on-going, allowing for the group to constantly be integrating new perspectives. We advertise for the CPRG through social media, mailing lists, presence at local gaming events, and word of mouth — including some members who joined after seeing a session and wanting to play on that day.

3.2.4 Our role in the CPRG:. For the CPRG, we take dual-roles as researcher and player, fluctuating between the two as necessary. Pre-session, we act as researchers; we discuss the current state of our findings and identify which questions we want to explore. We curate a subset of games each month to test different aspects of our developing theories. Our research focus influences our recruitment drives, and when we push to bring in different voices to the group. During sessions, we may join games that need additional players, which happens when members have different game choices or form uneven groups. This creates a sense of familiarity and camaraderie between us and the CPRG members, allowing them to speak more freely with us in their interviews. Many members have expressed the view that the CPRG feels like any other social boardgame club. Finally, we switch back to being researchers when we conduct the interviews, drawing on our deepened understanding of the game from our time as players and contexualising it with our pre-session research questions to guide follow-ups during player interviews.

[3]We choose in this paper to refer to participants in our study as either players or CPRG members as a way of respecting their co-construction of this research.

4 Analysis

Having previously explained and situated our methodology (Sec. 3), we now describe our data analysis process. By providing information about the players and games, we contextualise the data and our interpretive analysis. We then describe our analysis process in detail.

4.1 Contextualising the Data

In order to contextualize our data and resulting categories, we present some basic information about our players and the set of curated games they played. This information is provided to help demonstrate the diversity of our player pool, and levels of familiarity our players have with HDBs through exposure to a variety of games at these sessions.

4.1.1 Player Information: Table 1 presents information about the 21 players in our dataset, including: pseudonyms[4], their self-identified gender, age, the month of their first CPRG, and the number of CPRG sessions they have attended. The group is split between 11 men and 10 women, with ages ranging from 18 to 62. Half of the players interviewed started with the CPRG in June 2024 and have been attending regularly since then. We believe this represents a good mix of players with varying levels of HDB experience by the time of this reporting. While we cannot quantify players' gaming literacies (see Sec. 2.3), our ongoing, deep, and prolonged engagement with these players through our sessions allows us to tease out their gaming histories, preferences, attitudes, and motivations such that we gain a holistic understanding of their evolving gaming literacies for both boardgames and HDBs.

4.1.2 Game Information: Our full HDB collection contains more than 60 games, covering 56% of BoardGameGeek's top 70 ranked digital hybrid games[5]. However, as CPRG members self-select what they play in a session, only 25 are represented in this data set. Tables 2 and 3 present the games' titles, release years, complexity (i.e. weight rating per BoardGameGeek community vote), mechanisms (per BoardGameGeek; these categories are derived from Engelstein and Shalev [31]), technologies, and play counts (i.e. the number of interviews about that game in the data set). In particular, we note that although some of these games are marketed as children's games, they nevertheless offer engagement and interest for adult players, as reflected in comments on online forums including BoardGameGeek as well as in feedback from CPRG sessions and in their Complexity rating (e.g. Little Alchemists, 2.20) (see Tables 2 and 3).

These games were released between 2015 and 2024, with each year in that range having at least two games (except 2015). The games range from light-weight (Complexity: 1) to medium-heavy-weight (Complexity: 4), though most fall between light-weight and medium-weight (24/25). The most common digital component in our data set is a custom app for phones or tablets (21/25), and most games only required one device (21/25). Most of the games are cooperative (18/25), with the most common mechanism being deduction (10/25). Notably, most games in this set have only been played by one group (hence one interview). Games with multiple interviews indicate that multiple different groups of players chose that game for a session. The exception being *My Father's Work*, which required multiple play sessions to complete and so that play group was interviewed about the experience each time.

[4]All participants were given a chance to select their own pseudonym before submission deadline.

[5]We looked at the Top 100, which had 30 Unlock! games. We grouped all Unlock! games together since they are different scenarios using the same system. This is how we arrived at this number.

Table 1: Anonymised demographic data for our participants.

Pseudonym	Age	Gender	First session	Sessions Attended
Frank†	52	Man	June 2024	7
Ava	52	Woman	June 2024	6
Rory†	38	Woman	June 2024	9
Kim†	58	Woman	June 2024	9
Karen†	32	Woman	June 2024	9
Jack	32	Man	June 2024	9
Xavier	56	Man	June 2024	7
Orin	40	Woman	July 2024	5
Sam	39	Woman	June 2024	5
Fletcher	62	Man	June 2024	2
Andy	–	Man	June 2024	2
Ollie	–	Man	June 2024	1
Cleo†	27	Woman	July 2024	3
Max	36	Man	July 2024	3
Mila	29	Woman	October 2024	2
Igor†	33	Man	May 2025	4
Raz	51	Man	July 2025	2
Lilli	43	Woman	July 2025	1
Kero	18	Woman	July 2025	2
Sunky†	21	Man	August 2025	1
Exgo†	29	Man	August 2025	1

†Participants selected their own pseudonyms.

4.2 Data Analysis Procedure

We employed the constant comparative method outlined by Charmaz [19, p.31] — an iterative process of enmeshed data generation, initial coding, focused coding and categorizing, and interrogating until categories reach saturation such that a theory can be generated. Throughout our analytical process we wrote memos to clarify various meanings, synthesize information, and highlight questions that arose during our analysis. We used these memos to guide our theoretical sampling — a method for deciding what new areas to explore based on holes in your current understanding. In our research, theoretical sampling focused on asking players to try games that we thought would challenge some of the emerging ideas around meaningful hybridity. For example, to interrogate data about meaningful hybridity as lots of functionality, we explored PX of games with minimal functionality.

The nature of this analysis process can be difficult to communicate. In an attempt to clearly explain our specific process, we describe five steps: (1) data generation and cleaning; (2) initial coding; (3) focused coding and categorizing; (4) interrogating categories; and, (5) generating theory. While we continuously moved between and through these steps during the study, we present them here as linear steps we take when analysing a single interview from when

Table 2: Summary of games covered in the interview data (A to T).

Game	Release Year	Complexity (out of 5)	Boardgame Geek Mechanisms	Technology	Play Count
Beasts of Balance [14]	2016	1.20	Cooperative Game, Stacking and Balancing, Sudden Death Ending	App, RFID pieces, Bluetooth plinth	2
Chronicles of Crime [21]	2018	2.06	Cooperative Game, Campaign Game, Deduction*, Solo Game, Storytelling	App	1
Danger Danger [22]	2024	1.17	Real-Time, Card Game	Phone timer	1
Drone Home [70]	2020	1.00	Action/Dexterity*, King of the Hill, Real-Time	Toy drone	1
Echoes†[29, 30]	2021	1.38	Cooperative Game, Deduction	App	2
First Martians: Adventures on the Red Planet [91]	2017	4.16	Cooperative Game, Dice Rolling, Legacy Game, Modular Board, Campaign Game, Solo Game, Storytelling, Variable Player Powers, Worker Placement	App	1
Freelancers: A Crossroads Game [80]	2023	2.13	Cooperative Game, Deck Building, Role Playing, Campaign Game, Worker Placment	Web app	1
Little Alchemists [56]	2024	2.20	Contracts, Deduction, Hand management, Open drafting	App	2
Lord of the Rings: Journeys in Middle Earth [41]	2019	2.69	Action Points, Area Movement, Campaign Card Driven, Cooperative Game, Deck Building, Map Addition, Modular Board, Role Playing, Campaign Game, Solo Game, Stat-Check Resolution, Variable Player Powers	App	1
Mask of Anubis [42]	2016	1.00	Cooperative Game, Tile Placement	App	1
My Father's Work [69]	2022	3.13	Events, Hand Management, Narrative Choice, Storytelling, Worker Placement: Different Worker Types	App	3
Mystery House: Adventures in a Box [90]	2019	2.13	Cooperative Game, Deduction*	App	1
Picture Perfect [65]	2020	1.85	Auction, Deduction, Hidden Victory Points, Memory, Tile Placement, Variable Set-up	Phone camera	2
Point of View: Lost Places [10]	2024	1.25	Communication Limits, Cooperative Game, Deduction	App	1
Scream: The Game [28]	2023	1.00	Action/Event, Cooperative Game, Hand Management	App	1
Shop 'N Time [4]	2017	1.00	Card Game*, Open Drafting, Real-time*	App	2
St. Noire [16]	2019	1.33	Cooperative Game, Deduction*	Amazon Alexa	1
Stop Thief! [26]	2017	1.48	Action Retrieval, Cooperative Game, Deduction*, Hand Management, Hidden Movement, Memory, Point to Point Movement, Take That, Variable Player Powers	App	1
Sync or Swim [44]	2022	1.63	Action Timer, Card Game*, Cooperative Game, Hand Management, Melding and Splaying, Real-Time, Score-and-Reset, Set Collection, Trading	App	1
The Bad Karmas and the Curse of the Zodiac [37]	2024	2.79	Action/Event, Cooperative Game, Dice Rolling, Grid Movement, Campaign Game, Miniatures*, Real-Time*, Solo Game, Team-based Game, Variable Player Powers	Teburu System, bluetooth dice, apps	2

†This entry combines two games in this series, Echoes: The Cocktail and Echoes: The Microchip. Both games were released in the same year, and use identical gameplay and hybrid technology.

* This mechanism was added from the game's Boardgame Geek Category descriptor.

Table 3: Summary of games covered in the interview data - continued - (T to Z).

Game	Release Year	Complexity (out of 5)	Boardgame Geek Mechanisms	Technology	Play Count
The Search for Lost Species [68]	2023	3.00	Action Points, Deduction, Hexagon Grid, Solo Game, Turn Order: Time Track	App	1
Unlock!: Secret Adventures - A Noside Story [39]	2018	2.50	Card Game*, Cooperative Game, Exploration*, Puzzle*, Real-Time*, Storytelling	App	1
Until Proven Guilty: The Starry Sky Necklace [72]	2024	2.00	Card Game*, Cooperative Game, Deduction*	Web app	1
XCOM: The Board Game [57]	2015	2.91	Cooperative Game, Dice Rolling, Hand Management, Push Your Luck, Real-Time, Variable Player Powers	App	2
Yummy Yummy Monster Tummy [97]	2021	1.13	Card Game*, Cooperative Game, Hand Management, Matching, Push Your Luck	App	3

* This mechanism was added from the game's Boardgame Geek Category descriptor.

a session is finished through to final theory. We use this framing to make conceptualizing the processes easier for readers, while remaining specific about what was done.

