Eudaimonic Entertainment in Board Games:

Serious Interactions in Playful Simulations

By

Md Waseq Ur Rahman, Ph.D.

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Dissertation Committee:
Dr. Donna Z. Davis, Journalism and Communication, Chair
Dr. Maxwell Foxman, Journalism and Communication, Core Member
Dr. Danny Pimentel, Journalism and Communication, Core Member
Dr. Brice Kuhl, Psychology, Institutional Representative

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DISSERTATION ABSTRACT

Md Waseq Ur Rahman

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This dissertation studies the formation of pleasurable and meaningful entertainment experiences during playing board games using a media psychological lens. It sheds light on players' psychological and emotional substrates during play and the potential links between them that predict entertainment gratifications. Following the dual process model of entertainment framework that describes mechanisms behind pleasurable and meaningful gratifications (Oliver & Raney, 2011; Elson et al., 2014; Lewis et al., 2014; Bartsch et al., 2014; Bartsch & Schneider, 2014; Rieger et al., 2014; Vorderer & Reinecke, 2015; Weinmann, 2017; Raney et al., 2020), the study scrutinizes how playful interaction with analog elements of board games are connected to hedonic and eudaimonic forms of experiences that facilitate thought-provoking and self-reflective contemplation about the game's meaning and purpose. Theoretically, it explores the question of how players come to appreciate the experience of board game play (as opposed to playing for fun) and traces the connection between eudaimonic outcomes of playing board games and affective and psychological gratifications. The study first argues and empirically investigates the notion that board games present a unique media context to facilitate meaningful and enduring experiences that can involve both psychological gratifications as well as complex emotional deliberations. In addition, the study evaluates the potential downstream effects of the eudaimonic entertainment experience in influencing deep engagement and issue interest in socio-political

issues. Specifically, it scrutinizes board games that feature environmental, ecological, or natural themes in provoking reflective thoughts and issue interest about the environment (Fjællingsdal & Klöckner, 2017, 2020).

Together, the study evaluates the value of playful interactions with analog simulations in board games in facilitating meaningful entertainment in general and its effects on engagement with environmental science rhetoric and their advocacy value. To do so, it asks three overarching research questions. First, how do hedonic, non-hedonic, and eudaimonic mechanisms of entertainment experiences predict enjoyment and appreciation of board games? Second, how are board game elements linked to the experience of enjoyment and appreciation, and the specific mechanisms that underlie these outcomes? Third, how do eudaimonic experiences from playing environmental board games influence cognitive elaboration or reflective thoughts about the games themselves, as well as broader implications of the games' environmental theme outside of the game?

To answer these questions, a first survey study on board game players takes stock of the play experience in board games using the dual process model of media entertainment (Oliver & Raney, 2011; Elson et al., 2014; Oliver et al., 2016; Bartsch et al., 2014). Based on this theoretical framework, the study links the intrinsic elements of the analog medium, such as game mechanics, narrative themes, and social context of play to hedonic enjoyment and eudaimonic appreciation during board game play (Elson et al., 2014; Oliver et al., 2016). Second, the study evaluates the experience of commercially available environmental board games to understand the downstream effects of non-hedonic and eudaimonic forms of entertainment from environmental-themed board games in influencing environmental issue interest (LaMarre & Landreville, 2009;

Bartsch et al., 2014; Bartsch & Schneider, 2014; Vorderer & Reinecke, 2015; Weinmann, 2017; Raney et al., 2020). It considers how non-hedonic forms of emotions during media entertainment can influence cognitive depth and its effects on reflective contemplation, environmental issue interest, and connectedness to nature. The evidence presented for the study consists of two separate sets of sample populations investigated. To understand whether games can proffer meaningful emotional experiences, data was collected from general people who play board games. On the other hand, the examination of the experience of environmental science simulations in board games sought to understand the perspectives of players familiar with popular games that feature environmental/ecological themes.

The findings suggest analog games may indeed provide a space for discursive learning to unfold and for players to feel equipped to tackle critical issues relating to the environment through deliberative co-construction of playful simulations with others. The two studies together present converging evidence for how board games facilitate meaningful experiences. It reports evidence for the continuum that psychological gratifications lie on and that certain need satisfactions are crucial in delivering eudaimonic entertainment while others tend to coincide. The findings also indicate that a meaningful appreciation of board games can facilitate cognitive elaboration in the form of reflective thoughts. Certain types of reflective thoughts while playing games can lead to issue interest and connectedness to nature. Overall, player interactions with environmental board games and the resulting entertainment experience (e.g., satisfaction of self-determination needs, eudaimonic affect) may aid in negotiating challenging emotions arising from dissonance experienced during play. While these findings are constrained within the bounds of the limitations that exist in the study they can inform environmental science communication strategies to engage audiences with climate science.

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DEDICATION

To my loving parents and brother.

To my inspiring wife.

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I. INTRODUCTION

Media entertainment has primarily been understood as serving a hedonic utility for audiences, such as seeking enjoyment and pleasure to regulate aversive affective states as a mood management and arousal regulation strategy (Zillmann, 1988) or finding satisfaction from reinforcement of moral values from observing retributive justice as a function of audiences' affective dispositions (Raney, 2006). Despite enjoyment being the core concept in entertainment theory, early work relied on a minimal and tautological understanding, defined vaguely as the presence of pleasure and/or absence of negative emotions (Raney, 2006; Vorderer et al., 2004). As a result, a range of other functional experiential aspects of media entertainment and audience motivations remained unexamined. Despite early success in explaining audience predilections and responses to media entertainment, with the maturity of entertainment fare, this understanding could not explain the enjoyment or appeal of the more serious category of entertainment (e.g., sad movies or tragic dramas) (Oliver, 1993; Mills, 1993) or negatively valenced content (e.g., horror movies) (Tamborini & Stiff, 1987), or political comedy (Mattheiß et al., 2013). The beginning of the reconceptualization efforts saw worthy attempts at expanding the boundaries of the concept of enjoyment, defining it as a combination of cognition and affect (Raney & Bryant, 2002), an emotion or experiential state (Vorderer et al., 2004), associating component parts that define or predict enjoyment with personality, cognitive, affective, physiological, and behavioral dimensions (Nabi & Krcmar, 2004; Vorderer et al., 2004), yet never fully explicating the functional role of these aspects in the entertainment process (Tamborini et al., 2010).

Research addressing these initial explanatory limitations and expanding the conceptual breadth of entertainment theory revealed that beyond the pleasurable effect of enjoyment, there

further exists non-hedonic dimensions of entertainment (Vorderer & Ritterfeld, 2009; Vorderer & Reinecke, 2015). This conceptualization of entertainment experience distinguishes subjective evaluation of current needs and psychological or non-hedonic needs underlying individuals' self-concept and overall well-being (Raney et al., 2020). This understanding resembles other dichotomous conceptualizations of pleasure and meaning in positive and aesthetic psychology. For instance, subjective and psychological well-being (Keyes et al., 2002) or hedonic vs eudaimonic happiness (Waterman, 1993), or reactive and reflective aesthetic experience (Cupchic, 1995) where the former is associated with pleasure and positive emotions and effortless engagement and the latter with a sense of self-realization, personal growth, and meaning through effortful deliberation (Raney et al., 2020). Accordingly, media selection behavior can also be influenced by similar dichotomous audience motivations and the experiential outcomes can vary as a function of these motifs (Oliver & Raney, 2011). That is, audiences not only consume entertainment for leisure and respite, but media content can lead to meaningful experiences and eudaimonic emotions that provoke thoughtful contemplations about life's existential concerns and one's self-concept in relation to others and evoke innate feelings associated with being human. This assumption has been theoretically discussed and empirically validated across media forms, content, and genres (Oliver & Bartsch, 2011; Bartsch et al., 2014; Oliver et al., 2016; for an overview, see Raney et al., 2020). Particularly of interest for this study is how games, a medium popularly associated with frivolousness and superficial experiences, can facilitate gratification from meaningful contemplation.

Expanding on the meaningful entertainment framework (e.g., Oliver et al., 2016; Rogers et al., 2017; De Schutter & Brown, 2016; Kümpel & Unkel, 2017), research on digital games has revealed that, in combination with their unique ludic (e.g., game mechanics and rules) and

narrative structure, modern games can simulate sophisticated moral situations and complex dilemmas dealing with complicated issues regarding poignant aspects of human life and facilitate thoughtful affective states moving players deeply to elaborate on their experience, gain new insights and find existential meaning (e.g., Elson et al., 2014; Oliver et al., 2016; Daneels et al., 2021; Possler et al., 2023). Game simulations procedurally unfold the player's responsibilities, challenges, tasks, choices, and consequences that move forward in an abstract or narrative world. In addition to the content of games, the unique dimensions of digital games further shape the dynamics of the experience distinctly from linear and non-interactive traditional media. Empirical research has established that game mechanics that define user interactions with the narrative and the game world, dictating player actions that determine the exposition of the content, as well as the opportunities for social involvement with other players, construct a complex interplay of elemental dimensions of the medium that is conducive to meaningful and thought-provoking experiences uniquely suited to digital games (Elson et al., 2014; Possler et al., 2020; Daneels et al., 2021; Oliver et al., 2016; Bowman et al., 2016).

In fact, cognitive and affective states associated with meaningful experiences formed through interactions with games have predominantly been studied in the context of digital video games. This is in line with the scholarly progression hand in hand with the development of computing and graphic processing technologies that enabled virtual environments in digital games to proffer an unparalleled sense of involvement, absorption, and immersion in video games along with the vast array of interactive experiences made possible through digital software. However, the possibilities of such experiences, as well as empirically examining the meaningful framework in the context of analog media such as board games, have yet to receive much attention. While video games proffer digitally mediated interactions, virtual environments

with rich sensory cues, and immersive spatial presence, interactions in analog simulations proffer a unique context to scrutiny the effect of simulation mechanics and interactive experience of a narrative, devoid of digital mediation, while still conserving the dynamics of non-linearity.

In the absence of responsive computer software, players must learn the simulation rules and develop an understanding of the game system (mechanics) to keep track of and continuously update the game environment to play the game. In addition, board games involve a unique social involvement of collocated co-play that introduces human social interaction and cooperation required for content exposition, a unique medium experience. The presence of other players, particularly in collocated co-play, can require and enable discursive engagement with the ludic and narrative element, further influencing the entertainment experience. The cognitive deliberation required for analog play and discursive social interaction through collocated co-play present opportunities for meaningful emotions distinct from other media forms in terms of the ways games activate individuals' self-concepts and facilitate eudaimonic experiences. Therefore, an examination of this framework in a non-digital media context allows the scrutiny of the role of intrinsic features of the game medium in the formation of eudaimonic experiences, revealing further nuances of the interplay of psychological substrates that are critical drivers of non-hedonic meaningful experiences in games.

