The Effects of a Soundtrack on Board Game Player Experience

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ABSTRACT

Board gaming is a popular hobby that increasingly features the inclusion of technology, yet little research has sought to understand how board game player experience is impacted by digital augmentation or to inform the design of new technology-enhanced games. We present a mixed-methods study exploring how the presence of music and sound effects impacts the player experience of a board game. We found that the soundtrack increased the enjoyment and tension experienced by players during game play. We also found that a soundtrack provided atmosphere surrounding the gaming experience, though players did not necessarily experience this as enhancing the world-building capabilities of the game. We discuss how our findings can inform the design of new games and soundtracks as well as future research into board game player experience.

CCS CONCEPTS

• **Human-centered computing** → **Empirical studies in HCI**; *User studies*; • **Applied computing** → **Computer games**.

KEYWORDS

Player Experience, Soundtrack, Music, Board Games, Enjoyment, Tension, Thematicness, Atmosphere

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1 INTRODUCTION

A growing number of board games include technology in some form [14], ranging from the optional handling of some of the more tedious "bookkeeping" tasks—such as player health or score [33, 61]—to being integrated and essential to gameplay, expanding upon the world-building and narrative elements of the game [49, 54, 55]. Recently, the inclusion of digital elements in analogue games has become a topic of research, examining players' and game designers' attitude towards hybrid games [31, 47], alongside a thorough classification of the various roles and functions technology can fulfil in a board game [27]. However, many unknown factors remain with regard to the effects of technology on board game player experience. What are the consequences of integrating technology into these hitherto analogue experiences? What facets of board game player experience are relevant to examine, and what research methodologies can facilitate such examination? How might new research inform the design of novel board games or similar playful experiences?

Here, we investigate these questions in the specific case of board game technology that adds a musical soundtrack. Through companion apps or as additional downloadable content, soundtracks—music, sound effects and sometimes voice narration—are increasingly featured in modern board games. Simple, pre-recorded soundtracks can be a technically straightforward addition to certain styles of board game, and one can imagine the design of more complex approaches wherein a digital soundtrack dynamically responds to player actions or game state. Past research has shown that music can enhance the player experience of video games, particularly with regard to their world-building and thematic elements [37, 40, 58], but the effect of music on board games has not been studied to our knowledge.

We present a mixed-methods study examining the impact of a soundtrack on the experience of 14 hobbyist and casual board game players playing a specific game. Our study design draws on prior research in board game player immersion to identify metrics for relevant facets of player experience—focusing in particular on tension, enjoyment, and a quality we term "thematicness".

The soundtrack—officially released by the publisher—comprised of high-quality music (instrumental sound not intended to mimic any noises from the game world), sound effects (noises that would be expected in the world in which the board game was set) and voice announcements. The quantitative results show that music and

sound effects together significantly improve enjoyment and tension, as well as some specific measures of thematicness, compared to a version of the game that includes audio voice announcements but no music or sound effects. The presence of voice announcements alone did not result in significant improvements compared to gameplay without any added sound. The qualitative analysis reveals a richness in players' subjective experiences of gameplay, including the emotional impact of various soundtrack types on players, the differences among players in how they regarded tension in gameplay, players' differentiation between "atmospheric" and "thematic" experiences, and identification of factors independent from the soundtrack which affected player experience in important ways.

The main contributions of this work are the following:

- Evidence that the addition of music can enhance player experience in board games, suggesting that this is a fruitful avenue for new game designs to further explore
- Evidence that board game players—both casual and hobbyist—are aware of their experiences and can meaningfully articulate them, and that qualitative research applied to player interviews can generate new insights about player experiences
- An argument that "thematicness" is an aspect of player experience worth studying in board games, an example of how thematicness can be probed in player questionnaires and interviews, and evidence that casual and hobbyist players exhibit awareness of what makes their experience thematic
- Evidence that music can create atmosphere, and an argument that "atmosphere" is a facet of board game experience that merits further exploration

2 BACKGROUND

2.1 State of Board Games Research

Board gaming is a popular hobby with increasingly complex titles and a vast cultural surrounding of players, digital practices and organised live events [6, 9, 45]. The designing and publishing of new board game titles has seen rapid growth in the past forty years [50], even surpassing video games in successful Kickstarter funding by 211 million USD in 2020 [26].

The study of board games as part of games studies, media studies, or player experience research has an increasing library of interdisciplinary publications. In 2014, the *Analog Game Studies Journal* was established, with the goal of "providing a periodically published platform for the critical analysis, discussion of design, and documentation of analog games" [53], whilst in 2017 *Game Studies*—the international journal of computer game research—widened its submissions to non-digital games in an announcement titled "Just Games" [1]. Board games have been examined as media [8, 10], and as complex systems [22] with a diverse variety of mechanics game designers can utilise [50] in creating novel, interesting experiences for players.

Board game players' motivations are under increasing interest [32, 57], including their opinions regarding matters such as the inclusion of technology in analogue games [31, 47]. Researchers found that the material nature of board games is of great importance to players [44]; that board game players not just experience immersion, but they experience it in a variety of ways [23]; and that players find ways of maintaining their hobby even through hardship—such as the COVID-19 pandemic—with the use of remote collaborative tools and modifications of games to suit their needs [60]. Work by Kosa and Spronck [31] has studied players' views on technology being integrated into board games. They found that obsolesce of the technology is a concern—especially since board games are seen as longstanding objects. In their implications for design, they suggest that any included technology either be optional, or confirm continuous support for the future. Furthermore, they emphasise that any technology-augmented game has to preserve the "essence" of what makes a board game a board game—its materiality—and ensure that digital elements do not overpower the physical. Similarly, Rogerson et al. [47] examined both players' and board game designers' attitudes towards hybrid board games [47], and found great inconsistencies in their viewpoints based on people's pre-existing conceptions of what a board game was, alongside their pre-existing relationship with technology. Lastly, in another study, Rogerson et al. [27] classified the various roles technology currently fulfils in board games, creating an important taxonomy for both further research and the design of hybrid analogue-digital board gaming experiences.

2.2 Theme and World-Building in Board Games

Bevier [3] states that "theme" in board games has great importance and introduces the concept of "light theming" as a form of context in which elements of gameplay are better comprehended. He adds, however, that whilst through light theming, abstract games such as chess are contextualised, it does not mean the game becomes an accurate representation of the imagined actions associated with the setting.

Board games with themes which are more central to gameplay have been labelled as *ameritrash*, which—according to Costikyan [19]—are games "where the mechanics emerge from the themes, where railroad games have a historical connection to the 19th century, where zombies eat the brains of their victims and gain some game benefit there...where goals are related to what people in the situation of the game would actually try to do." (179). The term ameritrash emerged as a form of mockery—referring to the American origins of some of the early games of the genre—by players who preferred games with less thematic ties and more strategic depth, commonly labelled as *eurogames* [59], due to the European origins of early titles. However, ameritrash is increasingly being abandoned in favour of the more fitting *thematic games* label, as players felt it was "unnecessarily negative" [4]. BoardGameGeek—the central hub of the board games industry and hobby—defines thematic games as "games that emphasize a highly developed theme, characters, heroes, or factions with individually defined abilities, player to player conflict, and usually feature a moderate to high level of luck" [4]. The website further draws a clear distinction between eurogames and thematic games, stating that their intended audiences and gameplay mechanics tend to differ.

Chircop [15] differentiates titles based on "theme synergy"—where theme's most basic function is to entice players to be interested in a board game, and the more the theme is connected to the mechanics of the game, the more synergy there is between gameplay and its setting. He defines games with high theme synergy as

"one where, if it were to be stripped from its theme, the experience is significantly adversely altered to an extent that mechanics lose context and imbued meaning, to a point of potential redundancy" (17). This definition is similar to how ameritrash and—later—thematic games have been defined, however, Chircop also discusses medium theme synergy, where mechanics do not necessarily emerge from the theming of the game, but where theme complements the actions evoked within the mechanics instead. Differences between medium and high synergy can also be found in materials and visual representation within these games, where the higher the synergy, the more representative of the theming the game pieces and art become. In Chircop's analysis, eurogames are still distinguished from thematic, however, it is recognised that theme can have importance in eurogames as well.