4.2.1 Data generation and cleaning: After each session, we uploaded the interview recordings to Rev.com for AI-processed verbatim transcripts. We then added the file to an NVivo 15 project, which centralised our data. In NVivo, we manually corrected the AI-transcripts based on the original interview audio, particularly ensuring that speakers words were accurately captured and attributed. On a second pass through, we edited the corrected transcripts for grammar and readability, leaving annotations about the context of the conversation and tones.

4.2.2 Initial coding: We then analysed the interviews line-by-line using a mix of open and in-vivo coding techniques to capture both descriptive and latent meanings in the data. Our coding was guided by a series of analytical questions to help consider latent meanings in relation to our research question, including but not limited to:

- How do the players explain the technology and/or game?
- Are there specific qualities of the technology which they find more or less meaningful?
- Are they talking about a particular function from the HDB-Model?
- Do they have any preconceived ideas about the game?
- Is there any environmental factor that influenced their experience?
- Are there external factors influencing their experience?
- Does this imply a latent aspect of meaningful hybridity?

These questions focus on the player's gaming and technology literacy, and so reminded us to further contextualise statements like "it's really just a randomizer" (Kim, *Scream: The Game*) beyond just coding it as a description of functionality (i.e. randomising function) to why this might be worth discussing for this particular individual (e.g. meaning the *game complexity doesn't need this*). We also annotated the interviews, highlighting potential connections between interviews and implications that we may want to revisit, or follow-up on in future sessions. We reflected in these annotations on our own biases and assumptions about what players said, particularly if we had been a part of the game or had previously played it. For each interview, we also wrote a memo summarizing if that play group seemed to find the experience meaningful and why we thought that.

4.2.3 Focused coding and categorizing: For each interview we went through multiple passes of focused coding and categorizing. Our goal in this stage was to develop deeper understanding of the data beyond our initial codes and pull out any patterns from the data into categories. To this end, we explain our process as three types of focused coding passes: *code grouping*, *relationship grouping*, and *experiential grouping*.

In our *code grouping* pass, we combined similar initial codes into descriptive umbrella codes. We compared our initial codes for obvious groupings based on similarities in context and sentiment. For example, the umbrella code '*Technical Issues*' describes the types of problems that players encountered when using the technology along with related consequences. We generated '*Technical Issues*' by joining the initial concepts of '*Won't run on this platform/device*', '*Unclear fixes to problems*', '*Sub-optimal workarounds*', and '*Accidental penalties*'. Some initial codes, like '*the core of the game*', which describes what players think the game "really is", were specific enough to remain independent at this stage. We revisited these umbrella codes whenever new initial codes were generated from an interview.

In our *relationship grouping* pass, we related the new umbrella codes and remaining independent codes to each other resulting in categories. We revisited the notes and memos from our initial coding and discussed where some codes may be hinting towards the same underlying topic. This process relied more on our interpretation of the data, and knowledge of the players and games. As such, first iterations of this pass resulted in initial categories with holes that needed to be addressed through theoretical sampling and future coding.

Finally, in our *experiential grouping* pass, we revisited our memos describing whether the group saw the game as "more" or "less" meaningful. We used this insight to visually map the games on a spectrum from "less meaningful" to "more meaningful". The positions of these games and why they were placed as such were

Figure 1: Mapping of games on a spectrum of meaningfulness based on data from interviews. Clusters of games with similar levels of meaningfulness are indicated by purple backgrounds.

discussed at length by the researchers. Games that were played by multiple groups had their position re-evaluated whenever a new interview was being analysed. This iterative, discussion-based process led to a final mapping that highlighted some emergent clusters of games with similar levels of meaningful hybridity (Fig. 1). After successful interrogation, we raised these clusters into categories reflecting "types of hybrid experiences" and used them to interrogate other categories.

4.2.4 Interrogating categories: We employed critical discourse between authors to scrutinize our proposed categories for logical issues and holes in reasoning. This took the form of Sasha presenting the new category to Melissa, whose role was to critically evaluate and question the argument. In a round of discourse, Sasha would outline the category, its relationship to other existing categories, and how it adds to our understanding of meaningful hybridity by explaining why a game has a specific position in one of the "types of hybrid experiences" (i.e. the visual map, Fig. 1). We decided that categories could be considered saturated when they could pass through a critical discourse session without issue.

This critical discourse process revealed more nuanced holes in the categories, which were then addressed through the theoretical sampling process. This process also served to generate insights into how categories related to one another, particularly in the case of discussing boundaries between "types of hybrid experiences" and the processing stages. All of this fed back into the larger analytical cycle, allowing for more robust category construction.

4.2.5 Generating a theory: The aforementioned processes were ongoing since the beginning of our data generation, and intensified as categories approached saturation. In our final analytic step, we refocused the interrogatory critical discourse on how well the saturated categories worked together to create a holistic understanding of meaningful hybridity. The goal of this was to generate a cohesive theory from the categories. As part of this step we reflected on why these categories seemed most salient and whether there were alternative explanations that could have us reasonably doubt this model. As well, we focused on connecting the processes we found players use to determine meaningful hybridity to the emergent types of hybridity we saw from the visual mapping of games. We present our final theory in Sec. 5.

5 Findings: A Theory of Meaningful Hybridity

We analysed 37 semi-structured group interviews, collected over 10 CPRG sessions, from 21 unique players, interacting with 25 different games, between the periods of June 2024 and August 2025. From our analysis we construct a theory of meaningful hybridity for HDBs (illustrated in Fig. 2). Our theory connects the steps players take to determine whether an HDB is meaningfully hybrid to resulting descriptive categories of meaningful hybridity.

We start by providing a descriptive overview of our theory of meaningful hybridity. We then provide details about each concept of our theory. We organise this explanation using our three types of hybridity (functional, effective, meaningful) as these are the concrete categories that result from the internal player processes. For each type of hybridity, we explain what it is and then dive into the underlying processes used to construct its boundaries. We use quotes from our player interviews to illustrate how we interpreted and constructed these internal player processes. To further connect our results to our analysis method, **we bold textual phrases indicating codes used to arrive at our final categories**.

5.1 Theory Overview

We find that when engaging with a new HDB, players are able to quickly categorise the game as either **functionally hybrid** (the least meaningful), **effectively hybrid**, or **meaningfully hybrid** (the most meaningful). In assessing their HDB-PX, players move through *three ordered stages of implicit assessment*. Each stage is defined by a *series of questions* focusing at different points on the relationship between the game and technology, technology and player, and game and player. When a game fails to satisfactorily address one of the lower-order questions, the player immediately categorises it at the associated level of meaning (e.g. failing at stage one means a game is considered functionally hybrid). This is regardless of whether the game could have successfully satisfied a higher-order question, leading to situations where games that *seem* like they ought to have been "meaningfully hybrid" are instead seen as less meaningful. Games in this situation often exist near the boundaries of a category, and may move as players recontextualise their experience when they gain more HDB expertise. Notably this process only applies to games that claim "hybridity" — not games with "homebrewed hybridity" [85].

5.2 Stage 1 - Functional Hybridity

Functional hybridity describes an HDB-PX that generally lacks substance. Players see the digital components as unnecessary gimmicks, if the digital components work at all. Players may see the gameplay as poorly designed; though, in rare cases, a well-designed game may be considered functionally hybrid because the digital component felt unnecessary.

Players construct their understanding of functional hybridity through asking:

(1-1) Is the game enjoyable?
(1-2) Does the technology work? and,
(1-3) Does this even need an app?

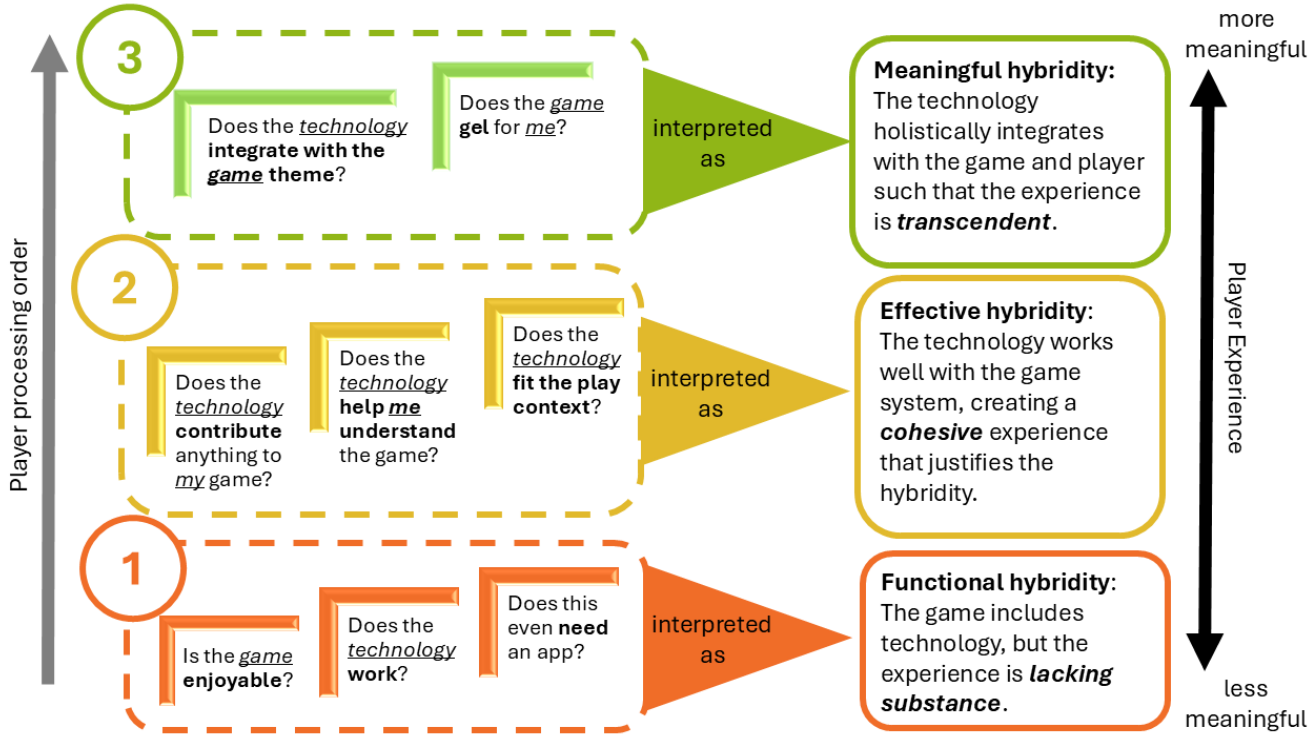


Figure 2: Grounded theory of meaningful hybridity for hybrid digital boardgames. On the left are the stages of processing players move through to evaluate their HDB-PX. On the right are the resulting types of hybridity, organized from least meaningful at the bottom to most meaningful at the top.