Theoretically, the study attempts to examine analog media in terms of entertainment theory to collect and present evidence that enjoyment of media content does not necessarily come at the cost of rationale scrutiny (e.g., Bilandzic & Busselle, 2008). Entertainment is generally associated with affective involvement that supposedly distracts audiences from the struggles of reality (e.g., escapism), engages them in ways that subvert their ability and

willingness to retain disbelief (e.g., fantasy fiction), or, in more riveting ways, transport them into the narrative world that no more cognitive resources are left to counterargue (e.g., suspenseful drama). For instance, it is suggested that affective involvement with entertainment content can reduce cognitive resources required to counter-argue against media narratives, leaving the audiences susceptible to behavior change or exploitation and manipulation (Bilandzic & Busselle, 2008; Busselle & Bilandzic, 2009). Modern entertainment, however, for good or bad, better or worse, has evolved to incorporate a broad range of socio-political themes and voluminous depth of idiographic portrayals in entertainment fairs that tap into deep emotional topics and offer complex emotional affairs (Lamarre, 2013; Bartsch & Oliver, 2011; LaMarre & Landreville, 2009; Slater et al., 2014; Slater et al., 2019; Oliver et al., 2021). And so have its audience, who have formed an even more complex palate for media entertainment that cannot be comprehensively subsumed under conceptual umbrellas of escapist enjoyment or positive affective involvement.

Along these lines, an important focus of the study is to evaluate the downstream effects of the eudaimonic entertainment from board games in the context of civic engagement with socio-political issues, in relevance to the debate about the role of serious entertainment in stimulating audiences and mobilizing prosocial behaviors contributing to literature that suggests specific types of fictional content stimulates more elaborate forms of cognitive processing which can result in enduring impressions that inspire further issue-interest with social and political issues (Bartsch, 2012; Bartsch et al., 2014; Knobloch-Westerwick et al., 2013; LaMarre, 2009). Specifically, the study examines the potential of eudaimonic entertainment from commercially available environmental board games that feature ecological, nature, or climate-related themes. Environmental board games have gained academic interest as practical tools for community

engagement with environmental science (Fjællingsdal & Klöckner, 2020). Interaction with board game-based simulations can enable systems thinking to help players parse through the intricate dynamics of the interconnected parts of the environmental system and understand the complexities as a whole (Waddington & Fennewald, 2018). This form of information architecture is beneficial in procedurally communicating complex environmental models that illustrate the science behind climate change crises. However, studies examining the potential of board games in communicating climate change tend to focus on the educational prospect and knowledge acquisition about environmental issues (Foltz et al., 2019). An unexplored area of research is how board game play can facilitate feelings of connection to nature or the environment through eudaimonic experiences (Raney et al., 2020).

Such an exploration is in line with the research exploring the contradictory nature of affective responses to media representations of climate change risks, e.g., the duality of fear appeals engendering coping responses in some cases and resistance in others (O'Neill et al., 2013; Leviston et al., 2014; Metag et al., 2016; Brügger et al., 2015). The need for nuanced approaches to climate change communication that consider the complexity of human emotions has been emphasized in recent calls for action in climate communication research (Moser, 2010, 2016), pointing towards the examination of approaches that impede defensive responses, design messaging that ease dissonances of worldviews, and reduce reliance on dire emotional appeal to mobilize the audiences (Chapman, 2016; Xue et al., 2016; Wolfe & Tubi, 2018; Salas Reyes et al., 2021). The question of how to effectively communicate the challenges of climate change while fostering a proactive response among the public has led scholars to explore the integration of affective science into climate change messaging (Baumeister et al., 2007; Chapman, 2017; Hornsey & Fielding, 2016). These efforts are primarily marked by the recognition of the

complex ways in which affective responses can influence public engagement with climate change issues. Therefore, the second part of this thesis explores the theoretical integration of the dual process of entertainment model with motivated information processing to examine how meaningful entertainment during board game play can facilitate eudaimonic appreciation and reflective thought about the environment and, in turn, a sense of connectedness to nature and pro-environmental interests.

To recapitulate, research in entertainment experience has examined how video games can facilitate thought-provoking, meaningful experiences (e.g., Games for Change). However, whether board games can facilitate similar resonant experiences or even how their analog characteristics may contribute to the distinct hedonic and non-hedonic experiential variables remains unexamined. Board games feature an unparalleled yet compelling gaming experience that has appealed to players across cultures for decades. Despite the lack of digital affordances, board games present analog interactivity that has the potential to uniquely facilitate stimulating and meaningful experiences by influencing psychological needs and eudaimonic emotions. Analog characteristics may impact intrinsic psychological needs and evoke meaningful affective states distinctly from video games. This project, therefore, examines how distinct simulation characteristics of board games, game mechanics, narratives, and co-located co-play with other players aid the formation of eudaimonic entertainment in terms of entertainment's subjective and psychological gratifications. As a result, the evidence will exhibit complexities of modern entertainment experiences that can potentially involve a range of experiences without interfering with the ability for rational scrutiny.

In a series of studies, this dissertation examines how the experience of ludic and narrative involvement through analog play and social interactions built into board game designs impact players' mental models of games' environmental narratives and the resulting hedonic and non-hedonic enjoyment from play. Beyond enjoyment, entertainment research has identified the cognitive and affective outcomes unique to games that enhance the medium's persuasive potential from other media forms and genres, delineating the possibility space for experiencing meaningful affective states that comprise both positive and negative valences and facilitate elaborative cognitive processing. With an overarching goal to gather multi-dimensional evidence for the association between entertainment and cognitive elaboration, this study attempts to understand the prospects of analog games in engaging players in thought-provoking deliberation.

First, the study explores fundamental questions about analog simulations: whether players find meaningful experiences in playing board games. In what ways does the analog nature of board games contribute to these experiences? What are some distinguishing features of meaningful experiences in board games? The study relies on scholarly progress made in the context of the literature on digital game experiences to isolate the uniqueness of the analog medium. Rather than relegating analog games as secondary to digital ones, the study takes advantage of the plethora of research on information processing in context of digital games as a framework to exploratorily shed light on board games. Second, to examine the downstream effects of meaningful entertainment in board games (e.g., for strategic communication), the study investigates to what degree playing with climate science models in environmental board games can facilitate issue-interest and pro-environmental intentions. Our examination focuses on the ways meaningful experiences in games can enhance cognitive depth in information processing

and motivate elaborate processing in dealing with the affective challenges of environmental science communication.

II. LITERATURE REVIEW

This literature review discusses the play experiences in board games in terms of the entertainment value proffered by the medium. Research in entertainment experiences has heavily focused on video games, and thus, there exists a lack of relevant knowledge about the enjoyment and appreciation of board games in extant literature. The review, therefore, relies on digital games research to explore the mechanisms explaining the entertainment experience of playing board games. This approach aids in establishing demarcations between the experience of digital and analog games, revealing the characteristic intricacies of the entertainment experience that board games feature. The review first describes the state of the art of the entertainment theoretical framework in distinguishing hedonic (e.g., enjoyment) and non-hedonic (e.g., appreciation) forms of gratifications from media fare and associated components constructs such as self-determination variables and meaningful emotions. It then delves into how enjoyment and appreciation of gaming experiences can be linked to the satisfaction of basic human psychological needs and non-hedonic affective states that arise through meta-emotional processes.

Next, it discusses the critical distinction between video and board games in terms of digital mediation. It presents research that establishes digital presence and interactivity experienced through the natural mapping of players' actions onto virtual worlds via game controllers as key to intrinsic need satisfaction, absent in the board game form. Based on this discussion it describes the interactive possibilities of board games. Subsequently, the review examines the intrinsic features of board games and how they influence entertainment experiences through analog play. It discusses the dynamics of play in the absence of computer software, the

tangible materiality of tabletop games, social interaction between players, and the nature of analog game mechanics and narratives as the key drivers of player experience. It then discusses how interaction with board game elements can facilitate enjoyment and appreciation by satisfying self-determination needs and the associated affective states.

Finally, in the context of study 2, the review further expands on the dynamics of meaningful entertainment and explores literature discussing the relationship between meaningful affective experiences and reflective thought. Reflective thought here is conceptualized as a media effect and a form of cognitive elaboration that further leads to attitudinal and behavioral dynamics. With its comprehensive approach, this review aims to provide a thorough understanding and explication of the mechanisms of enjoyment and appreciation experience in analog games. Exploring the theoretical framework, psychological aspects of the experiential dimensions, and unique features of board games offers a holistic view that will benefit the discussion of the two empirical investigations presented in the subsequent chapters.

The Dual Process Model of Entertainment

Entertainment experiences, based on the interactions between the content form and features and audience predilections, can lead to a range of cognitive and affective involvement as observed in the context of a broad range of media fare. In conjunction, games invite player engagement through playful or ludic involvement (Calleja et al., 2016), a deliberative interaction with the media to make choices that bring immediate changes in the mediated environment that has a distinct impact on player emotions (e.g., repairing negative affective states, Reinecke, 2012). Play experiences can thus facilitate a broad range of affective involvement, from a sense of intrinsic effectance (Klimmt et al., 2007) to thought-provoking contemplation followed by finding meaning (Oliver et al., 2016). This array of emotional and cognitive experiences associated with board game play can be somewhat captured through the entertainment theory framework, specifically, the dual process of entertainment model.

The dualistic assumption of the model stands on robust theoretical and empirical evidence of similar conceptualizations across other domains of scholarship examining depth in cognitive processing (heuristic vs. systematic) (Chaiken et al., 1989), appraisal of aesthetic experience (reactive vs. reflective) (Cupchik, 1995), sense of well-being (subjective vs. psychological) (Keyes et al., 2002), and happiness (hedonism vs. eudaimonism) (Waterman, 1993). The through line among these expansive research traditions is the exploration of the relationship between emotion and cognition and how they intertwine in various ways to involve the audience with communication, entertainment, artistic, spiritual, and well-being experiences. Research in mediated entertainment experience specifically has fostered multi-dimensional evidence and theoretical conclusions about the ways in which emotion and cognition intertwine

in individuals' information processing during media exposure. Entertainment theory integrates these assumptions in considering affective states and cognitive processing as intimately connected, influencing each other in specific ways leading to various audience responses (e.g., Raney et al., 2020).