Similarly, Arnaudo [2] categorises theme in games as a "representational component"—which ranges from minimal to high—based on the relevance of theme to gameplay. Whilst these categorisations align with that of Chircop's, he further adds that "such categorization should be thought of as a modulation of nuances rather than a rigid system" (pp. 16-17), stating that there are games which transcend the boundaries set by categorisation. His aim is not to distinguish between eurogames and thematic games, but rather, to provide a survey of the storytelling capabilities of modern board games, where "the emergence of story is encouraged by design. Typically, this requires the existence of a clear goal which the player is attempting to achieve, considerable freedom of choice as to how that end might be accomplished, and personalities which the player can identify with and be opposed by" (pp. 17-18).

Whilst the above categorisation and thematic classification of board games have been driven mostly by game designers and by surveys of games and their characteristics, in our previous study describing board game players' experiences of immersion [23] we found that theme—or world-building—can be a contributing factor to immersion. They classify board game players' experiences of immersion as way-points on a spectrum between "challenge" and "world-building", and define immersion as a collection of experiences with the player at the centre of the experience, where the experience happens when a player's requirements are met by what is provided by the game and the surrounding gameplay. Immersion types which require world-building are categorised as *Embodiment*, where players feel they were "navigating the problem solving aspect of the game whilst inhabiting a role within that fictional world" (7); *Contextual Submergence*, where players' immersion is a result of inhabiting the setting of the game itself (but not necessarily the role or the problem solving); and *Narrative Submergence*, where players described immersive experiences as a result of the narrative. The authors found, however, that world-building and narrative are not always a result of what is provided by the game, and that players themselves are able to craft the game-world through supplementary practices—such as changing the mood of the play area, role-playing their characters, crafting their own narrative, and listening to music which correlates with the game's setting.

2.3 Music and Sound in Board Games

An increasing number of board games feature music in some form. In some cases, music is additional content that is obtained from the publisher's website [35, 41], gained as a reward through Kickstarter campaigns [25], or purchased separately [52]. Such soundtracks, however, are optional to players, and are neither essential, nor synchronised to gameplay. Since board games are interactive systems with variable player counts and elements of uncertainty and randomness [21], because these soundtracks are fixed-media pieces with a predetermined length, events of gameplay and events of the soundtrack work independently from each other.

In a small number of other cases, games employ music as part of a timer system. Some board games utilise an *elapsed real-time* mechanism, as defined by Engelstein et al. [22]. These games feature a timer which is set to a predetermined time at the start of the game, indicating when the game ends. According to Engelstein et al., a fixed length independent from the actions of the players provides additional tension to gameplay. The way timers are implemented into a game differs from game to game, with some games asking players to use devices which can be found in their homes, whilst others include a timer in the game box. Some modern games, however, use soundtrack timers which combine elements of music, sound effects and sometimes voice narration, and "have the advantage of being able to incorporate mid-game instructions for players" [22, p. 190]. Soundtrack timers can—similarly to non-essential soundtracks—be either downloaded (e.g., [17]) or, in some cases, included in the box of the game as a CD (e.g., [39]). Increasingly, however, these soundtracks are delivered through a companion smartphone app, where the app usually has other features alongside the soundtrack timer (e.g., [29]).

2.4 Roles and Effects of Music in Video Games

Although no research to our knowledge has examined the effects of music on board games, there is substantial research on the effects of music in video games. Klimmt et al. [30], for example, found that music had a positive effect on the enjoyment of players in a fantasy video game, and increased players' feelings of fear in a horror game. Phillips [40] states that music can aid certain mind-states for players, which she defines as "being in the zone"—a state similar to Csikszentmihalyi's [20] flow state: a state of unbroken concentration. Munday [37] attributes music to causing cognitive immersion, where cognitive immersion is considered a function of the brain, aiding players blocking out distracting sounds while also helping players focus their attention to stimuli provided by the game itself.

Another role music can have in video games is strengthening the game-world and narrative elements of games. Phillips [40] states that different genres of games have different musical requirements. The exploration of a rich and detailed game-world is a feature of most "role-playing" or "adventure" games, for example, where the role of music is to aid the realisation of the fictional world, making its characters and culture believable. Similarly, Whalen [58] suggests that in order for both the game-world or its characters to become believable, they need distinguished theme music attributed to different locations and characters within the game. Munday [37] also considers music inseparable from the game-world, where music and other sounds—such as dialogue, sound effects and even silence—together with all other sensory information such as visual or tactile elements, merge to form the game-world itself. Collins

[18] argues that music reinforces the motivations of characters, while also helping the player navigate within the narrative and signalling changes in the story. Continuity is not only important in the overall flow of the game, but in the flow of its narrative. Both Collins and Munday state that music can connect the story elements, similarly to how it connects locations or phases of action and inaction.

Music can, furthermore, become feedback to players during gameplay. For example, players can recognise where they are by listening to music associated with a location, whilst also being prompted by music towards important goals, objects or characters [18], or differentiate between a "safe state" and "danger state" in the game [58], or further aid the game's flow by setting the pace of a given game [40].

Lastly, the concepts of *diegetic*—all sound and music which occurs within the fictional world and therefore is heard by its characters—and *non-diegetic*, referring to background music and audio that is not heard by the characters within the fictional world, are much discussed in both film and video game audio literature [18, 58]. However, it has been argued that these terms are inaccurate in video games audio due to the participatory nature of games, where the player inhibits the game world to some extent, and where audio has many roles and functions when compared to film [28], which is a medium more passively experienced by users. Whilst there is currently no research regarding diegetic and non-diegetic sound in board games, their shared participatory characteristics with video games, alongside the addition of play taking place in the physical space, make it even more difficult to assess whether these concepts apply.

3 METHODOLOGY

3.1 Aims: Measuring and Investigating Impact of a Soundtrack on Player Experience

Our primary aim is to explore whether and how the inclusion of a soundtrack of music and/or thematic sound effects might enhance the player experience of a board game. We have chosen to focus specifically on a soundtrack's effects on *Enjoyment*, *Tension* and *Thematicness*.

Whilst we have considered to focus on a soundtrack's ability to enhance immersion (a quality often advertised in board game marketing), our previous work into board game players' subjective experiences of immersion [23] found that players define immersion in a variety of ways which makes measurement of the experience difficult. Further, certain characteristics of board games (i.e., lack of digital display) make it incompatible with standardised video game immersion questionnaires. Therefore, we chose to focus on individual components which, based on our previous research, can contribute to certain types of board game immersion, however, which are also independently measurable facets of player experience.

Enjoyment, of course, is of key interest in player experience research [36]. Furthermore, past work has demonstrated music's ability to enhance enjoyment in video games [30]. We chose enjoyment both due to its importance to video game player experience research, as well as the soundtrack's potential ability to affect it.

Our previous research on board game player experiences of immersion [23] suggests that tension is a condition for immersion for a portion of board game players, and previous video games literature has also highlighted a soundtrack's ability to increase tension [37, 58].

Our quantitative approach to evaluating enjoyment and tension uses an established questionnaire previously used in games research (Section 3.5).

Following findings by [2, 15, 19, 23], we use the term "thematicness" to refer to players' perception of theme and world-building within the board game experience. The term "thematic" is frequently used by both players and the board games industry, either to discuss or to market games [2, 4, 22]. Additionally, players' reports of certain thematic elements of board games leading to immersive experiences [23] indicate that the extent to which players regard a board game as thematic (i.e., its "thematicness") is thus a relevant facet of player experience that should be considered in addition to enjoyment and tension. Further, past research suggests that music may be capable of enhancing thematicness in games: work by [18, 37, 40, 58] shows evidence for music enhancing world-building in video games, and in our previous work [23], we found that voluntary background music—music which was not part of the game, but paired with the game by players themselves—was sometimes used to strengthen the world-building element of board games.

There is no research to our knowledge which has studied board game players' definitions of thematicness or experiences of thematicness. Therefore, we have decided to use a qualitative approach alongside quantitative measures to examine thematicness in this study, as we felt this was best suited to forge new avenues in the exploration of this concept. The details of both our qualitative and quantitative approach can be found in Sections 3.5–3.6.

3.2 Materials and Conditions

3.2.1 The Fuse Game. For this study, we chose to use the board game *Fuse* [29] due to the following properties:

- The game is real-time—where players all play at the same time, without taking turns—eliminating waiting time before turns;
- The game has a fixed length regardless of the outcomes of gameplay, so that there is a consistent match between the soundtrack and gameplay;
- The game has a short play time (ten minutes), allowing for multiple play sessions, reducing the risk of fatigue for participants;
- The game has an official, optional soundtrack app, ensuring that the music and sound effects are aligned with the game's theme.