5.2.1 *Is the game enjoyable?*

> *"Can I be really, really rude? How was it fun?"* (Cleo, *Sync or Swim*)

Players are first and foremost concerned with having 'fun'; unenjoyable games are immediately deemed 'bad' and categorised into functional hybridity. Players have an innate sense for **'bad' game design**, as made apparent by critiques like the game being "almost too simple to be a cooperative game," (Sam, *Sync or Swim*) or the game restricting choices such that it "didn't always feel like [the players] had made the compelling choice," (Kim, *Until Proven Guilty*). However, the most damning critique was when an HDB was described as "a lovely activity, but **I didn't think of it as a game**," (Xavier, *Beasts of Balance*) because of its minimal player interaction.

There is another subtle factor that influences whether an HDB is seen as enjoyable: how much it ***feels* like a video game**. Players generally enjoyed the game more when "[it] didn't feel [like] I was playing a computer game," (Frank, *Yummy Yummy Monster Tummy*). While players recognise HDBs are boardgames, they are concerned that the introduction of technology — particularly heavy app-integration — will make it feel too much like a "computer game with physical dice," (Jack, *The Bad Karmas and the Curse of the Zodiac*). For some players, the novelty of hybridity can insulate a game from being immediately dismissed. For example, Orin "really enjoyed [*Beasts of Balance*]...just for playing around with the little types of animals...[and] the mad scientist aspect of just cross-breeding, moving them around. and seeing what you can make," though she admittedly was playing *with* the game rather than attempting to play the game correctly. Orin felt she would play the game again because "it's kind of like Jenga but creating ridiculous animals," highlighting the importance of this boardgame feel through comparison. In general, this underlying sentiment speaks to an implicit experiential distinction players feel between boardgames and video games, and represents a barrier that HDBs must address.

In short, games that are deemed reasonably well-designed (enough so that players can understand how it could be enjoyable) and maintain a boardgame feel satisfy this assessment and move on in processing.

5.2.2 *Does the technology work?*

> *"It felt a bit like Cluedo with an annoying clue mechanism called Alexa,"* (Kim, *St. Noire*)

While players feel like a technical issue "ruins the [game] momentum," (Mila, *Echoes*), they consider the broader impact as a spectrum from minorly annoying to making the game unplayable. At this stage, 'annoying' issues, like needing to "kind of fiddle with the phone to get my tiles to scan" (Cleo, *Little Alchemists*), are seen as the game and technology being '**fiddly**' but otherwise acceptable. However, **'unplayable' technical issues**, such as Alexa not

registering questions from players with an accent in *St. Noire*, cause players to shunt the game into functional hybridity.

A major class of 'unplayable'-level issues is when the technology does not work at setup. This gives players "a bit [of] anxiety of like...you hit a roadblock, [and] you're like, 'oh are we gonna start playing?"' (Raz, *The Bad Karmas and the Curse of the Zodiac*). These feelings of **anxiety around a game not working** are more common for players with minimal HDB experience, particularly when confronted with tech-heavy games or those with novel interactions. These types of games are prone to setup issues and play errors which players are not always equipped to fix. For example, in the first CPRG session, Frank, Kim, Rory, Ava, and Xavier were keen to play *Beasts of Balance*, a game where you scan RFID-tagged animal pieces and stack them on a plinth which connects to the game app via Bluetooth. However, the plinth would not connect to the app, making it impossible to start the game. In the following session, they changed the batteries on the plinth and tried using a different game device. This worked for a short-while, but then the plinth stopped scanning the animals. Before the third session, Sasha had to troubleshoot the game and re-register all the animal RFID tags. While the players were excited to finally try the game after three months, this difficulty characterised their opinions. When asked about whether they found the digital components smooth or clunky, Ava sardonically asked: "Do I answer for today?" Xavier expressed how this shaped his hesitancy to buy *Beasts of Balance* in case he ran into the same issues, stating: "If I were to buy this game myself...do you have a sort of like build [it] yourself RFID?"

Setup issues also include the game software not being easily available. Players "feel like one of the disadvantages to so many of these hybrid games is they've become useless once the app isn't updated anymore," (Sam, *Point of View: Lost Places*). Multiple games in our collection have apps that are either region-locked, or **no longer available** through the regular app stores. So in order to setup the game themselves, players would need to be tech-savvy and confident enough to find a "bootleg copy" (Xavier, *Mask of Anubis*). When this is impossible, players react as though the technology does not work, and it can sour their experience.

In short, games whose technology is easily available and works seamlessly on setup (even if it has annoyances in the interaction) will satisfy this assessment and move on in processing.

5.2.3 *Does this even need an app?*

> *"The way we played it feels like the app wasn't really needed at all,"* (Orin, *Point of View: Lost Places*)

Players initially feel that "with these hybrid games...a lot of the times I don't see why there's an app," (Kero, *Freelancers*). Players have a deep love for the materiality of boardgames [73], and feel that digital components must earn their place by **doing more than a physical component** could. This is apparent in Kim's disdain for *Scream: The Game*, saying: "[the app is] really just a randomizer...it's a bit like rolling a die or drawing a card...it doesn't really do much." While an app with a singular purpose was greatly disliked, games that did not have bespoke technology were dismissed entirely because they were seen to not have any functionality. *Picture Perfect* — a game about arranging guests for a picture at a dinner party — was played by multiple groups and generally considered an enjoyable and a well-designed game. At the end of the game, players use their phone to take a picture of their tableau and use this to manually score their points. While the picture could not be replaced by a physical component, the players did not see a purpose to it and so felt that it was **unnecessary to the experience**: "[I] don't really consider this a [hybrid] digital boardgame. All we do is like, let's take a picture at the end," (Orin, *Picture Perfect*).

Players' sense of 'needing' an app is influenced by their HDB experience, such that HDB novices may perceive less functionality than provided. At our first CPRG session, Frank, Ava, and Rory played *First Martians: Adventures on the Red Planet*, a cooperative game about surviving as a colony on Mars while dealing with ongoing issues. During play, Ava initially felt that the app would be unnecessary if they just had one more card deck for the in-game events. However, during the interview she reflected "if you don't do the event, it hangs around...if you do no events, you'd need to handle up to four or so events in a turn, and maybe that becomes hard with a deck of cards," (Ava, *First Martians: Adventures on the Red Planet*). Without previous HDB experience to draw on, players may presume hybridity is useless or gimmicky because they are unable to see beyond the immediate effects of the individual function to how it impacts other game systems and mechanisms.

In short, games that convince players the technology is necessary for play satisfy this assessment. A subtle factor in whether players will be successfully convinced is their own HDB experience.

5.3 Stage 2 - Effective Hybridity

Effective hybridity is an HDB-PX that feels cohesive, creating a sense that the hybridity is justified. Players generally find the digital components are essential for understanding and effectively playing the game. Players begin to consider how the technology relates to the game's play context through considering the ideal play environments, devices, and players. At this stage, players consider the games to be 'good enough' — they may take issue with aspects of the game or technology, but are willing to play it again (even if begrudgingly).

Players construct their understanding of effective hybridity through asking:

(2-1) Does the technology contribute to my game?
(2-2) Does the technology help me understand the game? and,
(2-3) Does the technology fit my play context?

5.3.1 *Does the technology contribute to my game?*

> *"I kept forgetting you had to scan the chapter card first. So we would get a chapter wrong...And I feel like it should autofill that bit."* (Kero, *Echoes: The Cocktail*)

Players now look beyond whether the technology is doing something at all, and begin to wonder **what the technology is doing *for me***. Effectively, players felt the technology ought to contribute by removing "chores" — the labour necessary to articulate a game that is not seen as part of the "core" enjoyment of the game [84, 99]. However, players have a varied understanding of what constitutes a chore.

The most straightforward **chore removal** comes from automating 'annoying' (i.e. repetitive, fiddly, or boring) gameplay elements. This could also include implementing simple quality-of-life features: "[The timer] would be better if it's configurable, right?...it's

not a very difficult functionality to do with the app," (Karen, *Shop N Time*). However, **perceived functionality may be different from the provided functionality**, especially if it requires turning on a setting, such as when Xavier suggested "it would be nice if you could just tap the image [of the ingredient]" (*Little Alchemists*), which was already implemented.

What players consider a 'simple' feature varies based on **what they expect the technology can do** and what they think it needs to do. When Frank, Ava, Rory, and Igor played *My Father's Work* — a complex worker placement game — they all agreed it would be nice to have the app handle saving the game state. Frank thought this would be exceptionally difficult because of how much unique data the game would need to capture for each player's game board and the game state. However, Ava felt it would be a simple matter of having "a dropdown of the entire deck and you just pick the one you've got." Igor further pushed the idea by suggesting:

> "[if] everyone [had] their own app, that would be, I feel like, easier to keep track of the resources you're getting and the cards in your hand...if it were sophisticated enough...say there were NFC chips in each of the pieces and they could tell where on the map that they were and...you'd have some kind of upkeep," (Igor, *My Father's Work*).

In short, games that provide ways to alleviate "chores" satisfy this assessment.

5.3.2 *Does the technology aid my understanding of the game?*

> *"there wouldn't be an error in like, 'oh, I forgot to grab my extra coin this upkeep phase', or 'I forgot to tally my extra victory point'...If that were counted automatically and then recorded...I feel like there would be less confusion in those upkeep phases."* (Igor, *My Father's Work*)

Players expect technology to "reduce the challenge around the rules" (Andy, *Lord of the Rings: Journeys in Middle Earth*). This 'challenge' has two parts: understanding what are the *rules*, and what are their *consequences*. Players feel they **understand what the rules are** when they can accurately interpret and enforce game rules. Players feel they **understand the consequences** of rule interactions when they make successful choices.

Players form their initial understanding of a game based on the game learning process. Absent an in-person or virtual[6] game teacher, players learn a game by reading its rulebook(s). For some players, it can be challenging to learn from a rulebook, particularly if it is **unclear or complex**, leaving them confused and frustrated about how to play. In response, players see hybridity as a potential solution to this, and want technology to both onboard and enforce rules for them. They imagine digital tutorials acting like a dedicated boardgame teacher walking them through a round of gameplay:

> "[T]he rulebook wasn't fantastic. I would've preferred a tutorial for that game, quite frankly. Just a small one that would show you...a tiny little island and just showed you how that all worked." (Kim, *The Search for Lost Species*)

However, digital tutorials are not wholesale replacements for rulebooks, and **poor onboarding can harm a players understanding of the game**. Digital tutorials are limited in scope to get players started, generally focusing on the basic gameplay and leaving players "unclear [about] what all the different pieces did," (Sam, *Beasts of Balance*). As well, digital tutorials generally cover mechanisms once, which is problematic for players like Karen who "didn't pay attention to it...and I keep forgetting the previous rules," (*The Bad Karmas and the Curse of the Zodiac*).