Research on entertainment experience preceding the dual process model relied on theories such as affective disposition and mood management that conceptualized engagement with entertainment media in terms of escapist indulgence, for instance, through affective involvement with narrative characters, focusing on the hedonistic pleasurable outcomes of exposure. Central to these frameworks is the idea that media use is generally motivated by affective regulation to escape from negative mood states or to preserve or enhance positive ones (e.g., Knobloch-Westerwick, 2006; Oliver, 2003; Zillmann, 1988). This heuristic or casual processing of media information in favor of positive affective states is labeled as enjoyment. For instance, enjoying a film. The dual process model integrates both the conceptualization of pleasure-centric hedonic enjoyment and meaning-centric eudaimonic appreciation as plausible outcomes of any media fare, asserting the relevance of entertainment products that can evoke negative affective states and present challenges, ultimately facilitating poignant, meaningful, and transformative experiences (Vorderer & Reinecke, 2015). That is, beyond the intrinsic appeal to provide individuals with instant gratification in terms of regulating mood and arousal, media entertainment can foster meaningful experiences that inspire distinct cognitive and affective outcomes other than hedonistic gratifications (e.g., Vorderer & Reinecke, 2015; Raney et al., 2020). Meaningful or eudaimonic entertainment entails non-hedonic responses such as thought-provoking emotions (Oliver & Bartsch, 2010), experience of challenge (Bartsch & Hartmann, 2017), personal growth and purpose in life (Wirth et al., 2012), and even inspiration (Oliver et

al., 2021) and self-transcendence (Rieger et al., 2018). This category of gratifications from media entertainment is understood as appreciation (Oliver & Bartsch, 2010), which requires deliberate and effortful engagement with media content and can result in meaningful experiences of empathy, elevation, hope, and awe (Raney et al., 2020).

Of importance, and as will be explicated in subsequent sections, is the fact that the conceptual duality does not imply exclusivity of the outcome variables or the composite components; that is, they do not exist on opposite ends of a spectrum. Rather, hedonic and non-hedonic outcomes can co-occur based on the type of media experience and audience motivations (Raney et al., 2020), as well as may appear in layers or cycles throughout an exposure (Bartsch & Oliver, 2011). That is, the same media content can provide both types of gratifications and offer non-hedonic satisfaction for some audiences, whilst others may only find hedonic gratification. In the following, the two forms of non-hedonic experiences proffered by media and sought by audiences are discussed: the first, the need for meaningful or eudaimonic affect, and the second, the need for psychological gratification. Both categories bear conceptual similarities and share overlapping composite dimensions. In line with current scholarship, this study assumes that hedonic and non-hedonic entertainment experiences exist within a continuum (e.g., Possler et al., 2023). As will be explicated in subsequent sections, this study contributes to the literature by presenting evidence of a potential connection between the two types of non-hedonic affairs.

Eudaimonic Entertainment

Explorations of the multidimensionality of entertainment gratifications examined the experience of media fare that induces negatively valenced emotions or affective states that are traditionally not associated with feelings of pleasure, such as sadness, horror, or disgust. Appreciation was conceptualized as a distinct outcome from enjoyment to capture the essence of entertainment from non-pleasure-inducing experiences, i.e., the co-existence of positive and negative affect (Oliver & Bartsch, 2010; Bartsch & Oliver, 2011; Oliver & Raney, 2014). Appreciation involves the appraisal of automatic and immediate responses to exposure as a meta-level emotional and/or cognitive processing of the direct experience (Bartsch et al., 2008; Hofer & Wirth, 2012). Given observance of optimal conditions (availability of cognitive and affective resources and audience willingness), initial negative responses may be reappraised to reduce aversive affect in favor of introspective processing that provides opportunities for new insights to come to the realization (Bartsch & Oliver, 2011). Such a contemplative experience is likened to the elaborate and provoking appraisal of art conceptualized in the reflective model of aesthetic experience (Cupchik, 1995) to support the claim that the experience of appreciation during media exposure can stimulate self-reflection and lead to a sense of personal growth (Bartsch & Beth Oliver, 2011). Similarly, in the context of political communication, intra-personal contemplation of viewpoints and opinions found in media, which entails critical evaluation and integration of new ideas into existing knowledge and even revising mental frameworks to update belief systems, has been conceptualized as deliberation within (Mansbridge, 2015; Mercier & Landemore, 2012; Weinmann & Vorderer, 2018; Weinmann, 2018).

Appreciation, therefore, can encompass both negative and positive emotions, conceptualized together as mixed-affective states, and can leave an enduring impression on the audience (Oliver & Bartsch, 2011). It is inherently reliant on elaborate forms of cognitive processing and encompasses complex emotional experiences. Depending on the content and individual differences, this effortful reflection on entertainment content via meta-level processing can result in finding psychological growth and meaning in life and lead to the experience of moving and thought-provoking emotions (Bartsch & Oliver, 2011; Oliver & Bartsch, 2010, 2011; Oliver & Raney, 2011). The gratification achieved through exposure to such entertainment is defined as eudaimonic or meaningful entertainment, and predilection for this non-hedonic category of entertainment as eudaimonic motivation (Oliver & Raney, 2011; Knobloch-Westerwick et al., 2013; Oliver & Bartsch, 2010; Wirth et al., 2012).

The association of appreciation with serious, meaningful, moving, and poignant emotional experiences has been empirically established. Non-fictional content, socio-politically relevant topics, and portrayals of human virtues or even follies that grapple with complex questions concerning life's purpose seem to be more associated with eudaimonic responses (Oliver & Hartmann, 2010; Oliver & Bartsch, 2011). Genres like drama, history, documentary, or art films, which are typically associated with a slower tempo of narrative exposition, are often suspects of meaningful entertainment (Oliver & Bartsch, 2010; Bartsch & Schneider, 2014). Fictional content that induces feelings of tenderness (Oliver, 2008), feeling moved (Bartsch et al., 2014), elevation (Oliver et al., 2012), awe, and inspiration (Oliver & Bartsch, 2011) also tend to provide eudaimonic gratification. In terms of digital media, video games that proffer a robust involvement with the game characters and compelling engagement with narrative exposition through plot-impacting choices can facilitate deeply moving, contemplative, and elevating

eudaimonic experiences (Daneels et al., 2021). In terms of board games as well, complex plot themes that involve collocated players in dire socio-moral dilemmas through analog role-playing and social interactions, forcing them to make difficult choices for narrative expositions, bear the potential for meaningful emotional experiences (Booth, 2021).

The enduring experience of meaningful emotions can have downstream effects of stimulating cognitive elaboration for serious socio-political content and may lead to reflective thought and issue interest. For instance, one study elicited different levels of feeling moved among participants using a short film. Researchers experimentally manipulated eudaimonic emotional involvement with moving film content, operationalizing the experience as a composite of negative valence, moderate arousal, mixed affect, and feeling moved and found that participants who felt more moved or touched by the experience tended to report more reflective thoughts and positive evaluation (Bartsch et al., 2014). In a similar vein, participants exposed to moving versions of politically relevant content exhibited more reflective thought, higher issue interest, and information-seeking behavior (Bartsch & Schneider, 2014). In both cases, the effect of the moving stimulus on reflective thoughts was fully mediated by the eudaimonic affective state experienced by the participants (Bartsch et al., 2014; Bartsch & Schneider, 2014). It is suggested that such moving or thought-provoking emotions associated with appreciation experience during media entertainment can stimulate reflectiveness among audiences and result in rewarding experiences of insight and meaning. For instance, one experiment showed that negative emotions experienced during exposure to a tragedy induced reflection about one's life and close relationships that, in turn, mediated enjoyment from feeling sad as well as overall ratings of happiness in life (Knobloch-Westerwick et al., 2013). This and other subsequent studies showed that eudaimonic appreciation entails deliberate appraisals of cognitively and

emotionally challenging experiences as opposed to the heuristic processing of pleasurable content (Lewis et al., 2014; Bartsch & Hartmann, 2017).

To sum up, appreciation as a non-hedonic form of gratification provides eudaimonic enjoyment from certain types of media portrayals that are more meaningful and relevant to issues of life and human existence. Based on the range of emotional outcomes encompassing appreciation, audiences are distinctly motivated to make specific media selections to avail thought-provoking experiences (Bartsch, 2012; Cupchik, 1995; Hofer & Wirth, 2012; Knobloch-Westerwick et al., 2013; Oliver & Raney, 2011) and can be associated with prosocial effects involving reflective thought processes and socio-political issue interest (Oliver, Hartmann, & Woolley, 2012; Bartsch et al., 2014; Bartsch & Schneider, 2014).

Psychological Gratification

Extending entertainment as mood management theoretical tradition, satisfaction of intrinsic psychological needs associated with self-determination variables were identified as major predictors of media enjoyment (Ryan et al., 2006). In addition to the needs for arousal and positive affect associated with hedonic gratification, the satisfaction of autonomy, competence, and relatedness needs, the core components of self-determination theory (SDT), were found to account for over half the unique variances in predicting enjoyment from playing video games (Tamborini et al., 2010, 2011; Oliver et al., 2016; Reinecke, 2016).

SDT is a theory that describes the nature of intrinsic motivation. It posits that individuals are motivated to pursue certain activities and behaviors that provide an innate sense of satisfaction even when no external rewards (Burgers et al., 2015) are present because it allows for the active assimilation of attributes that define and strengthen one's self-concept (Ryan & Deci, 2000). The conceptual label of the framework is suggestive of its underlying notions of how intrinsically motivated behavior aids in building character and the development of one's identity (Koole et al., 2006). The theory explains how engaging in exploratory, curiosity-driven, autonomous, and challenging behaviors is an innate human tendency as it aids in building a coherent sense of self (Deci & Ryan, 2000). Two sub-theories further explain how the core components are associated with intrinsic motivation and drive behavior, including media behavior (Ryan et al., 2006; Przybylski et al., 2010).

First, the Basic Psychological Needs Theory (BPN) suggests there are three fundamental human needs: autonomy, competence, and relatedness (Ryan & Deci, 2000). Just like physiological needs for affect and arousal (e.g., components of mood regulation in mood

management theory, MMT), components of SDT are also innate human requirements, specifically psychological ones, that are associated with a sense of well-being (Ryan & Deci, 2000; Deci & Ryan, 2008). The concepts can be applicable in the context of media use as well. As much as audiences seek to regulate arousal and experience positive mood, they are also innately wired to seek to satisfy autonomy, competence, and relatedness needs.