Fuse is a co-operative game, where players work together against the game, and there are no notable differences in gameplay depending on player count. Whilst there is no in-game narrative, the game has a setting of a space ship, where players take on the role of members of a bomb-defusal squad, attempting to defuse a set number of bombs in exactly ten minutes. To complete this task, players must collect dice to solve puzzles based upon cards in front of them. The fast-paced game requires speedy dice rolling, collectively allocating

resources and inter-player communication. Without careful management of all aspects of the game, the tasks are not dealt with quickly enough and all players collectively lose the game. Game components include cards, which represent the bombs, and dice, which players need to place on the cards in order to solve the spatial and mathematical puzzles presented on them.

Fuse is an example of an elapsed real-time board game. This means that players do not have ample time to consider and deliberate over their next move; rather, each move must be made at speed due to the time limitation on game play. This style of game has a high amount of time pressure as running out of time is the only way the game can be lost. Other notable examples of elapsed real-time board games are *Escape: The Curse of the Temple* [39] and *Space Alert* [17]—both of which feature a soundtrack timer—as well as *Magic Maze* [34] and *5-Minute Dungeon* [42], which both have timers but no audio. Furthermore, elapsed real-time board games belong to the larger group of real-time board games, where the difference between the two is the time limitation. For example, *Captain Sonar* [24] and *Galaxy Trucker* [16] are both real-time board games without a timer mechanic, however, players still take simultaneous actions as opposed to taking turns. There are currently 512 titles listed as featuring a real-time mechanic on BoardGameGeek [7]; however, it is worth mentioning that all board games are a combination of a variety of mechanics. Fuse, for example, features mechanics of card drafting, dice rolling and pattern building, resulting in sharing similarities with other board games with these mechanics, regardless of whether they are real-time or not.

Based on existing definitions of thematic games [2, 4, 15], *Fuse* could be considered to have medium theme synergy: elements of gameplay correlate with its theme, and due to heavy reliance on dice rolling, it is considered to have high elements of luck as well. Still, its components do not reflect the theme other than art on cards and on the box. In its soundtrack, there is rhythmic, high-tempo music, alongside sound effects of alarms and clock-ticking. The narrated time announcements are delivered by a fictional AI ship computer, which has a flat, emotionless voice. A picture of the box and typical two player set-up of a game of *Fuse* can be seen in Figure 1.[1]

3.2.2 Conditions. The standard version of the Fuse soundtrack app includes music mixed with sound effects, as well as voice-narrated announcements alerting the player to the time every passing minute until the game ends. A simple comparison of gameplay with and without the app prevents any determination of whether observed differences in player experience are due to the thematic music and sound effects, to the time announcements, or to a combination of these. Therefore, we employed the following three study conditions:

- **Condition A**: No music or sound effects and no time announcements. The only sound is a beep indicating the game's end.
- **Condition B**: Time announcements only (no music or sound effects). A voice speaks the time announcements every minute.

[1]In this video by Optimal Play, a full playthrough of the game can be seen, including the official timer app with the original soundtrack: https://www.youtube.com/watch?v=7vpGUkOcFFU

Figure 1: Box art (left) and typical set-up of *Fuse* for two players (right)

- **Condition C**: Time announcements every minute as well as the thematic music and sound effects from the original *Fuse* app.

In addition to sound, the original *Fuse* companion app features a visual timer, where minor visual effects are used, alongside showing the remaining time the players have through the game. After the ten minutes have passed, an animation of an explosion is shown. There are no further video effects in the companion app. Furthermore, the optional additional sarcastic voice AI comments that are available for players in the original app are disabled for all conditions.

In all study conditions, players used a laptop placed on the gaming table to play a video providing the audio and visual content. The sound of the video varied according to condition as described above. In all conditions, the visuals of the video were identical, reproducing the unaltered visuals from the original app.

3.3 Hypotheses

Comparing conditions B and C above enabled testing of the main hypothesis of **H1: A musical soundtrack enhances player experience of board games**, with three sub-hypotheses:

H1a: A musical soundtrack makes gameplay more enjoyable.
H1b: A musical soundtrack increases tension during gameplay.
H1c: A musical soundtrack enhances thematicness.

Furthermore, comparing conditions A and B above enables us to investigate the impact of the audio time announcements themselves on player experience. This corresponds to the additional hypothesis of **H2: Time announcements enhance player experience of board games**, with the sub-hypotheses of:

H2a: Time announcements make gameplay more enjoyable.
H2b: Time announcements increase tension during gameplay.
H2c: Time announcements enhance thematicness.

3.4 Participants

Participants were sampled from hobbyist board game players—defined by Rogerson [46] as players who participate in the surrounding practices of board gaming, including the collecting, organising and discussing of games—alongside people identifying as more casual players who co-resided with a hobbyist player. Due to

the ongoing COVID-19 pandemic, the experiment had to be conducted fully remotely and included materials which needed to be delivered to participants, which influenced how participants were sampled both in a geographical sense and in terms of their gaming experiences. It also posed limitations on the maximum number of participants we could recruit. In the end, 14 participants were recruited on the basis of the following criteria:

- Groups of two people living at the same address, available to participate together.
- At least one in the group identifies as a hobbyist board game player.
- Players own a computer with a webcam and microphone, and are able to play videos on their computer, alongside using video-conferencing software.
- Players should have not played the selected board game before.

Participants were asked to fill out a pre-survey, which enquired whether they identified board gaming as a hobby, whether they aimed to play board games frequently, whether they have collected board games and whether they have participated in online discussions regarding board gaming. Based on these questions, we identified 9 participants as hobbyist players, and 5 participants as more casual players. There was no correlation between gender and board game player experience. The mean age of participants was 30.15 (SD = 10.02). 5 participants identified as female, and 9 identified as male. All participants received a sealed copy of the game by courier service before the start of the experiment, which they kept afterwards.

3.5 Procedure

In groups of two players, participants were asked to play the game three times—once in each condition (A, B and C), in a randomised order. Players filled out a short questionnaire after each of the three play-throughs.

Eight of the questionnaire items are drawn from the Intrinsic Motivation Inventory (IMI) as defined by [48]. The IMI is a standardised survey consisting of seven sub-scales measured with a 7-point Likert scale, and it has been used in past research investigating video game player experience research (e.g., [11, 38, 51, 56]). Its seven sub-scales relate to different aspects of participants' subjective experiences of an activity. The IMI is flexible in that the researcher can choose which sub-scales to include in the final questionnaire, however, all questions within a category have to be used in the final survey. Furthermore, the wording of these questions can be tailored to better reflect the activity. For the purpose of this study, we selected only sub-scales measuring *Enjoyment* and *Tension*, as the remaining sub-scales had no relevance to the aims of the experiment.

We have also created an additional four questions to evaluate *Thematicness*, using the same format of a 7-point Likert scale, mixed into the questions of the IMI. As thematicness does not have a pre-existing definition or standardised measuring tools, we have built upon existing literature—including our pwn previous work into board game immersion—where similar concepts are discussed. In our immersion study [23], we identify "contextual submergence"—board game players' experience of feeling like they inhabit the game-world—as contributing to experiences of immersion; this informs Q13: "I felt like I was on a space ship during the game." [2, 15, 23] have each written about players' use of role-playing or identification with in-game roles as relevant to experience in thematic board games; for instance, we previously described "embodiment" as a type of immersion in which players inhabit a role within the fictional world [23]. This work informs Q14 ("I felt like I was defusing bombs during gameplay") and Q15 ("I felt like I was a real Bomb Defusal Technician during the game"). Our [23] concept of "narrative submergence" is also related to players feeling invested in the unfolding events within the game, including the fate of in-game characters; this informed Q16: "I felt that the survival of the ship's crew depended on me". The full questionnaire completed after each of the three play-throughs appears in Table 1.

Table 1: Questions answered by participants following each of the three play-throughs. Questions 1–7 (Enjoyment) and 8–12 (Tension) are from the Intrinsic Motivation Inventory [48], while Questions 13–16 address the new concept of thematicness. Question order was randomised and all questions used a 7-point Likert scale format.