Players often had specific questions about interactions and rule interpretations that were left unanswered by these self-contained tutorials. Often these questions were only clarified through trial-and-error; players would make a choice and use the game's feedback (via technology or state changes) to deduce how the rule works. This lack of informed choice becomes frustrating to players, particularly when it results in negative game consequences. When playing *XCOM: The Board Game* — a fast-paced, cooperative, resource management and push-your-luck game about defending the world from an alien invasion — Karen and Jack felt the game tutorial did not explain how to *successfully* prepare for combat. So, they made uninformed decisions on how many Interceptors[7] to deploy, leading to multiple failures in the first round and ultimately a total game loss. Karen felt:

> "I think the app [explained] 90% about the rule[s]. It would be better if they can give us a suggestion like '[if you're] defending [against] two enemies, you should better deploy three [Interceptors]'," (Karen, *XCOM: The Board Game*).

When technology implements a game's systems, players can interactively test and **refine their understanding through the feedback** on their choices during play. With technology enforcing rule-accuracy, players feel assured they are playing the game correctly. However, a mechanistic implementation often obscures *why* a choice leads to a particular consequence, leaving players unsure how to adjust their play to be successful. For example, when playing *Yummy Yummy Monster Tummy* — a cooperative game about mixing colours to match a monster — players felt "sometimes [the score] didn't make sense to us. Like the colours that we put, we felt were close to the monster, but then it wasn't," (Rory, *Yummy Yummy Monster Tummy*). While the game provides a percentage similarity score, visual bar indicator, and star rating for the players as feedback on how well their colour matched the goal, it does not explain how it arrives at this value. This left some players feeling disengaged because "eventually we weren't even playing the game properly, just trying to figure out what's going on in the background," (Kero, *Yummy Yummy Monster Tummy*).

Players expect the technology to also provide "enough information for us to make meaningful decisions," (Andy, *Lord of the Rings: Journeys in Middle Earth*). However, what qualifies as 'enough' depends on the **player's expectations about the core gameplay**. *Shop N Time* is a pick-and-pass card game where players are trying to collect item cards such that their final shopping cart value matches a goal number. The item values are based on their real-world cost at a specific point in time, and are not printed on the card. At the end of a round, players 'check-out', which reveals the

[6] e.g. How-to-Play videos, Dized tutorials

[7] Air combat units.

total value of their cart, but not the prices of individual items. Most players "didn't like that everything was hidden including for scoring...It essentially waved a magic wand and said your items cost this much and we had to be like, okay I guess they did," (Cleo, *Shop N Time*). To most players, the core gameplay was about attempting to accurately reach the total, and so the lack of feedback about item prices made the game feel somewhat arbitrary. Only Xavier felt "not having a good idea of what prices were was part of the fun." To him, the historical estimation of prices was core to the charm and instead the confusing element was remembering how penalties and bonuses applied at final scoring.

In short, games where the technology makes it easier to understand how to play accurately and effectively satisfy this assessment.

5.3.3 *Does the technology fit my play context?*

"It's a lovely game, but where does it really fit in? Because when do you ever play six hours on one game?" (Ava, *My Father's Work*)

By this point, players have a sense of how hybridity enhances this game. Where previous stages were focused on the game and technology proving themselves worthy, players now accept the game and technology as '**good enough**'. Their PX is generally satisfying, and they start to consider this HDB among other reasonable boardgames they have played. On this edge of 'good enough', players begin to reflect on whether they want to play this game again. As part of this, the players consider how the game's play context aligns with their own.

We understand a "play context" as the situated environmental conditions that allow for an engaging PX. Players and games both have play contexts; a game's play context reflects its perceived core gameplay, and a player's play context reflects their play practices. Players construct a game's play context through understanding what they perceive to be the core experience. Players then compare the game's play context with their own to assess whether the game would reasonably **fit into their play practice**.

Player conversations circled around some key qualities of a game's play context: the **ideal number of players**, the **ideal play time**, the **ideal play space**, and the **ideal device setup**. The first three are generic to boardgame play and the last is HDB-exclusive.

Ideal number of players: self-descriptive and directly related to the gameplay: "I think every person you add gets more complicated," (Sam, *Beasts of Balance*).

Ideal play time: reflects both actual and **perceived game length**. For example, Ava really disliked *First Martians* because she felt "we probably spent twice as long to learn the rules as to play the game." When she actually checked, she realised "the box says it plays in two hours, so we basically played it in two hours." However, knowing that the game was two hours — a game length she would normally enjoy — did not change her feeling that the game does not fit based on how long it felt.

Ideal play space: describes the physical properties needed for playing this game, such as table size, and room volume. For HDBs this may also include elements like access to power outlets and internet connections. By extension, it covers where a game could be reasonably played: "I feel like it's fun to play at a con[vention], but I would be worried about the drone flying off somewhere," (Kero, *Drone Home*).

Ideal device setup: describes the physical technology needed to play the game. Players bring up two factors: having **the right number of devices**, and having **the right types of devices**. Having the right number of devices is self-descriptive, but becomes important for games that allow for optional numbers of devices. Players have a strong sense about whether a game works better with shared or individual devices based on how it influences core gameplay elements like player communication, pacing and sequencing, and secret information:

> "I could see [multiple devices] working, but I do wonder whether that would be weird because it would kind of almost encourage simultaneous play, which the game doesn't seem to be encouraging," (Cleo, *Little Alchemists*).

Having the right type of device has two distinct meanings. The more common meaning was having a device whose screen size and affordances made it easy to interact with the game: "we started on a smaller little tablet than this one and Sasha was like, 'nah I'm getting an iPad, this is way too small to read,' " (Exgo, *XCOM: The Board Game*). The second meaning is having access to a device that will run the game: "once we were using Android, not Apple, it worked really, really smoothly and I really enjoyed it," (Orin, *The Bad Karmas and the Curse of the Zodiac*).

As part of having the right type of device, players may also consider the price of setting up the game. For example, *The Bad Karmas and the Curse of the Zodiac* needs the *Teburu System* and multiple bluetooth dice, plus one large device to run the game, and ideally one device for each player — making the price point of setting up the system alone well over $350 AUD before considering the device costs.

In short, games whose play context (number of players, play time, play space, and device setup) fits with the player's practices satisfy this assessment.

5.4 Stage 3 - Meaningful Hybridity

Meaningful hybridity is a transcendent HDB-PX, where the game, technology, and player harmonically resonate with each other. Players feel the game and technology are perfectly integrated, reflecting a balance between the digital and physical components in the game. These games also gel with the player's preferences and self-identity as a gamer, creating a strong sense of meaning and immersion during play. These games become the yardstick players use to evaluate future HDBs.

Players construct their understanding of meaningful hybridity through two questions:

(3-1) Does the technology integrate with the game theme? and,
(3-2) Does the game gel for me?

5.4.1 *Does the technology integrate with the game theme?*

"[if] filling in as the Dungeon Master was...what it set out to do, that's definitely what it did," (Igor, *Freelancers*)

Players enjoy when "the app is not a companion, it's where the game is play[ed]," (Frank, *Yummy Yummy Monster Tummy*), but also want to feel like the digital component "wasn't overbearing," (Igor, *Freelancers*). As players attempt to articulate this complex desire, they explicitly decouple meaningfulness from raw functionality:

> "It's interesting because [our HDB-Model discussion] makes it seem like [the app] didn't really do very much, but the things that it did do, we used every turn consistently," (Cleo, *Little Alchemists*).

Instead, players raise the idea of **thematic integration** as making meaningful hybridity.

Farkas et al. [33] introduces *thematicness* as "the degree to which the game-world feels realised to the player." By extension, we introduce *thematic integration* to describe the degree to which technology is designed to blend into and enhance the thematicness of the game. Players describe three qualities of thematically integrated games:

- having a **tight coupling between narratives and mechanics**;
- affording **'just right' interactions** with the technology; and,
- having a **balance** (i.e. the physical and digital components are in conversation with one another).

To explain these qualities, we can examine a game that embodies all of them: *Mask of Anubis* [42].

Mask of Anubis — a cooperative, communication-based, spatial-reasoning puzzle game — was one of the first games in our study players describe as meaningfully hyrbid. On a player's turn, they use the app (placed in a cardboard headset to look like a mask) to view part of a virtual scene. They have 90 seconds to describe this to their teammates, who recreate it with cardboard pieces. Frank describes these mechanics and the overall goal to us by explaining:

> "the flavour of the game is, nobody can enter the tomb, but we have a little dog with a camera. The dog is sending us back some visuals. We are on the outside trying to figure out what the inside looks like to find the Pharaoh. So we're trying to get the dog that's got the camera to the Pharaoh," (Frank, *Mask of Anubis*)

This tight coupling between narrative (which is reflective of theme) and mechanics helps players to conceptualize what they are doing, and to justify the game-enforced limitations in a natural way. For example, at the end of a level, "you physically walk the dog along the path to check if you do it correctly. And that was done quite cleverly because it doesn't just show you the map, it reveals the map every single step you take," (Frank, *Mask of Anubis*). This design choice allows the app to build tension and excitement in players while maintaining the narrative metaphor that your camera is on a dog:

> "It's interesting because I think our expectation of apps and virtual reality is definitely more sensory than this one was. There were no sounds, no narration, no sort of interaction...we were, except for Little Fox [an animated character], basically looking at [a] static picture. Whereas I think our expectation of what apps bring to a[n] experience is definitely sound and music and storytelling and other characters, and significantly more animation than what we've seen here," (Frank, *Mask of Anubis*)

Players enjoy the app, despite it not matching their expectations of what an app could do, because the interactions with it seem 'just right' thematically and by extension experientially. Relatedly, players felt "a really satisfying part of the game [was] engaging in the digital format and then recreating it in a physical format," (Frank, *Mask of Anubis*). This satisfaction comes from a sense of balance between the physical and digital components. Here, the physical and digital components feel equally important mechanically and thematically through their designs and interactions: "I think the cardboard pieces are really satisfingly thematic. Like it is what you see [on the app] in cardboard form, which I think was really satisfying," (Rory, *Mask of Anubis*). In this way, *Mask of Anubis* does not feel like a boardgame with a companion app, or a videogame with physical pieces but rather an intentionally designed whole.