Second, the Cognitive Evaluation Theory (CET) suggests that these innate needs can foster and maintain intrinsic motivation to initiate and continue to engage in an activity (Deci & Ryan, 2000; Ryan & Deci, 2000). Intrinsic motivation arises particularly from an appraisal of the possibility of an activity satisfying the psychological needs for autonomy and competence, which is sustained through the activity meeting these needs. This is contingent upon individual differences in curiosity, openness to explore, and even seeking challenges to extend one's skills, even if they do not directly contribute to any extrinsic benefits (Burger et al., 2015). However, in general, CET provides a compelling explanation for motivation for entertainment, which arises from the individual's evaluation of potentially experiencing the innate sense of self-determination. As will be discussed later, CET's assumptions have been validated for entertainment experiences, suggesting that audiences seek and find self-determination experience through engaging with media (Ryan et al., 2006; Tamborini et al., 2010; Tamborini et al., 2011; Oliver et al., 2016).

The core components of SDT explain how and why certain individuals live an active and self-determined life, whereas others seem to lead a rather docile and isolated path (Ryan & Deci, 2000). That is, these constructs explain the distinction between an intrinsically motivated individual and one who is suffering from amotivation. The need for autonomy is associated with

the need for independent self-governance and personal initiative. It is a need to feel the sense of volition or willingness/freedom to act in ways that are self-driven and independent of outside influence. Media that allow individuals to make choices and exert control can significantly enhance enjoyment by fulfilling this need. For example, interactive media like video games often provide environments where players can make meaningful choices that influence outcomes, thus satisfying the need for autonomy (Ryan et al., 2006). The need for competence involves the necessity to feel capable of achieving desired outcomes or a sense of effectiveness in the face of challenge or difficulty. Cognitively evaluating their level of self-efficacy or potential competency for an activity leads individuals to approach vs. avoid activities, which is further substantiated by actually receiving feedback from attempting to perform or engage (Ryan & Deci, 2000). Media experiences that challenge individuals and subsequently provide opportunities for success can satisfy this need very well (Ryan et al., 2006). Specifically, video game challenges can meet the need for competence by providing structured levels of difficulty and continued feedback on performance, which allow players to experience growth and achievement. This activation of a sense of efficacy in games is so powerful that people tend to form habits around media engagement that require active engagement to gain a sense of telic satisfaction (De Schutter & Brown, 2016).

The relatedness need concerns the desire to feel socially connected to important or close or relevant others and to maintain meaningful relationships (Ryan & Deci, 2001). The concept is rooted in individuals' sense of attachment to others and the sense of security they experience in the relationship. That is, relatedness is connected with a sense of security in relational support with others in general (Ryan & Deci, 2000) but can be true for mediated characters as well as in media engagement as a social activity (e.g., social media or multiplayer online games (Yee,

2006)). Media can satisfy this need by providing social interactions or by enabling users to engage with characters and stories on a personal level. For instance, narrative media, such as films and television dramas, often foster a sense of identification with characters, fulfilling the need for relatedness. Furthermore, the feeling of connectedness with broader human concerns through entertainment not only serves to address this need but also can evoke deep emotional experiences and meaningful reflections (Oliver & Bartsch, 2011).

Research on mediated self-determination has been quite expansive. Specifically, scholarly interest in expanding the explanatory power of entertainment theory has led to extensions of the core components of SDT. In explaining eudaimonic appreciation from video game play, where players are often responsible for the co-construction of the story presented in the game through taking up roles and performing tasks, players' needs for meaning or insight have emerged as an additional and distinct psychological and innate gratification dimension (Oliver et al., 2016). The viability of the insight needs has been theoretically explored (Koole et al., 2006) and empirically established (Oliver et al., 2016). The insight dimension of self-determination represents the innate human need and search for meaning. It encompasses the need to make sense of the core components of humane existence, such as the self and its identity, in isolation and in relation to others, the cycle of life and death, and other concerns that perplex as well as establish individuals' humanness (Koole et al., 2006). While this has generally been discussed in the literature in terms of existential concerns, in the context of media experience, it may simply be associated with the innate human disposition to the process of meaning-making (Vorderer & Reinecke, 2015). That is, understanding complex media narratives successfully negotiates the sense-making process while navigating complex affective states, which may also satisfy insights needs (Oliver et al., 2016). Media portrayals of tragedy or drama, in particular,

that are not necessarily associated with pleasurable affect may provide opportunities to reflect upon complexities of life involving socio-moral dilemmas or simply the mundane that overlay the purpose of life (Oliver & Raney, 2011).

Importantly for entertainment research and this study specifically, the four intrinsic psychological needs have been associated with mediated experiences as much as their real-world relevance. In fact, media and communications science scholarship focused on SDT is increasingly seeing a growth of evidence that media environments may actually be more efficient in simulating self-determination experience if as well as represent self-determined behaviors in themselves (e.g., Reinecke et al., 2014; Burgers et al., 2015; Brom et al., 2019; Tyack & Mekler, 2020; Qian et al., 2022). For instance, mediated characters behave more predictably than real others; therefore, the audience can establish a far more secure parasocial relationship (relationships play out during exposure to content (Slater et al., 2018)) with media characters satisfying the need for relatedness. On the other hand, interactive media environments like video games provide fertile grounds for self-determined behavior (Ryan et al., 2006). For instance, playing video games satisfies basic psychological needs for competence and autonomy as a function of the interactive presence and intuitive control over the virtual environment through the game controllers, leading to greater salience of intrinsic need satisfaction and associated affective rewards (e.g., enjoyment) (Ryan et al., 2006; Tamborini et al., 2010; Tamborini et al., 2011, Burgers et al., 2015). Furthermore, intrinsic features of the interactive media have been linked to specific SDT need satisfaction. Game mechanics in video games, for example, are associated with satisfaction of autonomy and competence, while narrative elements satisfy needs for relatedness (Oliver et al., 2016; Kümpel & Unkel, 2017).

Conceptualizing Meaningful Experience

To recapitulate the above discussion, the conceptualization of meaningful media experiences captures the broad range of gratification achieved from entertainment fare other than escapist pleasure, mood, and arousal regulation. In addition to these explicit needs, media entertainment selection and experiences are driven by innate psychological and rich emotional determinants. Broadly, these experiential possibilities emerge when media content functions to satisfy specific needs and, as a result, provide hedonic and non-hedonic gratifications. While hedonic experiences are associated with mood management needs, the non-hedonic category captures a wide range of gratification that taps into psychological and complex emotional needs satisfaction. Enjoyment from mood regulation needs to provide the typical hedonic pleasure from media fare. Non-hedonic components, such as satisfaction of autonomy and competence needs, are also associated with enjoyment that is distinct from escapism or regulating arousal. Rather, these two non-hedonic needs actually can aid in repairing negative affective states, the initial cause that leads the audience to seek escape from reality. That is non-hedonic intrinsic needs are independently associated with affect and may condition users towards selective exposure to such stimuli that aid in satisfying thwarted needs for competence and autonomy (Reinecke et al., 2012; Bowman & Tamborini, 2012).

The two other non-hedonic intrinsic needs of relatedness and insight can also predict enjoyment. However, their conceptual definitions and the media portrayals that they arise from indicate a link with enjoyment from negatively valenced affective states or appreciation associated with reflectiveness and dwelling in thoughts provoked by media content. The meta-emotional appraisal certainly requires additional effort but rewards the audience with a sense of

meaning and growth. The effortful deliberation, therefore, imprints an enduring experience. At the most rudimentary level, appreciation is associated with mixed affective states, moderate arousal, and negative valence (Ersner-Hershfield et al., 2008; Slater et al., 2016). However, contemporary research on modern media entertainment has shown the expansiveness of the possibilities of experiencing eudaimonic emotions such as feeling moved, elevation, awe, and inspiration. The functional relevance of these emotions in the audience's lives makes them meaningful. For instance, the experience of mastery (Janicke et al., 2018; Rieger et al., 2014) can not only replete emotional coping capacities but restore cognitive abilities through recovery experiences from stress and burnout (Rieger et al., 2015; Rieger et al., 2017). Even beyond, individual concerns about meaningfulness from entertainment are associated with eudaimonic emotions of feeling touched, moved, or inspired (Oliver et al., 2012) as well as feelings of elevation, inspiration, and awe (Rieger & Klimmt, 2019) that facilitate a broader sense of connectedness to the universe and humanity and motivate individuals to engage in moral behaviors.

Taken together, entertaining media can and do provide a context for self-determined behavior that facilitates the satisfaction of basic human needs, personal growth, and deep emotions that aid in the feeling of humaneness as well as connectedness to the universe. Based on this theoretical framework, the two studies in this investigation first try to link the elemental features of the board game medium with hedonic and non-hedonic gratifications in predicting enjoyment and appreciation. While the possibility of and the mechanisms behind meaningful experiences in video games have been established in the literature, this is the first endeavor to apply this framework to analog games. As interactivity-driven digital presence scaffolds meaningful experiences in video games, in the absence of computer hardware and software,

board games present a productive site for further investigating intricacies of the framework in terms of psychological need satisfaction and appreciation experiences. In keeping with research exploring the downstream effects of mediated meaningfulness, a second study then examines the experience of playing environmental ecological or nature-themed board games. The goal of this investigation is to examine the effect of eudaimonic entertainment in terms of analog games and scrutinize whether such an experience can lead to meaningful emotions and connections to the environment. It compares and contrasts board game elements to video games in scrutinizing how they fare in offering a meaningful experience to players

Central to the unique entertainment responses and underlying the experiential mechanisms in games lies a common through line, the impact of interactive features, the demand the game medium exerts on players (Grodal, 2000; Juul, 2005; Bowman, 2018; Melzer & Holl, 2021) that leads to a sense of immersion within and manipulation of the environment of the game world (Tamborini, 2000; Wirth et al., 2003; Tamborini & Skalski, 2006). Interactivity is one of the affordances generated by the computing and graphic processing capacity of digital software that invites input from users to navigate and perform tasks, essentially "manipulate" the sensory cues within the digital environment (Weber et al., 2014, p. 82). This demand for active engagement or requirement for player input for content exposition, otherwise conceptualized as action affordance (Bowman, 2018; Possler et al., 2023; Wolf, 2006), allows the formation of and non-discrete access to mental models of the gameplay and the happenstances in the virtual medium (Ijsselsteijn et al., 2000; Lombard & Ditton, 1997).

Meaningful Entertainment in Board Games

Research on meaningful experiences in games has predominantly focused on digital video games, specifically in terms of the intrinsic features of their form (e.g., interactivity) and the characteristic experience (e.g., flow states (Sherrick, 2021)) it proffers. As an interactive medium, games exert a range of cognitive and affective demands on players (Bowman, 2018). Consequentially, a multitude of experiential dimensions emerges that predict entertainment, including (but not limited to) satisfaction over performance (Klimmt et al., 2009; Bowman et al., 2013; Shafer, 2014), identification with the players' avatar (Trepte & Reinecke, 2010) or the game characters (Hefner et al., 2007; Lewis et al., 2008), experiencing suspenseful encounters, in first-person shooter game (Klimmt et al., 2009) as well as sports video games (Shafer, 2014), and social interaction and playing with others (Ryan et al., 2006; Bowman et al., 2013). Thus, games can proffer meaningful experiences by engaging players in various ways that cause them to react to simulated events in virtual environments during play as they would do in real-life situations outside of the game (e.g., Oliver et al., 2016; Holl et al., 2020; Bowman et al., 2021; Possler et al., 2023).