Post-playthrough questionnaire
IMI sub-scale for "Enjoyment"
Q1. I enjoyed playing this game very much
Q2. This game was fun to play
Q3. I thought this game was boring
Q4. The game did not hold my attention at all
Q5. I would describe this game as very interesting
Q6. I thought this game was quite enjoyable
Q7. While I was playing the game, I was thinking about how much I enjoyed it
IMI sub-scale for "Tension"
Q8. I did not feel nervous at all while playing this game
Q9. I felt very tense while playing this game
Q10. I was very relaxed in playing the game
Q11. I was anxious while playing the game
Q12. I felt pressured while playing the game
Custom questions for "Thematicness"
Q13. I felt like I was on a space ship during the game
Q14. I felt like I was defusing bombs during gameplay
Q15. I felt like I was a real Bomb Defusal Technician during the game
Q16. I felt that the survival of the ship's crew depended on me

Finally, after a ten-minute break to let participants rest and to look through their questionnaire answers, participants were asked to engage in a short semi-structured interview to reflect on their experiences. Both players were interviewed simultaneously, starting with the less experienced player to minimise the hobbyist player's influence on the casual player. When both players considered themselves hobbyists, interview order was decided randomly.

The first two interview questions were pre-determined and always the same for each participant:

- Which timer would you choose to play with and why?
- Could you describe each timer with three words (or more)?

After these, more specific questions followed based on participants' questionnaire responses. This could cover enjoyment, tension or thematicness. Lastly, participants were asked if they had anything more to add.

3.6 Data Analysis

3.6.1 Questionnaires. To test the effects of a musical soundtrack on *Enjoyment* and *Tension*, we conducted one-way repeated measures ANOVA, comparing the IMI Enjoyment and Tension sub-scale scores for conditions B and C, where C contained the music and sound effects, and B did not. The effects of time announcements were calculated using the same procedure, comparing B (containing the time announcements) and A (no time announcements). To test the effects of the musical soundtrack on *Thematicness*, we used a Wilcoxon Signed Ranks test comparing the individual scores of each questionnaire item (items 13 to 16 in Table 1) for conditions B and C. The effects of time announcements were calculated for conditions A and B using the same procedure.

3.6.2 Interviews. A Reflexive Thematic Analysis (RTA) was conducted on the semi-structured interviews, following guidelines by Braun and Clarke [12]. RTA is distinguished from other forms of thematic analysis in that it does not have a code book, whilst themes do not emerge but are identified through analysis and the researcher's preceding knowledge and experience with the subject matter. We also followed a *deductive* approach to thematic analysis, as the hypotheses and the results of the quantitative analysis both influenced how we engaged with the interview data, with the goal of gaining deeper insight into the effects of a soundtrack on board game player experience.

The procedure of RTA started with data familiarisation, through first transcribing, then reading interviews multiple times. During this step, initial impressions were collected in notebooks within MaxQDA, after which complete coding was conducted. There were 214 initial codes, both on the semantic level—as participants were asked to use descriptors for each timer—and the latent level through the researcher's own interpretation. The smallest coding units consisted of only a few words to a sentence. Codes were then refined and reformed into clusters based on meaning and content—especially the semantic codes, since participants used many descriptors with similar meaning—before all codes were examined to find relevant patterns. Themes we initially identified were then refined and reviewed until the final selected themes reflected the data analysed and the research questions we asked.

Table 2: Effects of Musical Soundtrack on Enjoyment and Tension (Repeated Measures ANOVA, $p < 0.05$ *highlighted in bold*)

	Mean	SD	*F(1,13)*	*p*	η_p^2
Enjoyment					
C (with soundtrack)	40.00	5.94	5.55	**0.035**	0.299
B (without soundtrack)	36.57	6.14			
Tension					
C (with soundtrack)	23.86	4.56	8.53	**0.012**	0.396
B (without soundtrack)	20.86	5.43			

Table 3: Effects of Musical Soundtrack on Thematicness (Wilcoxon Signed Ranks, $p < 0.05$ *highlighted in bold*)

	Median	*Z*	*p*
Q13			
C (with soundtrack)	2.5	-2.20	**0.026**
B (without soundtrack)	1.0		
Q14			
C (with soundtrack)	2.5	-2.05	**0.040**
B (without soundtrack)	1.5		
Q15			
C (with soundtrack)	2.0	-1.54	0.124
B (without soundtrack)	1.0		
Q16			
C (with soundtrack)	2.0	-2.00	**0.046**
B (without soundtrack)	1.0		

Table 4: Effects of Time Announcements on Enjoyment and Tension (Repeated Measures ANOVA)

	Mean	SD	*F(1,13)*	*p*	η_p^2
Enjoyment					
B (with time announcements)	36.57	6.136	0.180	0.678	0.014
A (without time announcements)	35.93	7.985			
Tension					
B (with time announcements)	20.86	5.433	0.248	0.627	0.019
A (without time announcements)	20.36	6.404			

4 RESULTS

4.1 Questionnaire: Effects of Musical Soundtrack

The effects of the musical soundtrack (i.e., music with integrated sound effects) on both *Enjoyment* and *Tension* were statistically significant, with players experiencing condition C as more tense (Hypothesis **H1b**) and more enjoyable (Hypothesis **H1a**) than condition B (Table 2).

The effects of the musical soundtrack on thematicness were statistically significant for questions 13, 14 and 16 (Table 1), which shows that the soundtrack increases feeling of being on a spaceship, feeling like defusing bombs and feeling responsible for the survival of the crew. However, there was no statistically significant difference between conditions B and C for question 15—feeling like a Bomb Defusal Technician. This means that we partially accept hypothesis **H1c**. Notably, though, responses for Q13–Q16 were low in both conditions (medians ranging from 1–2.5 out of 7). A summary of the results can be seen in Table 3.

4.2 Questionnaire: Effects of Time Announcements

The time announcements did not have a significant effect on either *Enjoyment* or *Tension* (Hypotheses **H2a** and **H2b** in Table 4).

The effect of time announcements on *Thematicness* was statistically significant for question 16, feeling like "the survival of the ship's crew depended on me". There was, however, no significant effect of time announcement on feeling of being on a spaceship, feeling like defusing bombs, or feeling like a Bomb Defusal Technician (questions 13, 14 and 15 in Table 1). Again, response scores for Q13–Q16 were low in both conditions (medians ranging from 1–1.5 out of 7). The results can be found in Table 5.

Table 5: Effects of Time Announcements on Thematicness (Wilcoxon Signed Ranks, $p < 0.05$ *highlighted in bold*)

	Median	Z	p
Q13			
B (with time announcements)	1.0	-1.511	0.131
A (without time announcements)	1.0		
Q14			
B (with time announcements)	1.5	-0.707	0.480
A (without time announcements)	1.0		
Q15			
B (with time announcements)	1.0	-1.414	0.157
A (without time announcements)	1.0		
Q16			
B (with time announcements)	1.0	-2.121	**0.034**
A (without time announcements)	1.0		

4.3 Interviews

Table 6 summarises participants' preferences for each timer, stated in response to the first interview question. Table 7 presents examples of descriptions participants provided for each condition, as prompted by the second interview question. Whilst most participants had a clear timer preference—which, for the majority (9) was Timer C—three players felt that their choice would depend on the situation in which play would occur. None of the participants clearly chose Timer A—silence—and only P2 indicated a choice between A and C, stating that the game was *"either like more fun with no distraction or more fun with like significant distraction (P2)"*.

Through the RTA process described in Section 3.6.2, we identified four themes regarding how playing with each timer affected player experience. After clustering our initial codes—resulting in the clusters in Table 8—we observed that the clusters contained concepts which often had conflicting ideas. For instance, participants described tension as either positive or negative, or described contrasting emotions towards each of the timers. The four themes, therefore, reflect detailed explorations of the relationships between these code clusters.

Sections 4.3.1–4.3.4 explore each of these four themes. In 4.3.1, we discuss the different effects timers had on players themselves—how they acted and felt during gameplay. In 4.3.2, we discuss that whilst music and sound effects create atmosphere, atmosphere and thematicness are not the same. In 4.3.3, we illustrate how participants experienced elevated tension with music and sound effects, however, tension is not always regarded as enjoyable. Finally, in 4.3.4, we investigate the wider contextual factors which can contradict the role of the timer, or influence the choice of timer, in the overall player experience.