Players also experienced thematic integration in *Freelancers: A Crossroads Game*[80]—a Dungeons and Dragons (D&D) inspired campaign game where the players act as a band of adventurers on a quest to slay a dragon. Players understanding of *thematicness* for *Freelancers* was based on their mental models of TTRPG-style gameplay, where the GM realises the game-world for the players through narration of events, improvisation of characters, and design of the adventures and encounters [24, p.4]. As such, the players felt the technology was *thematically integrated* through acting as a *good* GM. We found players allude to the tight coupling between narrative and mechanics in describing their joy at the app's storytelling and acting features. They describe the balance between components through their joy at the interaction between components. Similarly they express the 'just right' interactions through their feelings of the GM streamlining the TTRPG play process while still allowing for roleplay. Overall, players felt like "it was a good balance so everything that was personal to us were in front of us....everything that was story-driven or bookkeeping...was done on the [app] and very heavily storytelling was on the app. I like what Karen said about the dungeon master, [the app] was a really good dungeon master," (Frank, *Freelancers*).

In short, games where the technology is thematically integrated will satisfy this assessment. As part of this, it is important to remember that what informs players understanding of thematicness, and by extension thematic integration, can vary—a discussion we return to in Sec. 7.2.

5.4.2 *Does the game gel for me?*

> *"I do think that if you wanted a classic D&D experience from this game and you went into it expecting that you would be disappointed,"* (Igor, *Freelancers*)

At this final point, players turn inwards to consider whether the game gels for them. This involves comparing their play experience against their expectations for the game and themselves. When a player's experience aligns with, or exceeds their expectations, they are often able to embrace a game as meaningful.

A **player's expectations of a game** are formed by interpreting the game's contextual elements (e.g. theme, art style, genre) through

the lens of their previous gaming experience. This sometimes affords positive experiences where the player intuitively understands the game and so can enjoy it more. At other times, it creates a barrier to enjoyment when players cannot let go of what they thought a game should be: "I felt like if they wanted to really make an XCOM boardgame experience, there were different ways to go around [and] implement XCOM. I want the feeling of it, but also mechanics from the [video] games," (Sunky, *XCOM: The Board Game*).

A **player's self-expectations** relate their internal motivations and self-identity to a satisfying play experience. Players' internal motivations are vast, and do not always relate to winning the game:

> "For me, I enjoy games, I don't play games to win. I enjoy having something that I can achieve in a game, setting that as a goal. And if I win because I did that well then that's great. If I lose, but I still did the goal then that was a wonderful experience," (Frank, *My Father's Work*).

When a player's internal motivations cannot be met, they become dissatisfied in the experience. However, players at this stage recognise this dissatisfaction as a result of their personal performance and expectations. So as opposed to considering the game 'bad', the player decides that something "**seemed hypothetically [like] a good game, but didn't engage me in practice**," (Xavier, *Chronicles of Crime*). Complicating this further, players are sensitive to whether something was perceived as '**for kids**'. Even when they obviously enjoyed playing a game, players were quick to mention when "it's [a game] for children. Yeah, not for adults like us," (Karen, *Yummy Yummy Monster Tummy*).

As such, games whose experiences match or exceed the player's personal expectations satisfy this assessment.

6 How to Use this Theory

Our interpretive grounded theory is a description of the process a player seems to use to decide whether they think an HDB is meaningfully hybrid. It shows that players informally evaluate a game by asking themselves a series of ordered questions which reflect their expectations around hybridity; the game is then categorised based on which expectation it fails to satisfy. As the purpose of this theory is to explain how player's construct meaningful hybridity, subjective player elements, such as a player's HDB experience and game preferences, are relevant in the evaluation process. This is particularly apparent in later stage questions, like "Does the technology help me understand the game", which include more self-reflexivity about game literacy. Overall, this means that the boundaries between categories are porous since individual players may end up categorising the same game differently — we see this with the Teburu, where Raz and Lilli felt the technology did not help them understand the game (i.e. Effective Hybridity) but Orin and Kim who were playing with them felt everything was perfect (i.e. Meaningful Hybridity). As such, we want to clarify how we see this theory being used in design and analysis of games despite this subjective component.

6.1 Using this Theory for Design

Our theory can be used by game designers as a guiding set of ordered design questions about how technology should be used in the game. For example, our theory and data show that when players ask "Does the technology contribute anything to my game?", they are often satisfied when the technology alleviates "chores" (see 5.3.1). As such, when asked that question, designers looking to make meaningfully hybrid games should be able to answer what "chores" their technology offloads from the players. As well the *order* of design questions from our theory gives clear priority to each design decision. It highlights that the initial design questions must be satisfied before the final ones. For example, by having "Is the game enjoyable?" as the first question, it reinforces to designers that players want a good game regardless of what the technology could add.

6.2 Using this Theory for Analysis

Our theory could also be useful for qualitatively assessing HDB-PX in play testing or research settings. As we had previously highlighted that there are no reliable measures for boardgame PX, nor understanding about HDB-PX, our theory can serve as a model to contextualise player feedback on HDBs. The questions could serve as starting points for semi-structured group interviews in order to get more robust understandings about why a particular HDB was not meeting a player's expectations. As well, the questions could serve as a set of expert heuristics to evaluate a game, allowing for some consistent language in discussing HDBs.

7 Discussion

We now reflect on this theory and its implications for game design and how players understand HDB technology. We then consider the limitations of this work, and potential avenues for future scholarship.

7.1 Implications for Meaningful Hybrid Game Design

7.1.1 No minimum hybridity, just the right hybridity: Our analysis showed no clear mapping of HDB-Model functions or game features to our three types of hybridity. Rather, functions and features existed across the whole spectrum of PX. Similarly, we did not see any recurring function groupings that could be considered as characteristic of a particular type of experience. This implies there is **no minimal set of hybrid functions, nor specific features, an HDB could provide that would guarantee a meaningfully hybrid PX**. Instead, our findings stress the importance of having the *right* hybridity for the game and player. This is consistent with previous findings on players concerns with HDBs as noted in multiple works (e.g. [76, 77]).

7.1.2 Between Effective and Meaningful Hybridity - The Design Sweet Spot: In our dataset we find relatively few games that were seen as meaningfully hybrid, and a plethora across effective hybridity. Since the final sense-making process ("does the game gel for me?") is about the player's personal histories and gaming literacies, **meaningful hybridity cannot be achieved through game design alone**. Moreover, since the boundaries between stages are porous, we stress that not every game can — or needs to — deliver a meaningfully hybrid experience. However, this reveals a more concrete game design goal: *thematically effective hybridity* — the

boundary between high effective hybridity and low meaningful hybridity. Many of the games that players want to borrow and revisit sit in this thematically effective zone, implying that games designed for this experience will be widely enjoyed. Thematically effective hybridity encapsulates all the sense-making processes which focus on the design of the game and technology. Since these processes are more discrete and observable, it is possible to use them as heuristics to evaluate an HDB design. As such, **aiming for thematically effective hybridity could guarantee players a quality experience and affords opportunities for meaningful hybridity**.

7.2 Technology: Thing or Player?

Thematic integration marks a clear shift in players' perspectives: the technology goes from simply performing labour to playing a 'role' in the game. This becomes apparent in how players describe the technology and their relationship to it during the game. We broadly see players conceptualize the technology[8] as either a component (app-as-thing) or a player (app-as-participant). Technology in these categories exist at different distance levels [2], which affords different types of immersive experiences for players and shapes how they think about HDBs. **Understanding how to position the technology (as thing or participant) could be helpful for achieving thematic effective hybridity**.

7.2.1 App-as-thing. Apps are seen as components when they enhance verisimilitude by carrying out thematic metaphors. Games simulate a scenario for the players to inhabit, supported by goals, resources, and actions. Apps support the fantasy by providing another game system for the players to interact with, rather than being thought of as an enforcer of the game's rules. In this way, players expect the tools to be both thematically relevant and functionally fluid. When discussing the shortcomings of *St. Noire*, Kim reflects that:

> "I've played *Detective*, which basically has a database that you can interrogate...I would've thought, you know, here if this was a bit more story based, the database from *Detective* would be really great because then you could look a lot of things up," (Kim, *St. Noire*).

Kim's view of the app as a tool is clear from how she describes the *Detective: A Modern Crime Board Game* [58] web-app as a "database" and values its efficiency over Alexa's interrogation mechanisms.

"App-as-thing" technology affords immersive experiences by blurring the lines between the game world and real world. For example, Mila was delighted by the little details in *Unlock!: A Noside Story* — an escape-room style card game series with a mobile app that provides hints, codes, and timing functions. As the players hit start on the timer, the app imitates a phone call which players have to swipe to answer. This small, unexpected moment immediately immersed Mila in the fantasy because "when it had the quick call in the beginning, I wasn't sure if it was a call for your phone!" (Mila, *Unlock!: A Noside Story*).

7.2.2 App-as-participant. In games where apps take on the articulation work normally done by another human player, the app is seen as a *participant* in play. Players disliked the articulation work in games, as it placed undue stress on themselves and caused conflict at the table. For example, when playing *Yummy Yummy Monster Tummy*, Xavier worried that without an app, a player would need to decide whether the colours mixed correctly:

> "I don't think that this would be nearly as much fun if we had a person being the arbiter…because at least with the app, we are not arguing with each other," (Xavier, *Yummy Yummy Monster Tummy*).

In this way, the app-as-participant allows the players to more pro-socially engage with each other since "it's not like someone feels like they're too busy trying to keep track of everything," (Kero, *Freelancers*). By inspiring these pro-social feelings, the app taps into players' existing conceptual models connecting articulation work and human players, and so the players begin to personify the technology. We see this in the way players describe apps as "a common enemy," (Xavier, *Yummy Yummy Monster Tummy*), or "a little helper guy I had in the corner that I was feeding information to and then it would come back," (Kero, *Freelancers*). This was salient in roleplaying style games, where the app made the experience feel "more along the lines of how you would play D&D with a D[ungeon] M[aster]" (Orin, *The Bad Karmas and the Curse of the Zodiac*).

"App-as-participant" technology affords immersive experiences by taking on creative work which regular players may not want to do: "it's hard to find a Dungeon Master that can roleplay and act," (Karen, *Freelancers*). When players see the creative work as the main part of the experience, providing that on top of the regular articulation work stands out to players:

> "I think the story was such a big part of what I think what I enjoyed in this. If the story made less sense to me or there was less of a enjoyment of the comedic parts of the story, I think that would definitely lower my enjoyment of the story because if it wasn't for the story, it was basically a little bit of shuffling tokens back and forth and you had some upkeep," (Frank, *Freelancers*).