While research has traced the cognitive and affective outcomes conducive to meaningful experience from digital gameplay, much less is known about interactions with analog simulation systems in board games. Thus, extending extant research, this study compares and contrasts board game elements to video games in scrutinizing how they fare in offering a meaningful experience to players. Board games are similar due to their interactive action potential, the affordance of manipulating the simulation environment, and the general disposition of a predefined end state (winning or losing conditions), with the exception of sandbox games. If

board games are like video games, game mechanics should aid in satisfying autonomy and competence needs, whereas the narrative and social elements would tap into relatedness. Mechanic driven exposition of narrative plots should aid in the players' discovery of insights regarding life or the person of the player within the context of the narrative theme. Despite these similarities, the lack of digital mediation substantially alters the elemental dynamics of the analog counterpart's mechanics, narrative, and social experience.

In the following, it is argued that the analog interactive information architecture of board games proffers two distinct dynamics of play: deliberativeness of non-digitally mediated interactivity and discursiveness of collocated co-construction of simulations that are the essence of the experience. These two factors distinctly contribute to the hedonic and eudaimonic entertainment experience, influencing how affective states and satisfaction of psychological needs emerge from analog play.

Digital vs. Analog Interactivity

Central to the unique entertainment responses and underlying the experiential mechanisms in games lies a common through line, the impact of interactive features, the demand the game medium exerts on players (Grodal, 2000; Juul, 2005; Bowman, 2018; Melzer & Holl, 2021) that leads to a sense of immersion within and manipulation of the environment of the game world (Tamborini, 2000; Wirth et al., 2003; Tamborini & Skalski, 2006). Interactivity is one of the affordances generated by the computing and graphic processing capacity of digital software that invites input from users to navigate and perform tasks, essentially "manipulate" the sensory cues within the digital environment (Weber et al., 2014, p. 82). This demand for active engagement or requirement for player input for content exposition, otherwise conceptualized as action affordance (Bowman, 2018; Possler et al., 2023; Wolf, 2006), allows the formation of and non-discrete access to mental models of the gameplay and the happenstances in the virtual medium (Ijsselsteijn et al., 2000; Lombard & Ditton, 1997). Sensory cues in the three-dimensional virtual worlds involve players by drawing attention to the stimulus, which increases mental vigilance (Witmer & Singer, 1998; Wirth et al., 2003). Action affordances through interactivity aid the ability of the medium to control the attention on the stimulus environment, isolating the observer from other surrounding stimuli and effectively immersing them in the game world (Tamborini & Skalski, 2006). That is, the continuous flow of attention on both the virtual stimulus and the vigilance required to perform the interactive tasks results in a sense of presence or being there (Wirth et al., 2003; Tamborini & Skalski, 2006; Cowley et al., 2008). In this technology-mediated subjective experience, audiences are absorbed in the content exposition so that awareness of the physical world is reduced to allocate additional resources to the media, and the perception of the mediated nature of reality is obscured and supplanted by the simulated

existence within the media environment, often referred to as the experience of non-mediation (Lombard & Ditton, 1997; Tamborini, R., & Skalski, 2006). Changes to the digital environments based on player inputs dynamically update player mental models as players observe the consequences of their actions on the vividness of digital environments.

The extent to which actions in the physical world are efficiently mapped onto the game world through game controllers heightens the user's sense of presence in the virtual world (Wirth et al., 2003; Tamborini, 2000). This sense of digitally mediated presence scaffolds games' unique ability to cater to players' psychological gratifications beyond subjective notions of pleasurable affect and arousal, which leads to meaningful experiences (Ryan et al., 2006; Huta & Ryan, 2010; Tamborini et al., 2010). The extent to which interaction with a game seems natural facilitates a sense of presence in the game environment and is associated with the attainment of autonomy and competence gratifications (Ryan et al., 2006). A causal relationship was established by experimentally manipulating the experience of presence through intuitive mapping of player actions and found significant positive effects on heightening feelings of autonomy and competence as a function of the motion controls (Tamborini et al., 2010; Tamborini et al., 2011; Oliver et al., 2016). That is, while any media format can and does proffer eudaimonic entertainment, interactivity or action affordance of digital video games increases the salience of the experience through presence, at least in terms of self-determination variables of autonomy and competence.

To be sure, it is the natural mapping of players physical actions onto the virtual environment of a video game that provides an unparallel sense of mastery and flow (associated with SDT (Yeh et al., 2022)) through facilitating a sense of digital presence (Tamborini et al.,

2011). This simulation of a sense of being within the game world, or presence, via naturally mapped interactions, shapes players' mental models of the experience and has been empirically linked to various outcome variables that resemble a characteristic eudaimonic experience, including satisfaction of autonomy and competence. Board games, although similar in essence to video games, lack the digital mediation and a virtual world to inhabit and perform simulated tasks (Barbara, 2017; Rogerson et al., 2016, 2018), presenting substantial challenges for meaningfulness to occur, at least in terms of the self-determination experience to arise from play. However, board games present a unique action affordance potential as they demand audience engagement for exposition, allow interlocutors to manipulate the material game environment as well as require them to manually manifest the consequences of their actions (Wolf, 2006). While player actions in a board game can afford varied numbers of potential player decision-making and tasks to manage per round, due to lack of software mediation and the need for manual updates to the game environment, the speed with which decisions are implemented (or even required to be made) and the extent of their consequences are disparately different from digital games. In the interactivity continuum (Vorderer, 2000), analog games require absolute player control, as player actions are required to manifest the dramaturgy of gameplay through manual setup, organization, and updates of the game environment required for play progression. But there are no moments of zero player agency (e.g., full authorial control through cut-scenes in video games) as players are constantly learning to play, performing actions, strategizing future moves, or interacting with each other. Thus, despite the lack of naturally mapped actions and digitally mediated presence, it is both a theoretically and practically sound argument that board games are an interactive medium, even in the narrowest definition of the concept. In essence, board games present the potential for the figurative experience of non-mediation (defined as

presence) through an overlap of the symbolic meaning of the material components and player imaginations.

While digital interactivity and intuitive controls are essential features of video games in the formation of enjoyment and appreciation experience, board games uniquely present the core elements of video games: mechanics, narratives, and social interaction (Elson et al., 2014). Playing board games encompasses complex relationships between the players and the material components where information about the game (e.g., progress, transitional states, win-lose situations) is distributed amongst the game's physical components and the participants (Rogerson et al., 2018). There are no virtual environments or digitally mediated play spaces. Rather, tangible surfaces or game boards supplant digital screens, making materiality an essential component of the analog simulation environment and the play experience of board games (Rogerson et al., 2016). Other game elements appear as material pieces representing the mechanics and the narrative elements, such as rule books, tokens, meeples, miniatures, cards, and dice, as the board and game materials become the center of the focus of players. Player involvement in board games takes a new dimension as cognitive processes are concentrated internally within players', as both the individual and the social group, and distributed externally within the environment, its material components, and the players. The materials carry knowledge of the game/state at any moment during play, winning or losing conditions, and player performances, and mediate different forms of cooperation and collaboration necessary for the play process to progress. The tangible material of board games, therefore, scaffolds the meaning-making process.

Board games require the laborious work of information management (done by software in digital games). While much of it is supported by material elements, it also relies on the various forms of cooperation between the players regardless of whether the game is cooperative or competitive in nature (Bergström, 2010). The experience of effectance – dynamic changes to the digital game system as a result of player action (Klimmt et al., 2007) relies upon the embodied experience of information processing dispersed across players, physical game surfaces, and tokens used to enact the game and manually executing each move, as well as the cooperative coordination amongst players to organize material and bring life to play (Rogerson et al., 2018; Schmidt & Wagner, 2004). Thus, while the tangible elements of board games contribute to performing challenges, remembering essential information, planning strategies, and future moves, the cognitive processes distributed among players and game materials enable an understanding of players' decision-making and actions and how the game system responds as a result (Hollan et al., 2000; Rogerson et al., 2018). This process may demand higher cognitive processing resources than digital games for executing player actions and seeing the resulting changes to the system (Klimmt et al., 2007). At the same time, this intra and interpersonal deliberation required for play to progress may strengthen player involvement in the game. Analog interactions rely on players' collaborative efforts to learn and negotiate rules and engage with the game's narrative theme and active engagement with the game, requiring players to plan their actions during their own turn and during other players' actions. Thus, the board becomes the physical site where emotion and cognition are laid on to, the tabletop mediating the meaning-making process for board game players**.** Manifesting mechanics manually, navigating tangible interfaces while interacting with the game pieces, enacting thematic narratives through physical

materials and actions, as well as collaborating or competing with others during playing board games, thus emerge as strong precursors for self-determination experiences.

The strength of an electronic game's influence on players' psychological gratifications and meaningfulness emerges from the mental models emanating from the simulated presence (Tamborini, 2000; Wirth et al., 2003; Tamborini & Skalski, 2006). It is argued that natural mapping involves and immerses users via digital stimuli in ways that "facilitate the development of more complete" and accessible mental models (Tamborini & Skalski, 2006, p.235). However, when decision-making processes in digital games go by fast, players adaptively learn to respond to cues; it theoretically broadens the range of content players may process/experience but at the same time may reduce the impact on the mental model due to saturation of stimuli. Furthermore, the graphical richness of virtual worlds can also have a negative impact on cognitive processes through sensory overload. However, mental models formed through analog simulations may be more comprehensive and have a stronger influence on meaningful experiences, as they resemble actual decision-making and invoke player imaginations and relevant memories as opposed to digital sensory cues. In the absence of digital software, manual implementation of game mechanics facilitates a level of transparency of algorithmic consequences of the game rules, leading to a deeper understanding of procedural logic behind complex systems that drive the interactions within the game. It affords contemplative opportunities for meaningfulness to emerge from a smaller range of action affordance spectrum than video games, which reduces the intensity entailing a slower-paced decision-making and manual updating of the game environment. Thus, intra-personal deliberativeness and the interpersonal discursiveness involved in analog play can facilitate robust mental models of game systems, imprinting enduring and resonant experiences that can lead to reflective contemplations.