4.3.1 Timers: The Exciting, the Useful and the Empty. All three timers affected participants differently, through the way they played the game, to how they felt during gameplay. Players had an activated experience with timer C, filled with urgency to act: *"I was, like definitely much more like tense and keen to kind of do things and just...I did"* (participant P1), helping them keep their focus on the game's events: *"the last one, I was probably like, the most attentive for it...like I was aware of the time passing because the noises were keeping me like focused on it"* (P2), and *"I think you were more kind of in the zone and more kind of tense in the situation with the music"* (P7). This activeness and heightened attention were reflected in the descriptions they used for timer C, such as *"C, I would describe as more kind of intense and impactful and suspenseful. Like definitely the experience of playing while that was far more engaged and activated."* (P1). Active and focused gameplay also resulted in excitement: *"C, I thought was really exciting because [of] the music and it just kind of gets you in the zone"* (P8), and some players associated these with the game's bomb defusal theme: *"because the game is like stress, right? Like, defusing a bomb and like the numbers...and it should, it should be a rushed thing. So it was more enjoyable"*.

Table 6: Summary of Participants' Timer Choices

Timer	Participants Choosing this Timer	Example Rationale
Undecided	P1,P2,P9	"Either B or C" (P9) "A or C" (P2) "B or C" (P1)
B	P5,P6	"Most comfortable" (P6) "More focused" (P5)
C	P3,P4,P7,P8,P10,P11,P12,P13,P14	"Most enjoyable" (P3) "Atmosphere" (P7) "More tension" (P10) "More immersive" (P12)

Table 7: Examples of Participants' Responses Describing Each Condition

Condition	Example Descriptions
A	"lazy, disengaged" (P1) "empty" (P12) "relaxed" (P1,P12,P13)
B	"useful" (P6,P9) "efficient" (P14) "clinical" (P12) "annoying" (P8)
C	"atmospheric" (P7,P8,P9,P11,P12,P13) "intense, suspenseful, impactful" (P1) "dramatic" (P7) "tense" (P1,P2,P3,P4,P5,P6,P14)

There was a synergy between the actions and the mind states and emotions participants associated with these actions, such as *"the one with the sound was kind of the most intense"* (P3), and *"it felt a lot more dramatic, what was happening"* (P7). Grandiose words, such as "impactful", "suspenseful" and "dramatic" highlighted an experience in line with the game's theme on a functional and emotional level: participants' rushing and activated play-style was concordant with the imagined rushing and activated state of bomb defusal, as well as the excitement, suspense and drama of the gameplay being concordant with the imagined heights of emotional states during bomb defusal. Still, for some players, the intensity of timer C could become overwhelming—*"so the first one with the music was maybe a bit too much... like, I think [over time] I imagine it would become annoying"* (P6)—which could result in them choosing a different timer for consecutive plays. Still, even when C could hinder concentration, some still preferred the experience it created: *"Silence [A]… perhaps we concentrated better, but it was less enjoyable"* (P4).

Whilst for most participants, playing with timer B lacked the excitement and heightened emotions of C—and was missing the rush

Table 8: List of Final Code Clusters

Final Code Clusters	
Atmosphere	Players descriptors of atmosphere and its synonyms
World-building	All codes relating to theme, narrative and visuals, alongside players' suggestions for what would make the game more thematic.
Good Tension	When tension and its synonyms were described as a positive experiences
Bad Tension	When tension and its synonyms were described as a negative experiences
Descriptor - Emotive	Players' descriptors regarding how they have felt as a result of, or about the timers
Descriptor - Behavioural	Players' descriptors regarding how each timer influenced their behaviour
External Factors	All factors which were independent from the timers

and urgency of it—it provided a functional, controlled experience where most participants found it a useful addition: *"B was more like, I'd say more useful, because... I had more awareness of how much time I had left without having to check"*. It seemed that B "got the job done", without much flair, but with purpose: *"B, it's just the right amount of reminder and kind of making the game feel… making [me] feel more into the game. It felt like that was the purpose of what I was doing, it was for defusing the bombs"* (P5), and with efficiency: *"B I think was the most… the most efficient one in a way, you just get the information you need every now and then"* (P10). Whilst emotions such as excitement were exchanged for descriptors such as comfort *"I felt most comfortable with [B]"* (P6), some participants still felt that B helped them remain concentrated on the game without the extra distractions of the music: *"so B again, I'd say that one was more focused… clarity"* (P5), and provided some levels of tension for some: *"B... slight tension"* (P12).

A few players found B to be distracting; however, they cited reasons contrary to those named by players who found C distracting. Here, it was the lack of excitement (as opposed to too much excitement in C): *"B - I thought was a little bit annoying. And C, I thought was really exciting because of the music and it just kind of gets you in the zone… Whereas I thought yeah, distracting, I'd say for B"* (P8). This lack of excitement resulted in one player not even paying attention to the time announcements: *"I wasn't really paying attention to what the voice was saying, it just was a voice in the background. So that was a little distracting. And after a very short amount of time, I just phased it out, because it's not supplying me with any useful information apart from the time every now and again"* (P7), whilst another player found the voice *"very sterile and clinical—it's just this voice"* (P9).

Finally, timer A created a contrasting experience with C, where players felt *"a bit more leisure"* (P4), describing it as *"A [being] the complete opposite [of C]. Like it was extremely kind of laissez-faire, very, like lazy and disengaged"* (P1). Players became less activated: *"I think the one without the sound, [my partner] was telling me to like… 'it's on time', she said a few times, because I was kind of a bit more lazy"* (P3) and often had to make an effort to keep up with the time without the time announcements: *"I think the silence was a bit annoying because I couldn't see the timer, so at least [with the] other [timers] I had some idea of where we are"* (P6), as well as *"the silent one, that was the one where I needed to sort of give extra attention to the timer"* (P10) and *"I think also on the functional level... But in the one without any sound you just don't know like you… need to look at the screen to know your time"* (P3). Most participants described their experience as something missing, such as *"...and the third one just... absent? Like, there was just nothing. You know what I mean? Yeah... So it was missing something"* (P8), one participant even describing it as *"kind of empty and soulless"* (P9).

4.3.2 Atmospheric, but not (necessarily) Thematic. Timer C was often described as "atmospheric", which provided an extra experiential layer to the gameplay: *"C, atmospheric and more of an experience, I would say for C. So it kind of made it more than just the game... even if it wasn't, like, a lot more... it was more than just the game"* (P9). Atmosphere had a presence or an absence, depending on the timer: *"...as soon as we start [another version without the music]... it's not as good without the music. But after the music, then you see like, it's a huge difference in terms of the atmosphere at the table, I think."* (P7), and *"So C, the first one we did... it just gave it that atmosphere, which I think was quite obvious where it wasn't there as well"* (P11).

Whilst atmosphere was seen as a positive addition to the overall experience, players distinguished between atmospheric and thematic. The two concepts were not interchangeable for most players, and for the experience to become thematic, players often had other requirements, such as better or more complex narrative: *"I think it might be me finding it quite hard to get into the theme because there's just not... there's not that much of a story around"* (P6), or more visual and spatial representations through the game's components: *"[the game] perhaps could be expanded to like having a board and all the bombs were in different locations of the ship and things like that... something that makes you feel like you're more on a ship, even if it's just like a quite simple board that the cards are made upon"* (P12).

Many of the players mentioned remaining aware of the game's components, even with the presence of atmosphere: *"with the music, the music really just added atmosphere. I mean, it never really felt like [more] than you're rolling dice"* (P8), and the awareness of game components sometimes prevented them from feeling like they inhabited the game-world: *"I've really enjoyed this game, it's really good. But for me, it is dice drafting and placement. And the theme wasn't absolutely predominant for me. And I also look at mechanics and compare them a bit to previous experiences as in like, 'Oh, yeah, that's [like Sagrada]', so I'm not on the spaceship"* (P10), as well as *"It's difficult to say like you're on a spaceship. Yeah. I'm rolling some dice. I don't think I'm on a spaceship"* (P7).

Some participants compared their experiences to video games: *"I think just the noises in general at least, like a teeny tiny bit kind of like brought me into the world of the game [but] I almost expected there to be like a video or something. Like, you know, how like video*

games have cut-scenes. [They] set you up for like the next thing... I almost expected that... like characters, or something being like, 'Oh, no, the alien"' (P2).