7.3 Reflecting on the CPRG Method

When considering the efforts of running the CPRG against the data, we think the method is effective and valuable. In the early interviews, we notice our players reiterating the same opinions from the player attitudes work about technology not working, or thinking apps are pointless. However, through prolonged exposure we start to get past those initial assumptions and draw out more interesting opinions. One major factor in the method's success appears to be that we provide devices with all the games pre-installed, maintain the games in working order, and are a point of contact for troubleshooting issues during a session. This alleviates player anxieties around technology not working: "If I was hosting and people were at my house and came over to play this, I would've probably gotten nervous. But here I didn't mind it," (Lilli, *The Bad Karmas and the Curse of the Zodiac*).

[8]We use "apps" as a catch-all for any digital game component. This was the shorthand players used in our discussions, regardless of whether the tool was actually an "app" or something else like a website or database.

While we maintain the method was effective and valuable, we ran into issues getting players to select specific games that were of interest to us. Specifically, while we own *Mansions of Madness* [94], *The Search for Planet X* [67], *Mind MGMT: The Psychic Espionage "Game"* [23], *Return to Dark Tower* [15], *Alchemists* [55], and *Destinies* [38] (i.e. games in top 10 ranked HDBs on BoardGameGeek), players did not choose to engage with these games during these CPRG sessions. Players seemed to self-select away from these games for a variety of reasons, including length of play time, perceived game complexity, difficulty finding an interested playgroup, and existing access to some of these games at home. We tried to address some of these issues by offering a mix of weekday and weekend sessions in the hopes that more complex, longer form games would be picked. However, players felt: "You need to think of the opportunity cost - all the other games you're not playing because you're playing this for six hours, you know?" (Ava, *My Father's Work*).

7.4 Limitations

We identify two main limitations in this work.

7.4.1 Focus on First-Plays: Our dataset primarily captures players' first experience with a game. So, our theory can only reasonably speak to how players construct meaningful hybridity when encountering a new HDB. We recognise that first-plays reflect imperfect knowledge of a game, as players often need multiple playthroughs to understand if they were playing correctly: "that happens anyway with new boardgames...you're still going through 'Oh no, that's not the right rules there in the right small spot'," (Orin, *The Bad Karmas and the Curse of the Zodiac*). As such, first-plays are particularly influenced by a player's gaming history and literacy. In later sessions, players communicated that effectively interacting with HDBs requires them to "know how these kinds of apps work," (Kim, *The Search for Lost Species*). So feedback from early interviews, when CPRG members were less familiar with HDBs, may be less insightful than later ones. Our CPRG method attempts to account for this in two ways. Firstly, our recurring player base gives us opportunities to consider a player's specific responses in the context of their previous opinions and stated preferences. Secondly, by only having one copy of each game, we force player groups to play games at different sessions. This means even though each interview represents a group's first-play, it captures those first-plays at different levels of HDB experience, thus enabling greater contextualisation for responses which we captured in our analysis.

7.4.2 Novelty and Genre Fatigue: As players regularly attend the CPRG, the novelty of HDBs begins to wear off. We see from our analysis that novelty has an early impact on how players think of meaningful hybridity because they do not have multiple mechanisms to compare against. Therefore, the reduction in perceived novelty is helpful to raising our data quality. An unexpected side effect of this is genre fatigue: "I liked it...The only thing is it is yet another deductive game. And so many app games, or app-supported games, seem to be about deduction or problem-solving," (Kim, *Little Alchemists*). While there are only ten deduction-based games in our dataset, of which Kim has played six, our hobbyist instincts also feel that HDBs skew towards deduction-based gameplay. We could not find data about the proportion of published HDBs which are deduction-based.

7.5 Future Works

For the time being, we continue to run our CPRG sessions. From our experience analysing this dataset, this method offers a rich ground for generating data about HDB-PX. We are invested in continuing to curate our members' expertise in this field, such that we could explore more questions with them. As such, when discussing potential future works, we envision them as being run through or with the CPRG.

Our limitations highlight multiple conditions which could affect our understanding of meaningful hybridity. These are clear avenues of exploration for further refining our theory. We think an immediate step in refining our theory is investigating under-represented genres of HDBs. In examining uncommon genres using this method, we would be able to consider whether the processes we found are universal to hybridity or particularly skewed by game genres in our dataset. We see this as a logical step forward because our larger research goal is to construct a *general* theory of meaningful hybridity, and so are invested in exploring the limits of our current work. As well, focusing on uncommon hybridity serves to further expand our CPRG members' expertise and alleviate current genre fatigue issues.

We also want to further test the model to see how it can be used to inform and evaluate game designs. We are particularly keen to design custom games targeting different processes of the model to see whether we can induce specific types of PX. We see work translating this theoretical knowledge into more practical design guidelines as being beneficial for designers and industry in assessing the viability of potential HDBs.

8 Conclusion

This paper presents a twelve-month-long constructivist grounded theory study, on what constitutes meaningful play for HDBs, resulting in a descriptive theory of meaningful hybridity. Our theory identifies and orders eight processes which players use to evaluate an HDB as meaningfully hybrid, and further maps those processes to three experiential categories of hybridity (functional, effective, and meaningful). Our analyses find that meaningful hybridity is an on-going negotiation between the player, game, and technology. In constructing this theory, we find there is no minimal set of hybrid functions, nor features, which would guarantee a meaningfully hybrid player experience. However, this serves to highlight *thematically effective hybridity* as a more reasonable design goal for HDBs. We speculate that the processes in our theory could be used as heuristics for evaluating HDBs, which would be a practical way for designers to use this knowledge. As well, we learn that thematically integrated technology tends to be seen as either a thematic component (app-as-thing) or as another participant (app-as-participant) based on its role in the game. This distinction could be useful when designing an HDB as it connects these categories to some key gameplay roles.

This work contributes to literature on hybrid play, player experience, and hybrid digital boardgames by articulating a formal understanding of meaningful hybridity. It also serves to explore

the use of a CPRG for generating insights into specific research questions. Through deliberate, reflexive practice we argue that the CPRG affords more nuanced and rich data, despite minor limitations. As such, we recommend that future work exploring player experience take a similar approach to cultivating specific game-related expertise in players through on-going data generation.

Acknowledgments

This work is supported through the Australian Research Council DECRA (DE240100730) awarded to MJR. We are incredibly thankful for the on-going support of our CPRG members, without whom this work would not be possible.

References

[1] Vero Vanden Abeele, Katta Spiel, Lennart Nacke, Daniel Johnson, and Kathrin Gerling. 2020. Development and validation of the player experience inventory: A scale to measure player experiences at the level of functional and psychosocial consequences. *International Journal of Human-Computer Studies* 135 (2020), 102370. https://doi.org/10.1016/j.ijhcs.2019.102370

[2] Devi Acharya, Laijana Braun, Yasheng She, and Mirek Stolee. 2024. Blood on Whose Hands - The Impact of Hybridity and Distance Level on Board Game Player Experience. *PAIDIA – Zeitschrift für Computerspielforschung* Sonderausgabe "Monsters, Magic, Mediality" (2024). https://doi.org/urn:nbn:de:101:1-2504011214299.714349426918

[3] Krzysztof Adamkiewicz, Julia Dominiak, Anna Walczak, Andrzej Romanowski, and Paweł W. Woźniak. 2024. Screenless Interactive Tabletop Gaming with Capacitive Surface Sensing. In *Proceedings of the 2024 CHI Conference on Human Factors in Computing Systems* (Honolulu, HI, USA) *(CHI '24)*. Association for Computing Machinery, New York, NY, USA, Article 958, 10 pages. https://doi.org/10.1145/3613904.3642654

[4] Daryl Andrews. 2017. *Shop 'N Time*. Boardgame. Mercury Games, Canada.

[5] Charlene Ang, Lorraine Renee Cortel, Carlo Luis Santos, and Ethel Ong. 2023. Fable Reborn: Investigating Gameplay Experience between a Human Player and a Virtual Dungeon Master. In *Extended Abstracts of the 2023 CHI Conference on Human Factors in Computing Systems* (Hamburg, Germany) *(CHI EA '23)*. Association for Computing Machinery, New York, NY, USA, Article 134, 7 pages. https://doi.org/10.1145/3544549.3585793

[6] Tom Apperley and Catherine Beavis. 2013. A model for critical games literacy. *E-learning and Digital Media* 10, 1 (2013), 1–12.

[7] Jonne Arjoranta, Ville Kankainen, and Timo Nummenmaa. 2016. Blending in Hybrid Games: Understanding Hybrid Games Through Experience. In *Proceedings of the 13th International Conference on Advances in Computer Entertainment Technology* (Osaka, Japan) *(ACE '16)*. Association for Computing Machinery, New York, NY, USA, Article 26, 6 pages. https://doi.org/10.1145/3001773.3001798

[8] Saskia Bakker, Debby Vorstenbosch, Elise van den Hoven, Gerard Hollemans, and Tom Bergman. 2007. Weathergods: tangible interaction in a digital tabletop game. In *Proceedings of the 1st International Conference on Tangible and Embedded Interaction* (Baton Rouge, Louisiana) *(TEI '07)*. Association for Computing Machinery, New York, NY, USA, 151–152. https://doi.org/10.1145/1226969.1227000

[9] Jonathan Barbara. 2014. Measuring User Experience in Board Games. *Int. J. Gaming Comput. Mediat. Simul.* 6, 1 (Jan. 2014), 64–79. https://doi.org/10.4018/ijgcms.2014010105

[10] Lukas Bleuel. 2024. *Point of View: Lost Places*. Boardgame. HABA, Germany.

[11] João Bosco Borges, Carmen Li Juy, Izac Sidarta de Andrade Matos, Paulo Vitor Angelo Silveira, and Ticianne de Gois Ribeiro Darin. 2020. Player experience evaluation: a brief panorama of instruments and research opportunities. *Journal on Interactive Systems* 11, 1 (2020), 74–91.

[12] Virginia Braun and Victoria Clarke. 2025. Reporting guidelines for qualitative research: A values-based approach. *Qualitative Research in Psychology* 22, 2 (2025), 399–438.

[13] Emily Brown and Paul Cairns. 2004. A Grounded Investigation of Game Immersion. In *CHI '04 Extended Abstracts on Human Factors in Computing Systems* (Vienna, Austria) *(CHI EA '04)*. Association for Computing Machinery, New York, NY, USA, 1297–1300. https://doi.org/10.1145/985921.986048

[14] George Buckenham and Alex Fleetwood. 2016. *Beasts of Balance*. Boardgame. Sensible Object, United Kingdom.

[15] Tim Burrell-Saward, Isaac Childres, Noah Cohen, Rob Daviau, Justin D. Jacobson, and Brian Neff. 2022. *Return to Dark Tower*. Boardgame. Restoration Games, United States.