In the following, we take stock of the intrinsic features of board games to understand the nature of the experience of interaction with simulations devoid of digital mediation and explore how analog information architecture introduces deliberative and discursive interactions with the material elements on to which knowledge of the state of the simulation is distributed.

Game Mechanics: Analog Interactivity

Game mechanics dictate the dynamics of play: the interactions with the game and other players and establish the rules of engagement that determine player experiences (Sicart, 2008; Boyan & Sherry, 2011). The essential role of game mechanics (digital or otherwise) is to deliver a sense of accomplishment and effectance, a gratification that is particularly salient to the video game medium (Miyamoto, 2017). Analog game mechanics can still preserve the interactive dynamics of the game medium. The audience can influence the game environment or the simulation system as player actions are imperative to initiate and progress play. While the dynamic response of digital interactivity influences the salience of effectance facilitating enjoyment (Klimmt & Hartmann, 2005), the perception of causal effects of player actions on analog environments can be equally satisfying as humans are innately driven to interact with the environment (Klimmt et al., 2007; Ryan & Deci, 2000). In fact, observing the material changes in player actions in the tangible elements of board games contributes to more enduring satisfaction. Performing challenges, remembering essential information, planning strategies, and future moves – the shared cognition amongst players and within materials enables an understanding of players' decision-making and actions and how the game system responds as a result (Booth, 2021). Thus, board game mechanics have the potential to feature equally compelling simulations that influence player's sense of agency and effectiveness.

While the narrative elements place a layer of meaning to the otherwise abstract rules, behavioral mechanics that drive player actions bring life to the game and dictate both the progress and direction of exposition. For instance, in the board game Monopoly, three aspects: the rules, goals, and strategies make up the mechanics of the game (Pruett, 2011). The rules

relate to the action affordances of rolling a dice, moving around a rectangular board, picking cards, and acquiring properties. The goal dictates the win-or-lose conditions, that is, to be the player with the most money at the end of the game. The explicit strategies dictated by the mechanic are to purchase houses and hotels and profit from the other players. A sense of effectance is built into every turn player takes until the winning and losing players become apparent. As the play progresses, players learn the implicit strategies of how to get ahead of others by acquiring more desirable properties and avoiding rent traps. More importantly, through the deliberations required to make each move, players begin to understand the procedural argument (e.g., the dynamics of a private land ownership system in this case) and become complicit within the game world. Game-play mechanics can be powerful by involving players with a narrative theme. For instance, a single narrative theme can be structured in multiple ways to develop distinct expositions simply based on the design choice of the mechanics (Booth, 2021). The games First Martians, Martians, Pocket Martians, and Terraforming Mars are all focused on the theme of colonizing the planet yet apply distinct mechanics of interaction for the rhetorical exposition of the theme.

As interactivity takes a distinct form in the absence of digital mediation (and without electronic game controllers), the experience of immersion is solely reliant on the mechanics of the game that dictate player behaviors and player imaginations to attach narrative meanings to their actions. In board games, players are always responsible for the game's progression as algorithmic events of action consequences are dependent on active engagement, both cognitively and materially. Such a level of player dependency can make analog simulations claimants of a very high level of interactivity. On the other hand, this sole dependency of the entire experience on player efforts (e.g., time to set up, understand the dynamics of the system, manually update

the environment) reduces the intensity of interactivity (e.g., unlike as observed in first-person shooting games). Although there are board games in the action genre where action pace can often simulate an experience resembling digital interactivity (e.g., Space Cadets), the action-over-time ratio cannot match digital software. Due to the dependence on human agency, the type of actions board games can afford, the number of potential player decisions, the variability available per decision, the speed with which these decisions need to be executed, and the extent of their outcomes are distinctly limited (Wolf, 2006). As different types and genres of games invite distinct player inputs, interactive variability can shape the experience of immersion in the game/story world and effectance over game tasks, the associated mental models, and how the engagement satisfies self-determination needs.

Instead of existing on either extreme that takes away the gamefulness or the expressive prowess of the medium, board games feature an analog interactive affordance that generally resides somewhere in the middle with the imperatives of minimal organization of the material according to rules in the one end (e.g., putting together pieces of a puzzle) and predefined endgames with player(s) wins or loses against other player(s) or the game. While this variability may not necessarily hinder the possibility of meaningful experiences, it does make for a distinctive salience of its qualia. For example, a highly demanding game with multiple moving pieces to keep track of and complex dynamics of win-lose conditions could challenge the players to reflect on the interplay of game mechanics. But it can also appear frustrating, thereby inducing a motivational threshold that the game design might need to overcome through setting up hedonic cycles to onboard the players and into the crux of the complexities. On the other hand, minimal interactions, as required in interactive narratives where the action potential is reduced, may be deemed less challenging and unconducive to feeling effectance. However, a smaller

breadth of decisions can still facilitate eudaimonic experiences when players can feel a sense of agency over the plot direction and a sense of responsibility for the character through the meaningfulness of the choices (Green & Jenkins, 2014). Regardless, the deliberation and effort required for play in board games, from low to high levels of interaction, requires an unparalleled co-creation or co-construction of both the mechanic and narrative elements, which can aid the formation of eudaimonic outcomes (Possler et al., 2023).

This analog interaction is reliant upon cognitive processes distributed within the material as well as amongst the players, which aids in the development and maintenance of robust mental models in analog simulations rather than digital ones. The vigilance required for this deliberativeness to function within an analog environment as opposed to a virtual one is higher. Beyond learning the rules of the simulation and effectively applying them in making decisions required for play, players additionally need to keep track of the state of the game and strategize ways to achieve a favorable outcome. Especially as players remain not responsible for the dynamic changes to the virtual environment, once they learn how to play, the impact of decisional points on mental models of virtual simulations tends to reach a plateau. Contrastingly, board games require players to not only learn to play but also develop an understanding of the game system (mechanics and rules) to continuously update the environment manually to progress the game, which simultaneously impacts the mental models of the state of the game as well as the planning future decisions. The additional effort may actually strengthen player involvement in the game, facilitating immersion within the game world. This deliberativeness that arises from manually implementing the game mechanics could be quite effortful, thus potentially correspondingly rewarding. Mechanic-driven deliberativeness in an analog game environment proffers a unique ludic engagement that should be associated with appraisals of autonomy

(whether players are able to function independently while navigating rules) and effectiveness from performing actions (whether desired outcomes are achieved).

Narrative Experience of Board Games

Narrative themes in board games are as important as mechanics, if not more. With the increasing appeal, board games have substantially improved to feature complex thematic experiences of fantasy, adventure, horror, and combats, as well as new modes of engagement, like subscription services to narrative mystery games where players solve a single true-crime-style case over monthly installments (Hunt A Killer, 2024). That is, the intrinsic features of the analog medium combined, board games can feature complex narrative plots, influencing a range of player motifs and possibilities of meaningful entertainment by allowing for a unique co-construction experience.

Narrative elements in a board game can be likened to the experience of interactive stories. The non-linearity and lack of authorial control over plot exposition may not be conducive to building rich character arcs and hinder compelling expositions of linear media. Similarly, board games' low immersive potential may not enable strong character identification (Klimmt et al., 2009) or a sense of being within the story world (Wirth et al., 2007). Board games also do not have elements like non-player characters or cut-scenes to support plot development. While interactive features tend to disrupt the flow of linear plot progression, seemingly inhibiting the experience of discreet transportation into the character's world and identification with character features (Green et al., 2004), they also enable players to affect the story structure, the ways in which stories are told (e.g., narrative pacing) as well as experience the possibility of multiple plot progression (e.g., sequencing of events) like in digital games (Lee et al., 2006; Aarseth, 2012).

The interactive potentiality of board games enables distinct exposition of narrative themes through strategic thinking and randomness via ludic engagement, player effort, and

cooperative work required for game progression. From being redirected to page numbers to making decisions for characters in significant plot points to solving puzzles – various techniques of interactions in analog games can engage players in the co-construction of narrative experience (Miles, 1996). Players in specific roles must make decisions and perform game tasks within their agentic boundaries, increasing the stakes in experiencing the narrative consequences of their ludic actions. This sense of control allows players to adapt the story according to their own values and beliefs as well as experience alternative perspectives through a projective identity based on action consequences, enhancing the impact of empathic responses that make for a compelling story experience (Steinemann et al., 2017).

Making important plot decisions shapes and provides for a very personal narrative experience of being complicit in the dramaturgy of the exposition and evokes empathic connections to story characters or even players' self-roles and leads to the satisfaction of relatedness needs (Peng et al., 2010; Elson et al., 2014). Interactively co-constructing narrative plots allows players to control and change the course of a plot according to their personal preferences and allows their self-concepts, such as agency and sense of responsibility, to get involved (Green & Jenkins, 2014). These changes, as well as the game-infused hindrance to such agency, in turn, lead to contemplative experiences. Meaningful engagement through the possibility to explore different roles of the self (e.g., in terms of feeling responsibility toward game character roles or trying out different possible selves) in the end can elicit thought-provoking entertainment and appreciation of the experience (Green & Jenkins, 2014).

Deliberative effort required for play may actually lead to greater immersion into board game narratives and lead to appreciation (Green & Jenkins, 2020). This deliberation to derive

meaning brings in reader antecedents: individual beliefs, motivations, psychological needs, and need for cognition/affect into the mix that create opportunities for meaningful experiences through enhancing audience relevance by allowing them to introject their own beliefs and values into the narrative construction process (Van laers et al., 2014). While these deliberations over narrative outcomes allow users to practice autonomy over self-beliefs and competence over understanding of the world around them, the resulting dynamics of narrative revelation as a consequence of reader choices may facilitate as well as challenge readers' perspectives (Whitby et al., 2019). These interpersonal deliberations can lead to self-reflection when facing in-game dilemmas or emotionally moving and elevating experiences (Daneels et al., 2021) and aid in attaining diverse perspectives enabling alternative interpretations of the events in the game (Busselle & Bilandzic, 2009), leading to the satisfaction of insight needs.

In board game terms, the exposition has an additional layer of interpersonal deliberation in the narrative co-construction process, which can provoke meaningful expressions that are shared with other players and facilitate eudaimonic experiences like the interactive narrative form (Green & Jenkins, 2014; Steinemann et al., 2017). This affordance can supplant the gratifications associated with building a meaningful relationship with player avatars as well as support characters in digital games. In fact, building connections to in-game digital characters through reciprocity of interactions may be replaced in board games by an introspective exploration of self-concepts in relation to other players through observing the consequences of one's own and others' choices on the narrative outcomes, which can aid meaningful experiences to arise (e.g., Tyack & Wyeth, 2017; Coanda & Aupers, 2021). Combined with one's own character roles and identities, the involvement of other human players in the narrative co-construction process could lead to the formation of deep and meaningful social interaction and

result in emotional connections key to appreciation experiences (Banks & Bowman, 2016). Given the evidence on how other players' presence influences game enjoyment, the possibilities of self-exploration and self-expression that collocated co-play in analog simulations offer can be particularly salient for meaningful emotions as well as the satisfaction of relatedness and insight needs (Bowman et al., 2013; Gajadhar et al., 2010; Kartsanis & Murzyn, 2016).