When asked further about how a video would have related to the experience being more thematic, P2 added that *"it would have enhanced it"*. Similarly, another participant mentioned that the existing visual timer of the game was helpful: *"perhaps it was the music. We had like quite a lot of like... the video was playing a part. I think for me, at least"* (P4), but it still did not make the experience thematic: *"in terms of the theme, I don't know. I do enjoy the sound generally, I'm that kind of person that always puts sounds on, but not in terms of like 'I'm on a ship, yeah, this is the theme"'* (P4).

4.3.3 Tense, but not (always) Fun. Whilst most participants described their experience with timer C as tense, the ways they regarded tension varied between participants. Some saw it as a contributing factor to a better experience, with P4 saying *"if you don't have the tension, and the time, the game doesn't really work"* and P10 saying *"[C], it kind of gave a bit more tension to the game that was maybe missing certainly in A when it was completely silent, and then in B as well"*. Others, however, saw it as added stress, and said they would choose another timer if they played the game again: *"So there's a fine balance to it. And I think that B hit that nail on the head, I felt like for C, when there was quite a lot of pressure with the added explosions in the background or the metronome, it was more difficult to focus on what I was actually doing and I was missing things, which might have been a bit more obvious to me if there was [a] lack of that atmospheric background"* (P5).

For some participants, they saw the ideal choice of timer as involving a decision between doing better in the game versus a more atmospheric experience: *"But I'm just debating...[between B and C]...to make it better at the game, I choose B because it gives you the time, but then it doesn't kind of distract you [by] adding extra pressure. But I also enjoyed the little bit of extra atmosphere that the music gives you"* (P9).

Others regarded tension in C as unrealistic, due to how the music and sound effects were used within that timer: *"the music did create an artificial sense of pressure. I think partly though it was because it was being a bit more cinematic and a bit more bombastic that it was easier to laugh off"* (P1) and in some cases, tension caused by timer C could affect a participant indirectly through how the other player acted: *"It kept my attention like, on the fact that we were in a rush more [as opposed to] just having a clock going [which] doesn't really get me to like rush and it definitely made him flip out. So yeah, like he was like rushing way more with the third one [C] which was stressing me out"* (P2).

4.3.4 It's Not the Timer, It's Me. Some aspects of player experience were influenced by factors independent from the timers, such as the first play-through providing novelty. In this example, P9 explains that he enjoyed the game because it was new, rather than because of the timer he played the game with: *"Oh, so because I think it was fresh in my mind. So I think it was… the first time I play a game, I tend to enjoy it the most"* (P9). Furthermore, consecutive plays made the game less and less interesting, independent from the timer they played with: *"the first one was a challenge, because we weren't as used to it, and probably was a bit harder and more interesting atmosphere as well... I think it was a factor that we got better and better as we went along"* (P10). How well participants felt they were doing in the game also influenced their enjoyment and perceived pressure, regardless of which timer they played with: *"To me, the reason for that was actually I wouldn't say it was to do with the backing. I think it was because the last game we played, I felt that we were doing really badly. So because I thought 'okay, I'm pretty sure we've got no chance of getting to the end of this', I felt less pressurised"* (P9).

Other than novelty, players' personal preferences influenced their choice of timer, even if they agreed that one was more experiential than the other: *"I think probably B was the one version of the game that you could approach as a fairly abstract puzzle, and I like being able to kind of take a bit of a step back and solve things. So I think from that perspective, I probably found it more interesting, [even though] soundtrack C was a more complete experience"* (P1). Similarly, another player would choose a timer based on their personal preferences, despite how enjoyable that experience was: *"I have like a bit of preference against games with apps. But I really enjoyed the ones that I eventually play with apps. I don't know why...like, the sound doesn't feel like a good enough reason [to choose timer C], but I enjoyed [the game] more with it... I don't know. Stupid... it's really stupid"* (P3).

Perceptions of thematicness in this experience were in some cases influenced by preconceptions based on the player's preceding experiences with theme in other board games: *"these sort of games have a tacked on theme, which never works for me [though] I have problems with themes in in heavier games [as well]"* (P3) and not all players would want the game to become more thematic, or board games to be more thematic in general: *"I don't want there to be videos. I don't want there to be like extra layers of narrative. I think that would make me like the game a lot less. Board games with narratives are silly. That's basically my position. You don't need a board game to have a narrative—it's dumb"* (P1).

5 DISCUSSION

5.1 Enjoyment and Tension

In this study, we explored the effects of a soundtrack on board game player experience. We found that, as expected, the presence of music and sound effects enhanced players' subjective experiences of both *Enjoyment* and *Tension*, when compared to playing the game with narrated time announcements. Conversely, playing the game with only the narrated time announcements did not have a statistically significant effect on either *Enjoyment* or *Tension*, when compared to silence. These findings are on par with [30], where video game players' emotional experiences—such as enjoyment—were also elevated by the presence of a soundtrack.

Whilst we initially considered elevated *Tension* due to the soundtrack to be a desirable outcome, further discussions with players and our qualitative analysis revealed that players can feel overwhelmed when they perceive too much tension, and therefore, it was not always a positive experience to them. Similarly, the music and sound effects were in some cases considered a distraction to players' ability to concentrate on the game. In these cases, players found the narrated time announcements a good alternative, where they could still benefit from useful information about the state of the game, whilst still maintaining focus on progressing in the game. Players' previous experiences and musical preferences could play

a role in this, as one participant reported that, as a drummer, they found the rhythmic elements of the soundtrack distracting. Similar results were reported by Cassidy et al. [13], where video gamers' performance was negatively affected when the game music was not chosen by them, as opposed to playing with music of their choice, especially when the music was "high arousal".

Players' emotive language regarding the three timers also differed, with descriptors for the musical soundtrack timer often reflecting excitement—highlighting the perceived drama and tension of the experience—whilst descriptors highlighted the functional benefit of the time announcements, and the lack of urgency and self-reported "lazyness" when playing with silence.

5.2 Thematicness and Atmosphere

Qualitative analysis highlighted that players' self-reported experience of thematicness was low in all conditions, when compared to what they consider a thematic experience. This yielded interesting results in exploring the differences between thematicness and atmosphere, as players considered the experience atmospheric, rather than thematic. Based on players' descriptions, it appears that atmosphere is one element of a thematic experience, however, atmosphere alone is not enough to establish thematicness without other elements of the game further contributing to thematicness. These other elements, as reported by players, include narrative development, more realised in-game characters and homogeneous visual representations of the theme through art and game pieces.

Atmosphere is not a new concept, and it has been previously studied by Ribero et al. in the context of video games [43]. In contrast with our findings, however, Ribero et al. found audio-visual cohesion to be a contributing factor to atmosphere, where the extent of perceived "thematic fit" is in correlation with perceived atmosphere. Based on our findings that players had requirements in addition to atmosphere for the experience to become thematic, it appears that thematicness in board games may have a specific meaning to players, which may differ from "thematic fit" in video games. In our findings, a soundtrack was sufficient to achieve atmosphere, even when players considered the visual elements of the game lacking. However, this was not the case for thematicness, and therefore, it appears that atmosphere could support thematicness, but it is not the same as thematicness.

In our preceding work [23], we found that board game players were able to contribute to their own immersion through voluntary practices, where they supplied elements themselves which they considered missing. These were often connected to the world-building aspect of gameplay, such as mood setting, voluntary background music or extending the narrative of the game. We speculate that board game players have different expectations of thematic cohesion in board games in general, and may require less cohesion for atmosphere to be achieved. However, we also believe that they have pre-existing expectations of what thematic game experiences are presumed to be—as definitions of thematic games are commonly circulated amongst board gaming communities through online practices and discussions surrounding the hobby [45], and players therefore expect the game elements [15, 19] to match those expectations.

Our study outcomes suggest that both the concepts of atmosphere and thematicness are concepts worth further investigating, as atmosphere was perceived by players as a positive addition to the experience, even when players did not perceive their experience as strongly thematic. This could mean that adding a soundtrack to a board game might compensate for less thematic coherence when thematicness itself is not the goal of the game, providing designers and publishers an additional tool to convey a setting. Making music and sound effects optional may also facilitate a better experience to players who would find music distracting.