[16] Nolan Bushnell and Zai Ortiz. 2019. *St. Noire*. Boardgame. X2 Games.

[17] Gordon Calleja. 2011. *In-game: From immersion to incorporation*. MIT Press, Cambridge, Massachussetts, USA.

[18] Marcus Carter, Mitchell Harrop, and Martin Gibbs. 2014. The Roll of the Dice in Warhammer 40,000. *Transactions of the Digital Games Research Association* 1, 3 (Oct. 2014), 28 pages. https://doi.org/10.26503/todigra.v1i3.20

[19] Kathy Charmaz. 2014. *Constructing grounded theory: A practical guide through qualitative analysis* (2 ed.). Sage, Thousand Oaks, California.

[20] Jenova Chen. 2007. Flow in Games (and Everything else). *Commun. ACM* 50, 4 (April 2007), 31–34. https://doi.org/10.1145/1232743.1232769

[21] David Cicurel. 2018. *Chronicles of Crime*. Boardgame. Lucky Duck Games, Poland.

[22] Ian Clayman. 2024. *Danger Danger*. Boardgame. Exploding Kittens, United States.

[23] Jay Cormier and Sen-Foog Lim. 2021. *Mind MGMT: The Psychic Espionage "Game"*. Boardgame. Off the Page Games, Canada.

[24] Jeremy Crawford, Christoper Perkins, and James Wyatt. 2014. *Dungeon Master's Guide, Fifth edition*. Tabletop Roleplaying Game (Manual). Wizards of the Coast, United States.

[25] Mihaly Csikszentmihalyi. 1997. *Finding flow: The psychology of engagement with everyday life*. Basic Books, New York, NY, USA.

[26] Rob Daviau, Robert Doyle, and Justin D. Jacobson. 2017. *Stop Thief!* Boardgame. Restoration Games, United States.

[27] Alena Denisova, A. Imran Nordin, and Paul Cairns. 2016. The Convergence of Player Experience Questionnaires. In *Proceedings of the 2016 Annual Symposium on Computer-Human Interaction in Play* (Austin, Texas, USA) *(CHI PLAY '16)*. Association for Computing Machinery, New York, NY, USA, 33–37. https://doi.org/10.1145/2967934.2968095

[28] Aaron Donogh, Prospero Hall, and Funko Games. 2023. *Scream: The Game*. Boardgame. Goliath Games, Netherlands.

[29] Matthew Dunstan and Dave Neale. 2021. *Echoes: The Cocktail*. Boardgame. Ravensburger, Germany.

[30] Matthew Dunstan and Dave Neale. 2021. *Echoes: The Microchip*. Boardgame. Ravensburger, Germany.

[31] Geoffrey Engelstein and Isaac Shalev. 2022. *Building Blocks of tabletop game design: An encyclopedia of mechanisms*. CRC Press, Boca Raton, United States.

[32] Laura Ermi and Frans Mäyrä. 2005. Fundamental components of the gameplay experience: Analysing immersion. *Worlds in play: International perspectives on digital games research* 37, 2 (2005), 37–53.

[33] Timea Farkas, Alena Denisova, Sarah Wiseman, and Rebecca Fiebrink. 2022. The Effects of a Soundtrack on Board Game Player Experience. In *Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems* (New Orleans, LA, USA) *(CHI '22)*. Association for Computing Machinery, New York, NY, USA, Article 192, 13 pages. https://doi.org/10.1145/3491102.3502110

[34] Timea Farkas, Nathan Gerard Jayy Hughes, and Rebecca Fiebrink. 2024. How Boardgame Players Imagine Interacting With Technology. *Proceedings of the ACM on Human-Computer Interaction* 8, CHI PLAY (2024), 1–24.

[35] Timea Farkas, Sarah Wiseman, Paul Cairns, and Rebecca Fiebrink. 2020. A Grounded Analysis of Player-Described Board Game Immersion. In *Proceedings of the Annual Symposium on Computer-Human Interaction in Play* (Virtual Event, Canada) *(CHI PLAY '20)*. Association for Computing Machinery, New York, NY, USA, 427–437. https://doi.org/10.1145/3410404.3414224

[36] Jérémy Frey. 2016. Remote Heart Rate Sensing and Projection to Renew Traditional Board Games and Foster Social Interactions. In *Proceedings of the 2016 CHI Conference Extended Abstracts on Human Factors in Computing Systems*. ACM, 2892391, 1865–1871. https://doi.org/10.1145/2851581.2892391

[37] Davide Garofalo and Riccardo Landi. 2024. *The Bad Karmas and the Curse of the Zodiac*. Boardgame. Xplored, Italy.

[38] Michał Gołąb Gołębiowski and Filip Miłuński. 2021. *Destinies*. Boardgame. Lucky Duck Games, Poland.

[39] Vincent Goyat. 2018. *Unlock!: Secret Adventures - A Noside Story*. Boardgame. Space Cowboys, France.

[40] Aqeel Haider, Casper Harteveld, Daniel Johnson, Max V Birk, Regan L Mandryk, Magy Seif El-Nasr, Lennart E Nacke, Kathrin Gerling, and Vero Vanden Abeele. 2022. miniPXI: Development and validation of an eleven-item measure of the player experience inventory. *Proceedings of the ACM on Human-Computer Interaction* 6, CHI PLAY (2022), 1–26.

[41] Nathan I. Hajek and Grace Holdinghaus. 2019. *Lord of the Rings: Journeys in Middle Earth*. Boardgame. Fantasy Flight Games, United States.

[42] Takashi Hamada and Kenji Shimojima. 2016. *Mask of Anubis*. Boardgame. Hasbro, United States.

[43] Ulf Hartelius, Johan Fröhlander, and Staffan Björk. 2012. Tisch digital tools supporting board games. In *Proceedings of the International Conference on the Foundations of Digital Games* (Raleigh, North Carolina) *(FDG '12)*. Association for Computing Machinery, New York, NY, USA, 196–203. https://doi.org/10.1145/2282338.2282376

[44] Lucas Hedgren and Divya Hedgren. 2022. *Sync or Swim*. Boardgame. Bézier Games, United States.

[45] Minh Hua and Rita Raley. 2020. Playing With Unicorns: AI Dungeon and Citizen NLP. *DHQ: Digital Humanities Quarterly* 14, 4 (2020), 27 pages. https://www.proquest.com/scholarly-journals/playing-with-

unicorns-ai-dungeon-citizen-nlp/docview/2553526112/se-2

[46] Wijnand A IJsselsteijn, Yvonne AW De Kort, and Karolien Poels. 2013. *The Game Experience Questionnaire.* Technical Report. Technische Universiteit Eindhoven, Eindhoven.

[47] Wijnand A IJsselsteijn, Huib De Ridder, Jonathan Freeman, and Steve E Avons. 2000. Presence: concept, determinants, and measurement. In *Human vision and electronic imaging V*, Vol. 3959. International Society for Optics and Photonics (SPIE), Bellingham, WA, USA, 520–529. https://doi.org/10.1117/12.387188

[48] Walther Jensen, Thomas Streubel Kristensen, Christoffer Sand Kirk, Hassan Abdul Hameed, Daniel Bergmann Villadsen, and Markus Löchtefeld. 2020. Hybrid Settlers - Integrating Dynamic Tiles into a Physical Board Game using Electrochromic Displays. In *Extended Abstracts of the 2020 CHI Conference on Human Factors in Computing Systems* (Honolulu, HI, USA) *(CHI EA '20)*. Association for Computing Machinery, New York, NY, USA, 1–7. https://doi.org/10.1145/3334480.3382857

[49] Daniel Johnson, M. John Gardner, and Ryan Perry. 2018. Validation of two game experience scales: The Player Experience of Need Satisfaction (PENS) and Game Experience Questionnaire (GEQ). *International Journal of Human-Computer Studies* 118 (2018), 38–46. https://doi.org/10.1016/j.ijhcs.2018.05.003

[50] Ville Kankainen and Janne Paavilainen. 2019. Hybrid board game design guidelines. In *Proceedings of DiGRA 2019 Conference: Game, Play and the Emerging Ludo-Mix*. Digital Games Research Association (DiGRA), Tampere, Finland, 22 pages. https://doi.org/10.26503/dl.v2019i1.1098

[51] Jack Kelly, Michael Mateas, and Noah Wardrip-Fruin. 2023. Towards Computational Support with Language Models for TTRPG Game Masters. In *Proceedings of the 18th International Conference on the Foundations of Digital Games* (Lisbon, Portugal) *(FDG '23)*. Association for Computing Machinery, New York, NY, USA, Article 78, 4 pages. https://doi.org/10.1145/3582437.3587202

[52] Louise H Kidder and Michelle Fine. 1987. Qualitative and quantitative methods: When stories converge. *New directions for program evaluation* 1987, 35 (1987), 57–75.

[53] Nurit Kirshenbaum. 2021. *Research through Design of Bendable Interactive Playing Cards.* Thesis. University of Hawai'i at Manoa.

[54] Mehmet Kosa and Pieter Spronck. 2018. What tabletop players think about augmented tabletop games: a content analysis. In *Proceedings of the 13th International Conference on the Foundations of Digital Games* (Malmö, Sweden) *(FDG '18)*. Association for Computing Machinery, New York, NY, USA, Article 6, 8 pages. https://doi.org/10.1145/3235765.3235782

[55] Matúš Kotry. 2014. *Alchemists.* Boardgame. Czech Games Edition, Czech Republic.

[56] Matúš Kotry. 2024. *Little Alchemists.* Boardgame. Czech Games Edition, Czech Republic.

[57] Eric M. Lang. 2015. *XCOM: The Board Game.* Boardgame. Fantasy Flight Games, United States.

[58] Jakub Łapot, Przemysław Rymer, and Ignacy Trzewiczek. 2018. *Detective: A Modern Crime Board Game.* Boardgame. Portal Games, Poland.

[59] Effie L.-C. Law, Florian Brühlmann, and Elisa D. Mekler. 2018. Systematic Review and Validation of the Game Experience Questionnaire (GEQ) - Implications for Citation and Reporting Practice. In *Proceedings of the 2018 Annual Symposium on Computer-Human Interaction in Play* (Melbourne, VIC, Australia) *(CHI PLAY '18)*. Association for Computing Machinery, New York, NY, USA, 257–270. https://doi.org/10.1145/3242671.3242683

[60] Nicole Lazzaro. 2008. *The Four Fun Keys.* Morgan Kaufmann, Burlington, MA, 317–343.