The experience of attachment to players' character roles while collaborating or competing with others may enhance the impact on self-esteem and satisfaction from play observed in digital games (Lewis et al., 2008). The presence of other human players and social interactions built into the narrative co-construction, therefore, can enable a broad range of complex emotions, including those that reflect a degree of agency, responsibility, and pride but also guilt, compassion, humility (Grizzard et al., 2014; Hartmann et al., 2010). These complex emotions can evoke contemplative experiences about in-game choices within the narrative context but also facilitate reflective moments that not only provide players opportunities to satisfy their needs for meaning but also introspect on the broader implications of games in the real world (Oliver et al., 2016).

The Social Context of Collocated Coplay

Analog games involve a meticulous information management process, a task typically handled by software in digital games, but in this case, supported by physical components and various forms of player cooperation, regardless of whether the game is cooperative or competitive in nature (Rogerson et al., 2018). A distinct form of cooperation is a necessary precursor of analog play, requiring ongoing and inherent teamwork among players to effectively engage with the game, which is imperative to play. The game components play a crucial role in facilitating this cooperation, as the manual management of analog information architecture necessitates a wide range of collaborative efforts to maintain focus, learn and negotiate rules, adapt to dynamic changes, simulate challenging scenarios, and resolve competitive contentions based on rules (Berland & Lee, 2011). This collaborative process, guided by the game's mechanics, is essential for understanding and bringing the game's narrative theme to life through interpreting and enacting the rules. The game components are not only essential for gameplay but also serve as tools for players to maintain the cognitive work to manage information about the game states, plan their action moves, and strategize as they observe other players in action (Rogerson et al., 2016).

Board gameplay relies on inherent cooperation among players for the work required for co-play (Barbara, 2017; Booth, 2021). From understanding the rules as a group to continuously updating the material setup to represent the current state of the game, board games require a degree of social cooperation (Rogerson et al., 2016). A set of implicit rules of engagement, therefore is imperative (Bergström, 2010). For example, if multiple players do not understand the rules, the play process is hindered, let alone achieving gratification from effectance. Similarly,

masterful implementation of rules on the part of players can lead to very contentious play, which may bring out aggression in some and frustration in others. Overall, the social cooperation required for navigating challenges in board games can lead to the satisfaction of relatedness as co-play situations can allow players to feel connected to each other. Whether such feelings go beyond the game is debatable (e.g., acquaintances playing at a board game night at a local store). While this sociality can enhance the enjoyment of board game play too much competitiveness may get in the way of satisfaction of relatedness as well. For instance, when implicit rules of engagement are broken by one or more players cheating (e.g., Bergström, 2010).

The exposition of board game narratives emerges from collocated co-play that involves intra-personal co-construction of players' own narratives from their own action-consequence experiences as well as through an interpersonal co-construction of the plot through social interaction among the players. The presence of other players influences the deliberativeness and the associated psychological gratifications. Successfully competing with others may enhance the effectance experience of playing with computer software. Subverting other competitor's strategies to score or win can be as satisfying as experiencing personal competence. That is, competitive co-play may enhance a unique sense of satisfaction of competence needs. However, being able to function autonomously may be a precursor for enhancement in gaining competence. That is, a basic degree of understanding of the game is required before players can begin to implement strategic moves to meaningfully compete with others.

The tangible nature of board games: rule books, playing surfaces, and tokens that facilitate play requires colocation of the players interacting with the gameboard and face-to-face with others as opposed to digital game interfaces where interaction, even during multiplayer

situations, is focused on the screen rather than with other players (Barbarra, 2017). Players often give a voice to their characters, appraise positive and negative feelings toward co-players, and influence each other's behaviors which may further enhance the play experience (Barbarra, 2017) as performing in front of other people tends to increase behavioral involvement (Ravaja et al., 2006). Observing other players making decisions and facing the consequences can also help gain additional insight into the game and a sense of relatability. Thus, social interaction with other players in board games may be particularly influential in the satisfaction of relatability and insight needs as co-located co-playing in board games standout as a mechanism distinct from digital games and one of the core appeals of board games (Tychsen et al., 2007; Booth, 2021). The robust social dimension of board games where co-located co-playing with other players invites the opportunity for observing and influencing each other's decision-making and behavior (Barbara, 2017). While social interaction in video games can also influence feelings of competence (Bowman et al., 2013), co-located co-playing with other players in board games may enhance the sense of competence as well as be particularly influential in intrinsic need satisfaction of relatedness (Tychsen et al., 2007; Booth, 2021). Social interaction elements in board games may also influence the need for insight through shared reflection during moments of dilemma in decision-making during gameplay; observing other players making decisions and facing the consequences can also help gain additional insight into the simulation presented in the game. Specifically, it invites complex dimensions of self-esteem, social capital, and relationship dynamics among players into the gameplay experience (Lewis et al., 2008; Elson et al., 2014).

III. STUDY 1

The past decade has seen a massive rise in the interest and innovation in modern board games, moving tabletop entertainment from a niche to a mainstream pastime. The market value for tabletop gaming is forecasted to reach 12 billion U.S. dollars by 2023 (Tighe, 2022). However, tabletop simulation is by no means a phenomenon of the modern times. The origin of simulations and games goes back to ancient times. While the British Museum claims the Royal Game of Ur as the oldest board game recorded in history, originating in ancient Mesopotamia approximately four thousand-six hundred years ago (British Museum, 2021), there are instances of games dating back much further. Origins of other games, such as Mancala/Wari, Senet, Mehen, and Backgammon, seem to go back to as early as 7000 BC (Neil, 2017; Good Games Australia, 2023). The majority of these ancient games come from Egypt, Persia (Modern Iran), and ancient Mesopotamia. Even popular games like GO (2000 BC, China) and Chess (600 AD, India) have deep roots in the history and culture of tabletop play (Neil, 2017) and representations of leisurely artifacts of the past.

Records from the past two centuries reveal many instances of exploration of the analog simulation medium beyond leisurely purposes in terms of expressing ideas, complex historical events, and even disseminating news information (Rigelow, 1978; Train, 2021). These games often featured war simulations to play out battle scenarios (e.g., Avalon-Hill War Games), or maintenance of international diplomatic relationships through strategy and tactics (e.g., Diplomacy), or role-playing simulations where players act out historical events and social crises of the time like struggles of an immigrant life (e.g., Gateway) (Rigelow, 1978). One of the earliest games about land taxation systems went on to become the most popular board game of

all time. Monopoly was originally conceptualized as early as 1904 (Britannica, 2024). The expressive power of the medium did not stay limited to history and education. The expressive prowess of analog simulation systems became part of the mass media, appearing as sarcastic ludic (involving playful interaction with content) features on dictators (France, 1889) as well as fascist war propaganda (Italy, 1945) (Train, 2021). In more optimistic turns, the medium genre has seen pro-social applications when a 1970 Psychology Today issue modified the game Monopoly to redesign the game to address issues of race and inequality, which today stands out as an exemplar of board games' rhetorical value (Andersen, 2021).

Over the decades, with the increasing appeal, board games have substantially improved to feature complex thematic experiences of fantasy, adventure, horror, and combats, as well as new modes of engagement, like subscription services to narrative mystery games where players solve a single true-crime-style case over six monthly installments (Hunt A Killer, 2024). Despite the diversity of purposes and types of leisure they offer, modern board games can generally be distinguished between two styles of play. The first is the more American-style game where competition is key as players emerge in direct conflicts. Mechanics often rely on randomness but, together with the theme, focus on involving and immersing the players in the game simulation (e.g., Arkham Horror, Battlestar Galactica) (Delgado, 2016). The second category, Eurogame, largely emanating from Germany, focuses more on mechanics driving the play player performances through strategies and management of resources (Moe T., 2019). The primary points of contentions in modern board games that set apart the two major types of commercial board games are the nature of the competition, information availability, strategy and randomness, themes, rules, and winning conditions (Gentlestream, 2012).

Paralleling the rise in popular interest, board games have gained substantial scholarly attention as a social entertainment (Booth, 2021), educational tool (Bayeck, 2020), environmental communication (Fjællingsdal & Klöckner, 2020), health intervention (Gauthier et al., 2019) and even as a form of mental health exercise (Kerr et al., 2020). Ultimately, for games and simulations research, current knowledge points towards crucial points of inquiry that address challenges such as representational accuracies of exploratory simulation games oversimplifying real-world problems, reliability issues emerging from analog games may fail to capture the complexities of decision-making processes, and the generalizability issues of model outcomes (e.g., policy-making) emerging from the inherent limitations of the game environment (Reddie et al., 2018). Despite a focus on the experience of play and understanding the outcome, dynamics remain understudied. While these studies focus on the specific ways board games may manifest as practical engagement tools across diverse domains, they also highlight the potential of games to foster thought-provoking and meaningful experiences about life and the human condition (Oliver et al., 2016; Oliver and Bartsch, 2011). Scholarship in meaningful gaming experience reveals that games can facilitate opportunities for introspection, self-reflection, and meaningful entertainment through the satisfaction of basic psychological intrinsic needs (Oliver et al., 2016; Ryan et al., 2006; Tamborini et al., 2011).

As summarized in previous chapters, research on meaningful experiences during entertainment consumption has seen a meteoric rise over the past two decades. This exploration began in an attempt to address the limitations of traditional theoretical assumptions that failed to explain paradoxical entertainment media use. Concentrated efforts have resulted in new and more comprehensive definitions of the experience of enjoyment and the addition of new theoretical dimensions underlying entertainment. In general, enjoyment from media use is

understood as a combination of hedonic and non-hedonic experiences and responses. Hedonic responses encompass the pleasurable arousal and affective experience. Underlying hedonic responses, a key mechanism for positive affective experiences is the satisfaction of an individual's basic psychological needs of autonomy, competence, relatedness, and insight. Depending on the potential of the media engagement, non-hedonic responses could result in mixed affective states where both positive and negative emotions co-occur. Further, non-hedonic responses can take the form of deep emotional involvement from thought-provoking experiences that may lead to a sense of personal growth and well-being.