Notably, our participants—regardless of identifying as casual or hobbyist players—were able to clearly articulate their experiences, speaking in nuanced ways about atmosphere and thematicness. As hobbyist players are currently the subject of most board game player experience research—and often engage in the surrounding practices of the board gaming hobby, such as detailed in-person and online discussions regarding the games themselves and their own resulting experiences—the level of detail in reflecting upon their experiences was not surprising. However, we did not expect casual players to have similarly in-depth explanations of a topic they do not consider a hobby. Based on our findings, we suggest that casual players' experiences are worth further examining in future research, as whilst they may be less interested the "hobby" aspect of board gaming, they still play and enjoy the games themselves. We anticipate that further qualitative work engaging with diverse players—both hobbyist and casual—can help reveal new insights about player experiences of thematicness and atmosphere as well.

Finally, we chose the game *Fuse* due to its characteristics of having its own official soundtrack, a short and fixed length, low complexity—it has a BoardGameGeek complexity score of 1.67 out of 5 [5]—and a theme with player roles. Additional advantages of the game include its wide availability and small box size, making it ideal for delivering it to participants in a remote study. Fuse, like all board games, consists of a combination of mechanics. This means that whilst it is a real-time game, it is also a co-operative game—sharing characteristics with other co-operative games—a dice rolling and dice drafting game and a card drafting and a pattern building game, bearing similarities to all other games which include any of these mechanics. Our findings suggest that the soundtrack, in combination with one or more of these mechanics, resulted in enhanced enjoyment, tension and atmosphere whilst playing the game. It seems possible that players of other games which share some or all of the features of Fuse might also experience similar effects.

5.3 Limitations

This study examined changes to board game players' experiences as a result of a musical soundtrack in one board game, which had a musical soundtrack developed by the publisher to align with theme and timings of the game. This prevents the generalisation that effects would be the same with any board game or soundtrack, however, it serves as an initial step in understanding possible effects of augmentations of board games through technology. We are aware that the small sample size further limits the generalisation of our findings, and prevents analysis of differences in experiences

between casual and hobbyist players, or between players who regularly play board games with soundtracks and those who do not. We also did not test for the differences in player experience that might arise as a result of the quality of the soundtrack, and we did not test how music independent from the game (i.e., not composed specifically for the game) might affect player experience, as we were specifically interested here in the effects of audio which was originally intended to be used with the game. Furthermore, we anticipate that the effect of soundtrack on player experience might be different in games that are significantly more or less thematic than *Fuse*.

5.4 Design Implications

This work provides evidence that adding a soundtrack to a board game can yield positive benefits. Designers and publishers might wish to make more use of audio—either as optional content or as an integral part of gameplay—as another tool when designing for a desired player experience. Furthermore, when the goal of designers is to create highly thematic experiences, they might use audio together with strong narrative and visual elements to strengthen thematic ties with the game world.

5.5 Future Work

Evidence suggests that theme and thematicness are facets of the board game playing experience that players are aware of and can discuss in detail. Whilst its importance varies between players, it is a phenomenon worth further investigating and defining in future research. For example, future work investigating players' definitions of thematicness could help both board games researchers and designers better understand what the building blocks of thematic experiences are. Furthermore, our findings suggest that there is a distinction between the concepts of thematicness and atmosphere, however, further investigation could determine what the exact differences are, what is the hierarchy between the two concepts, and where players draw the line between an atmospheric and a thematic experience.

Based on our findings, we suggest that casual board game players—whilst less engaged in surrounding practices of the board gaming hobby—are articulate about their experiences and are willing to participate in studies just as hobbyist players do. As many board games are specifically targeting casual players, we suggest that sampling participants from this group could widen the understanding of how people engage with board games, helping both designers and researchers engage with a more diverse view of board gaming in general.

As board games share many characteristics as a result of them combining different mechanics, there are certain factors which could alter how adding a soundtrack would affect player experience. For example, further research could investigate whether interactive audio—audio which is synchronised to game state—or music which thematically differs from the game's theme affects player experience differently from our findings.

Another avenue of research that has been highlighted by the current work is the possibility that music may affect board games in different ways depending on the specific features of the board game. It may be that music has the ability to increase tension on a game which relies on time pressure, but can have a calming effect on a game which has long periods of thought or strategy for example. Future research would allow us to gain a deeper understanding of the interaction between music and the various different types of board game.

6 CONCLUSION

This work explored the effects of a musical soundtrack on player experience in a board game using a mixed methods study with 14 board game players. Our quantitative results show that a musical soundtrack enhanced enjoyment and tension as well as aspects of thematicness. Thematic analysis of after-play interviews revealed a number of other facets of player experience, including the soundtrack's ability to evoke atmosphere—a concept players distinguished from thematicness. Our findings suggest new possible avenues for game design in utilising the assistance of music to elevate new board game experiences. Furthermore, they establish board game players—regardless of casual or hobbyist status—as a demographic with awareness of their own experiences, which warrant further study. Lastly, they motivate possible further research exploring the precise relationship between atmosphere and thematicness in board games.

REFERENCES

[1] Espen Aarseth. 2017. Just games. *Game Studies* 17, 1 (2017).
[2] Marco Arnaudo. 2017. *The Experience of Flow in Hobby Board Games | Analog Game Studies.* http://analoggamestudies.org/2017/11/the-experience-of-flow-in-hobby-board-games/
[3] Alexander Bevier. 2019. Writing for nondigital games (board games). In *The Advanced Game Narrative Toolbox*. CRC Press, 51–63.
[4] BoardGameGeek. 2010. Thematic Games. https://boardgamegeek.com/wiki/page/Thematic_Games. Accessed: 2021-9-4.
[5] BoardGameGeek. 2015. FUSE. https://boardgamegeek.com/boardgame/171273/fuse. Accessed: 2021-12-19.
[6] BoardGameGeek. 2021. Game Conventions. https://boardgamegeek.com/wiki/page/Game_Conventions. Accessed: 2021-8-29.
[7] BoardGameGeek. 2021. Real-Time. https://boardgamegeek.com/boardgamemechanic/2831/real-time/linkeditems/boardgamemechanic?pageid=1&sort=rank. Accessed: 2021-12-11.
[8] Paul Booth. 2014. Playing Dead: Transmedia Pathos and Plot in The Walking Dead Board Games. *Intensities: The Journal of Cult Media* 7 (2014), 20–35.
[9] Paul Booth. 2015. *Game Play : Paratextuality in Contemporary Board Games.* Bloomsbury Academic.
[10] Paul Booth. 2021. *Board Games as Media.* Bloomsbury Publishing USA.
[11] Jason T Bowey, Max V Birk, and Regan L Mandryk. 2015. Manipulating Leaderboards to Induce Player Experience. In *Proceedings of the 2015 Annual Symposium on Computer-Human Interaction in Play* (London, United Kingdom) *(CHI PLAY '15)*. Association for Computing Machinery, New York, NY, USA, 115–120. https://doi.org/10.1145/2793107.2793138
[12] Virginia Braun and Victoria Clarke. 2021. One size fits all? What counts as quality practice in (reflexive) thematic analysis? *Qualitative Research in Psychology* 18, 3 (July 2021), 328–352. https://doi.org/10.1080/14780887.2020.1769238
[13] Gianna Cassidy and Raymond MacDonald. 2009. The effects of music choice on task performance: A study of the impact of self-selected and experimenter-selected music on driving game performance and experience. *Music & Science* 13, 2 (2009), 357–386. https://doi.org/10.1177/102986490901300207
[14] Simon Castle. 2020. Best app-assisted board games. https://www.dicebreaker.com/topics/app-assisted-board-games/best-games/best-app-assisted-board-games. Accessed: 2021-9-7.
[15] David Chircop. 2017. An Experiential Comparative Tool for Board Games. *Replay. The Polish Journal of Game Studies* 3, 1 (Aug. 2017), 11–28. https://doi.org/10.18778/2391-8551.03.01
[16] Vlaada Chvátil. 2007. *Galaxy Trucker.* Czech Games Edition.
[17] Vlaada Chvátil. 2008. *Space Alert.* Czech Games Edition.
[18] Karen Collins. 2008. *Game Sound: An Introduction to the History, Theory, and Practice of Video Game Music and Sound Design.* MIT Press, Cambridge, Massachusetts; London, England.

[19] Greg Costikyan. 2011. Boardgame Aesthetics. In *Tabletop Analog Game Design*. 179–187.

[20] Mihaly Csikszentmihalyi. 2008. The Conditions of Flow. In *Flow: The Psychology of Optimal Experience*. Harper Perennial Modern Classics, Chapter 4, 71–94.