[61] Marc LeBlanc. [n. d.]. 8 Kinds of Fun. http://algorithmancy.8kindsoffun.com/

[62] Antonios Liapis and Alena Denisova. 2023. The Challenge of Evaluating Player Experience in Tabletop Role-Playing Games. In *Proceedings of the 18th International Conference on the Foundations of Digital Games* (Lisbon, Portugal) *(FDG '23)*. Association for Computing Machinery, New York, NY, USA, Article 8, 10 pages. https://doi.org/10.1145/3582437.3582457

[63] Mariusz Majchrowski. 2024. *Spy Guy: Fantasy.* Boardgame. Trefl, Sopot, Poland.

[64] Regan L. Mandryk and Diego S. Maranan. 2002. False Prophets: Exploring Hybrid Board/Video Games. In *CHI '02 Extended Abstracts on Human Factors in Computing Systems*. ACM, 506523, 640–641. https://doi.org/10.1145/506443.506523

[65] Anthony Nouveau. 2020. *Picture Perfect.* Boardgame. Corax Games, Germany.

[66] Heather L. O'Brien and Elaine G. Toms. 2008. What is user engagement? A conceptual framework for defining user engagement with technology. *Journal of the American Society for Information Science and Technology* 59, 6 (2008), 938–955. https://doi.org/10.1002/asi.20801 arXiv:https://asistdl.onlinelibrary.wiley.com/doi/pdf/10.1002/asi.20801

[67] Matthew O'Malley and Ben Rosset. 2020. *The Search for Planet X.* Boardgame. Renegade Game Studios, United States.

[68] Matthew O'Malley and Ben Rosset. 2023. *The Search for Lost Species.* Boardgame. Renegade Game Studios, United States.

[69] T.C Petty, III. 2022. *My Father's Work.* Boardgame. Renegade Game Studios, United States.

[70] PlayMonster. 2020. *Drone Home.* Boardgame. PlayMonster, United States.

[71] Karolien Poels, Yvonne AW De Kort, and Wijnand A IJsselsteijn. 2007. *D3.3: Game Experience Questionnaire: development of a self-report measure to assess the psychological impact of digital games.* Technical Report. Technische Universiteit Eindhoven, Eindhoven.

[72] Enrico Procacci. 2024. *Until Proven Guilty: The Starry Sky Necklace.* Boardgame. DV Games, Italy.

[73] Melissa J. Rogerson, Martin Gibbs, and Wally Smith. 2016. "I Love All the Bits": The Materiality of Boardgames. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems* (San Jose, California, USA) *(CHI '16)*. Association for Computing Machinery, New York, NY, USA, 3956–3969. https://doi.org/10.1145/2858036.2858433

[74] Melissa J Rogerson and Sasha Soraine. 2025. Playing with Players: On the Criticality of Critical Play. In *Proceedings of DiGRA Australia 2025 (DiGRAA)*. DiGRA Australia, 3 pages. https://digraa.org/wp-content/uploads/2025/01/DiGRAA2025-RogersonSoraine-v2-Sub-Melissa-Rogerson.pdf

[75] Melissa J. Rogerson, Lucy A. Sparrow, and Sophie O. Freeman. 2023. The SMeFT Decks: A Card-Based Ideation Tool for Designing Hybrid Digital Boardgames for Distanced Play. In *Proceedings of the 34th Australian Conference on Human-Computer Interaction* (Canberra, ACT, Australia) *(OzCHI '22)*. Association for Computing Machinery, New York, NY, USA, 298–309. https://doi.org/10.1145/3572921.3572933

[76] Melissa J. Rogerson, Lucy A. Sparrow, and Martin R. Gibbs. 2021. More Than a Gimmick - Digital Tools for Boardgame Play. *Proc. ACM Hum.-Comput. Interact.* 5, CHI PLAY, Article 261 (Oct. 2021), 23 pages. https://doi.org/10.1145/3474688

[77] Melissa J. Rogerson, Lucy A. Sparrow, and Martin R. Gibbs. 2021. Unpacking "Boardgames with Apps": The Hybrid Digital Boardgame Model. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems* (Yokohama, Japan) *(CHI '21)*. Association for Computing Machinery, New York, NY, USA, Article 111, 17 pages. https://doi.org/10.1145/3411764.3445077

[78] Richard M Ryan, C Scott Rigby, and Andrew Przybylski. 2006. The motivational pull of video games: A self-determination theory approach. *Motivation and emotion* 30 (2006), 344–360.

[79] Katie Salen and Eric Zimmerman. 2003. *Rules of play: Game design fundamentals.* MIT press, Cambridge, Massacheusetts, USA.

[80] Donald Shults. 2023. *Freelancers: A Crossroads Game.* Boardgame. Plaid Hat Games, United States.

[81] Premeet Sidhu and Marcus Carter. 2021. Pivotal Play: Rethinking Meaningful Play in Games Through Death in Dungeons & Dragons. *Games and Culture* 16, 8 (2021), 1044–1064. https://doi.org/10.1177/15554120211005231 arXiv:https://doi.org/10.1177/15554120211005231

[82] José Olinda da Silva and Paulyne Matthews Jucá. 2026. Experience Report on Using HybridGamePX. In *Interaction and Player Research in Game Development*, Ticianne Darin, Kamila Rios, Georgia Cruz, Leonardo Tórtoro, and Diego Ricca (Eds.). Springer Nature Switzerland, Cham, 161–178.

[83] Sasha Soraine and Jacques Carette. 2025. The Many Views of Game-Related Experiences with the Experiential Tetrad. , Article 16 pages. https://doi.org/10.1145/3723498.3723805

[84] Sasha Soraine and Melissa J. Rogerson. 2025. Core or Chore? How Hybridity Impacts Player Experience. In *Proceedings of the 20th International Conference on the Foundations of Digital Games (FDG '25)*. Association for Computing Machinery, New York, NY, USA, Article 72, 4 pages. https://doi.org/10.1145/3723498.3723842

[85] Lucy A. Sparrow and Melissa J. Rogerson. 2023. Lessons from Homebrewed Hybridity: Designing Hybrid Digital Boardgames for Distanced Play. *Proc. ACM Hum.-Comput. Interact.* 7, CHI PLAY, Article 376 (Oct. 2023), 28 pages. https://doi.org/10.1145/3611022

[86] Robert A Stebbins. 2012. *The idea of leisure: First principles.* Transaction Publishers, New Brunswick, New Jersey.

[87] Evgeny Stemasov, Tobias Wagner, Ali Askari, Jessica Janek, Omid Rajabi, Anja Schikorr, Julian Frommel, Jan Gugenheimer, and Enrico Rukzio. 2024. DungeonMaker: Embedding Tangible Creation and Destruction in Hybrid Board Games through Personal Fabrication Technology. In *Proceedings of the 2024 CHI Conference on Human Factors in Computing Systems* (Honolulu, HI, USA) *(CHI '24)*. Association for Computing Machinery, New York, NY, USA, Article 328, 20 pages. https://doi.org/10.1145/3613904.3642243

[88] Ron Tamborini and Paul Skalski. 2006. The role of presence in the experience of electronic games. *Playing video games: Motives, responses, and consequences* 1 (2006), 225–240.

[89] Kevin Tang, Terra Mae Gasque, Rachel Donley, and Anne Sullivan. 2023. "It Has to Ignite Their Creativity": Opportunities for Generative Tools for Game Masters. In *Proceedings of the 18th International Conference on the Foundations of Digital Games* (Lisbon, Portugal) *(FDG '23)*. Association for Computing Machinery, New York, NY, USA, Article 63, 6 pages. https://doi.org/10.1145/3582437.3587204

[90] Antonio Tinto. 2019. *Mystery House: Adventures in a Box.* Boardgame. Cranio Creations, Italy.

[91] Ignacy Trzewiczek. 2017. *First Martians: Adventures on the Red Planet.* Boardgame. Portal Games, Poland.

[92] Joseph Tu, Eugene Kukshinov, Reza Hadi Mogavi, Derrick M. Wang, and Lennart E. Nacke. 2025. Designing Biofeedback Board Games: The Impact of Heart Rate on Player Experience. In *Proceedings of the 2025 CHI Conference on Human Factors in Computing Systems (CHI '25)*. Association for Computing Machinery, New York, NY, USA, Article 466, 21 pages. https://doi.org/10.1145/3706598.3713543

[93] April Tyack and Elisa D. Mekler. 2021. Off-Peak: An Examination of Ordinary Player Experience. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems* (Yokohama, Japan) *(CHI '21)*. Association for Computing Machinery, New York, NY, USA, Article 115, 12 pages. https://doi.org/10.1145/3411764.3445230

[94] Nikki Valens. 2016. *Mansions of Madness: Second Edition*. Boardgame. Fantasy Flight Games, United States.

[95] Eric N. Wiebe, Allison Lamb, Megan Hardy, and David Sharek. 2014. Measuring engagement in video game-based environments: Investigation of the User Engagement Scale. *Computers in Human Behavior* 32 (2014), 123–132. https://doi.org/10.1016/j.chb.2013.12.001

[96] Josef Wiemeyer, Lennart Nacke, Christiane Moser, and Florian 'Floyd'Mueller. 2016. Player experience. In *Serious games: Foundations, concepts and practice*, Ralf Dörner, Stefan Göbel, Wolfgang Effelsberg, and Josef Wiemeyer (Eds.). Springer International Publishing, New York, United States, 243–271.

[97] Andreas Wilde. 2021. *Yummy Yummy Monster Tummy*. Boardgame. Lucky Duck Games, Poland.

[98] Stewart Woods. 2012. *Eurogames: The design, culture and play of modern European board games*. McFarland & Company, Inc. Publishers, Jefferson, United States.

[99] Yan Xu, Evan Barba, Iulian Radu, Maribeth Gandy, and Blair MacIntyre. 2011. Chores are fun: Understanding social play in board games for digital tabletop game design. In *DiGRA '11 - Proceedings of the 2011 DiGRA International Conference: Think Design Play*, Vol. 16. Digital Games Research Association (DiGRA), Tampere, Finland, 16 pages. https://doi.org/10.26503/dl.v2011i1.591

[100] José P. Zagal. 2008. A framework for games literacy and understanding games. In *Proceedings of the 2008 Conference on Future Play: Research, Play, Share* (Toronto, Ontario, Canada) *(Future Play '08)*. Association for Computing Machinery, New York, NY, USA, 33–40. https://doi.org/10.1145/1496984.1496991

[101] Eric Zimmerman. 2009. *Gaming Literacy: Game Design as a Model for Literacy in the Twenty-First Century*. Routledge New York, New York, USA, Chapter 1, 23–31.