[21] George Skaff Elias, Richard Garfield, and K Robert Gutschera. 2012. *Characteristics of Games* (1st ed.). MIT Press, London. 4–7 pages.

[22] Geoffrey Engelstein and Isaac Shalev. 2019. *Building Blocks of Tabletop Game Design: An Encyclopedia of Mechanisms*. Taylor & Francis Group.

[23] 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). ACM, New York, NY, USA. https://doi.org/10.1145/3410404.3414224

[24] Roberto Fraga and Yohan Lemonnier. 2016. *Captain Sonar*. Matagot.

[25] Funforge SARL. 2015. *TOKAIDO - COLLECTOR'S EDITION by Funforge SARL — Kickstarter*.

[26] Charlie Hall. 2020. *Games broke funding records on Kickstarter in 2020, despite the pandemic*. Accessed: 2021-8-29.

[27] 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). ACM, New York, NY, USA. https://doi.org/10.1145/3411764.3445077

[28] Kristine Jørgensen. 2011. Time for New Terminology?: Diegetic and Non-Diegetic Sounds in Computer Games Revisited. In *Game Sound Technology and Player Interaction: Concepts and Developments*. IGI Global, 78–97. https://doi.org/10.4018/978-1-61692-828-5.ch005

[29] Kane Klenko. 2015. *FUSE*. Renegade Game Studios.

[30] Christoph Klimmt, Daniel Possler, Nicolas May, Hendrik Auge, Louisa Wanjek, and Anna-Lena Wolf. 2019. Effects of soundtrack music on the video game experience. *Media Psychology* 22, 5 (Sept. 2019), 689–713. https://doi.org/10.1080/15213269.2018.1507827

[31] 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 - FDG '18*. ACM Press, Malmö, Sweden, 1–8. https://doi.org/10.1145/3235765.3235782

[32] Mehmet Kosa and Pieter Spronck. 2019. Towards a Tabletop Gaming Motivations Inventory (TGMI). In *Videogame Sciences and Arts*. Springer International Publishing, 59–71. https://doi.org/10.1007/978-3-030-37983-4_5

[33] Matúš Kotry. 2014. *Alchemists*. Czech Games Edition.

[34] Kasper Lapp. 2017. *Magic Maze*. Sit Down!

[35] Libellud. 2015. Mysterium – Libellud. https://www.libellud.com/mysterium/?lang=en. Accessed: 2021-9-5.

[36] Elisa D. Mekler, Julia Ayumi Bopp, Alexandre N. Tuch, and Klaus Opwis. 2014. A Systematic Review of Quantitative Studies on the Enjoyment of Digital Entertainment Games. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (Toronto, Ontario, Canada) *(CHI '14)*. Association for Computing Machinery, New York, NY, USA, 927–936. https://doi.org/10.1145/2556288.2557078

[37] Rod Munday. 2007. Music in Video games. In *Music, Sound and Multimedia*. Edinburgh University Press, 51–67.

[38] Faham Negini, Regan L Mandryk, and Kevin G Stanley. 2014. Using affective state to adapt characters, NPCs, and the environment in a first-person shooter game. In *Proceedings of the 2014 IEEE Games Media Entertainment* (22-24 October). Toronto, Ontario, Canada, 1–8. https://doi.org/10.1109/GEM.2014.7048094

[39] Kristian A Østby. 2012. *Escape: The Curse of the Temple*. Queen Games.

[40] Winifred Phillips. 2014. *A Composer's Guide to Game Music* (1st ed.). The MIT Press, Cambridge, Massachusetts.

[41] Serious Pulp. 2017. *The 7th Continent - Serious Poulp*. Accessed: 2021-9-5.

[42] Connor Reid. 2017. *5-Minute Dungeoun*. Wiggles 3D.

[43] Giovanni Ribeiro, Katja Rogers, Maximilian Altmeyer, Thomas Terkildsen, and Lennart E Nacke. 2020. Game Atmosphere: Effects of Audiovisual Thematic Cohesion on Player Experience and Psychophysiology. 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, 107–119. https://doi.org/10.1145/3410404.3414245

[44] Melissa J Rogerson, Martin Gibbs, and Wally Smith. 2016. "I Love All the Bits". *CHI '16: Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems* (2016), 3956–3969. https://doi.org/10.1145/2858036.2858433

[45] Melissa J Rogerson, Martin Gibbs, and Wally Smith. 2017. *Exploring the Digital Hinterland: Internet Practices Surrounding The Pursuit of "Offline" Hobbies*. Technical Report. Tartu, Estonia.

[46] Melissa J Rogerson, Martin R Gibbs, and Wally Smith. 2018. Cooperating to Compete: the Mutuality of Cooperation and Competition in Boardgame Play. *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems* (2018), 1–13. https://doi.org/10.1145/3173574.3173767

[47] Melissa J Rogerson, Lucy A Sparrow, and Martin R Gibbs. 2021. More than a gimmick - digital tools for boardgame play. In *Proceedings of the 2015 Annual Symposium on Computer-Human Interaction in Play (CHI PLAY '21)*. Association for Computing Machinery (ACM), 1–23. https://doi.org/10.1145/3474688

[48] Richard M Ryan, Valerie Mims, and Richard Koestner. 1983. Relation of reward contingency and interpersonal context to intrinsic motivation: A review and test using cognitive evaluation theory. *Journal of Personality and Social Psychology* 45, 4 (Oct. 1983), 736–750. https://doi.org/10.1037/0022-3514.45.4.736

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

[50] Dilini Samarasinghe, Michael Barlow, Erandi Lakshika, Timothy Lynar, Nour Moustafa, Thomas Townsend, and Benjamin Turnbull. 2021. A Data Driven Review of Board Game Design and Interactions of Their Mechanics. *IEEE Access* 9 (2021), 114051–114069. https://doi.org/10.1109/ACCESS.2021.3103198

[51] Jan D Smeddinck, Regan L Mandryk, Max V Birk, Kathrin M Gerling, Dietrich Barsilowski, and Rainer Malaka. 2016. How to Present Game Difficulty Choices? Exploring the Impact on Player Experience. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems*. Association for Computing Machinery, New York, NY, USA, 5595–5607. https://doi.org/10.1145/2858036.2858574

[52] Midnight Syndicate. 2016. *Midnight Syndicate's orchestral zombie apocalypse album*. Accessed: 2021-9-5.

[53] Aaron Trammell, Emma Leigh Waldron, and Evan Torner. 2014. Reinventing analog game studies. *Analog Game Studies* 1, 1 (Aug. 2014).

[54] Nikki Valens. 2016. *Mansions of Madness: Second Edition*. Fantasy Flight Games.

[55] Isaac Vega, J Arthur Ellis, and Mr Bistro. 2020. *Forgotten Waters*. Plaid Hat Games.

[56] Rodrigo Vicencio-Moreira, Regan L Mandryk, and Carl Gutwin. 2015. Now You Can Compete With Anyone: Balancing Players of Different Skill Levels in a First-Person Shooter Game. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems*. Association for Computing Machinery, 2255–2264. https://doi.org/10.1145/2702123.2702242

[57] Joe A Wasserman and Julia K Weiss. 2020. Development and validation of the Boardgaming Motivations Scale. *SocArXiv* (January 2020). https://doi.org/10.31235/osf.io/z7hxc

[58] Zach Whalen. 2004. Game Studies - Play Along - An Approach to Videogame Music. http://www.gamestudies.org/0401/whalen/. *Game Studies the International Journal of Computer Game Research* (2004).

[59] Stewart Woods. 2012. *Eurogames: The Design, Culture and Play of Modern European Board Games* (1st ed.). McFarland & Company, Inc., Publishers, Jefferson, North Carolina.

[60] Ye Yuan, Jan Cao, Ruotong Wang, and Svetlana Yarosh. 2021. Tabletop Games in the Age of Remote Collaboration: Design Opportunities for a Socially Connected Game Experience. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems* (Yokohama, Japan) *(CHI '21, Article 436)*. Association for Computing Machinery, New York, NY, USA, 1–14. https://doi.org/10.1145/3411764.3445512

[61] Mario Zechner. 2019. Gloomhaven Helper. http://en.esotericsoftware.com/gloomhaven-helper. Accessed: 2021-9-7.