Overall, scholarship in this area suggests that media entertainment presents reliable sites for self-determined behavior by audiences and meaningful experiences through satisfying basic psychological needs beyond traditionally understood hedonic needs. Digital video games, particularly, have received much scholarly attention in empirically examining the assumptions of the dual factor of entertainment framework and found evidence for meaningful or eudaimonic experiences (e.g., hope, awe, elevation) during play. Based on the foundations of self-determination theory, these studies revealed that player experience of enjoyment and appreciation of video games are associated with intrinsic need satisfaction (Oliver et al., 2016). For instance, game mechanics and intuitive control are associated with satisfaction of autonomy and competency, while story experience and social play satisfy needs for relatedness (Tamborini et al., 2011; Oliver et al., 2016). In addition, Oliver et al. identified a fourth dimension of insight needs satisfied via story elements (2016).

However, how board games fare in the conceptualization of enjoyment as intrinsic need satisfaction remains unexamined. Study 1 utilizes the breadth of work in communication science

and media psychology exploring entertainment as simultaneously pleasurable and meaningful media effects and examines how board game characteristics and the resulting social play can facilitate thought-provoking emotional experiences. Using the entertainment theory framework described earlier, this study first examines the range of entertainment responses in board game play and the underlying motivational and emotional mechanisms that drive the pleasurable vs. meaningful entertainment outcomes. Second, it investigates the intrinsic features of the board game media and investigates their relationship with the mechanisms underlying enjoyment and appreciation. The findings highlight the potential of board games to foster thought-provoking and meaningful experiences about life and the human condition (Oliver et al., 2016; Oliver and Bartsch, 2011).

Research Questions

Board games present an opportune context to examine the theoretical assumptions about entertainment experience from media devoid of digital reflectance, as well as the idiosyncrasies of the medium will reveal nuances about the relationship between hedonic needs, intrinsic psychological needs, and non-hedonic affective response in predicting the experience of enjoyment and appreciation. To better understand how board game characteristics are conceptually associated with the satisfaction of intrinsic needs, shared cognitive and affective challenges amongst players, and how these relationships are associated with enjoyment and appreciation of board games, this study asks the following questions:

RQ_1: How are hedonic, non-hedonic affect, and intrinsic needs associated with enjoyment and appreciation of board games?

RQ_2: How are board game elements associated with intrinsic needs in predicting enjoyment?

RQ_3: How are board game elements associated with intrinsic needs in predicting appreciation?

Method

Sample

Data were collected from participants on the survey platform Centiment. Only participants who had substantial experience of playing board games were invited to participate in the study. A total of thirteen hundred and ninety-one respondents were screened through a pre-screening study that asked about participants' interest and familiarity with board games, as well as their frequency of play. A key criterion for screening participants was if they had experienced and could recall a specific play session that was either particularly fun or meaningful for them. Only participants who answered yes to this question proceeded to take the survey, and responses were kept only if they answered the attention check question correctly. This resulted in a sample size of three hundred and forty-nine. From this pool, data from only participants who could mention the name of the game they were recalling were kept for analysis, N=323. The average duration for each response was 14.50 minutes. Respondents were pre-dominantly heterosexual white North Americans, 131 male, 183 female, age: 18–70, M = 38.27, SD = 9.70. Majority reside in the Northeast, South, Southeast, and Northwest regions of the US. Most participants reported having a Bachelor's degree or some college experience and having some form of employment (full or part-time) with a median household income between $61,000-90,000. Most games reviewed are competitive in nature and are very commonplace.

The most reviewed games were Monopoly (104 times), Clue (16 times), Sorry (14 times), Scrabble (12 times), and Cards against humanity (10 times). Other games mentioned at least five times were Life, Candy land, Chess, Uno, Trivial pursuit, Yahtzee, Risk, and Pictionary. Participants generally found these games to be more fun than meaningful (e.g., 156 responses

indicated that the games were primarily fun). But they also reported that they were able to appreciate the games (e.g., 120 responses found the games to be both enjoyable and meaningful) as well as find their playing experience meaningful in some ways (e.g., 47 responses felt that the games were more meaningful than simply fun). For instance, out of the 104 mentions of the game Monopoly 47 participants reported finding meaningful experience playing the game.

Measures

Entertainment Gratification

Enjoyment was measured using a four-item scale with a strong reliability score (Cronbach's $\alpha = 0.908$, M = 6.43, SD = .82). Example items included, "*I enjoyed playing the game"* and "*It was fun to play the game"* (Oliver et al., 2016; Oliver & Bartsch, 2010). Appreciation was measured using a four-item scale (Cronbach's $\alpha = 0.774$, M = 5.52, SD = 1.09). Example items included, "*I appreciated playing the game"* and "*The game was thought-provoking"* (Oliver et al., 2016; Oliver & Bartsch, 2010). All items were measured on a seven-point Likert scale ranging from strongly disagree = 1 to strongly agree = 7.

Hedonic Affect

Hedonic affect from playing environmental board games were examined using two different measures arousal, and positive affect (Tamborini et al., 2010). Participants were asked rate the arousal experience using a single-item prompt "I experienced a certain degree of emotional arousal while playing" (M = 4.65, SD = 1.77). Experience of positive affect from playing was also probed through a single item prompt, "Playing the game made me happy" (M = 6.22, SD = 0.97) (IJsselsteijn et al., 2009). Both items were measured on a seven-point Likert scale with strongly disagree = 1 to strongly agree = 7.

Satisfaction of Self-determination Needs

The satisfaction of self-determination needs of competence, autonomy, and relatedness were measured using items from the video game Player Experience of Need Satisfaction (PENS) scale (Ryan et al., 2006; Oliver et al., 2016). Sense of need satisfaction of autonomy was measured using three-items including, "*I experienced a lot of freedom in the game.*" (Cronbach's α = 0.871, M = 5.76, SD = 1.03). Competence was also measured using three-items including examples like "*I felt very capable and effective when playing*" (Cronbach's α = 0.806, M = 5.93, SD = 1.05). For relatedness included the study included game character related items, e.g., "*I found the relationships I formed with game character(s) in this game important*" and other player related prompts, e.g., "*I found the relationships I formed with other players in this game fulfilling*", forming a four-item measure (Cronbach's α = 0.789, M = 5.25, SD = 1.19). The satisfaction of insight needs was included as one of the key psychological variables associated appreciation of entertainment experience and identified as a key predictor of meaningfulness. The three-item scale was applied as originally conceptualized and developed (Oliver et al., 2016). An example item included, "*Playing the game has made me wiser.*" (Cronbach's α = 0.850, M = 4.93, SD = 1.40). The four measures for self-determination need satisfaction overall exhibited a robust internal consistency for the sample. All items were measured on a seven-point Likert scale ranging from strongly disagree = 1 to strongly agree = 7.

Eudaimonic Affect

To examine the nature of eudaimonic emotions experienced by players the study employed three different measures. The first was *negative affect*, measured through prompting the participants to rate the statement "Playing the game made me sad" (M = 2.21, SD = 1.66)

(IJsselsteijn et al.'s 2009). To account for meaningful emotions this study measured eudaimonic emotions in terms of feeling moved, tender and poignant, developing a three-item measure labeled as *Feeling Moved* (Bartsch et al., 2014; Oliver et al., 2016). The items had a strong internal consistency (Cronbach's α = 0.837, M = 4.42, SD = 1.44). In line with previous literature, the experience of emotional and cognitive challenge was measured using a single-item prompt for each that included items like, "*I felt cognitively challenged"* (M = 5.30, SD = 1.47) and "*I felt emotionally challenged*" (M = 4.45, SD = 1.89) (IJsselsteijn et al.'s 2009; Bartsch & Hartmann, 2017). All items were measured on a seven-point Likert scale ranging from strongly disagree = 1 to strongly agree = 7.

Entertainment Motivation

Entertainment motivations can have strong impact the experience of content exposure and how information is processed. Therefore, the survey asked participants to describe their entertainment preferences. Motivation for entertainment exposure was examined in terms of audience's hedonic and eudaimonic predilections towards media fare (Oliver and Raney, 2011; Cohen 2016). The measure for hedonic motivation included six-items (Cronbach's α = 0.848, M = 5.78, SD = 0.88) including, "*My favorite kinds of media experiences are happy and positive*" and "*It's important to me that I have fun when engaging with entertainment content.*" The measure for eudaimonic motivation also included six-items (Cronbach's α = 0.912, M = 5.51, SD = 1.09), including "*I like entertainment that challenges my way of seeing the world*" and "*I like media experiences that make me more reflective."* Both measures were adapted from previous research and were measured on a seven-point Likert scale ranging from strongly disagree = 1 to strongly agree = 7 (Oliver and Raney, 2011; Cohen 2016).

Game Characteristics

Participants' experience of the elemental features of board games: mechanics, narratives and social context of play were examined using measures developed in previous literature that discussed the experience of intrinsic characteristic of the medium (Elson et al., 2014). In line with this literature, this study measured gameplay, narrative and social context of play in terms of their general experience. Gameplay ratings measured engagement with the game's mechanics and rules using a four-item scale (Cronbach's $\alpha = 0.805$, $M = 5.68$, $SD = 1.03$) that included items such as, "*The rules of the game featured an optimal balance of difficulty and skills*" (Elson et al., 2014). Narrative elements were prompted to be rated using a four-item scale (Cronbach's $\alpha = 0.862$, $M = 5.18$, $SD = 1.35$). Example items included, "*The story theme featured a coherent plot."* (Kümpel & Unkel, 2017). The social experience of playing board games was measured using a four-item scale (Cronbach's $\alpha = 0.792$, $M = 6.04$, $SD = .97$) developed based on the discussion from Elson et al., (2014). Sample items included, "*I felt connected to the other players while playing the game"* and "*Our actions depended on each other's actions."* Due to the relevance of these items with other forms of game experience measures as well as theoretical basis explaining gaming experiences (e.g., Elson et al., 2014) all three scale exhibited a strong internal consistency for the sample. All items were measured on a seven-point Likert scale ranging from strongly disagree = 1 to strongly agree = 7.

Results

Regression Modeling

To examine how engagement with board game play, hedonic and non-hedonic affect, and intrinsic needs are associated with enjoyment and appreciation of board games a linear regression analysis was used. To inspect the influence of these dimension on player experience we submitted all dependent variables into separate models with enjoyment and appreciation as outcome variables.

Results suggest distinct experience dimensions during board game play shaped enjoyment and appreciation differently for our participants.

Table 1.1: Descriptive Statistics for Study 1

	Mean	SD	Min	Max	Skewness	Kurtosis
Enjymnt	6.428	0.82307	1.25	7	-2.707	10.702
Appreciation	5.5209	1.08551	1	7	-0.913	1.178
Competence	5.9257	1.05408	1	7	-1.706	4.344
Autonomy	5.7554	1.0254	1	7	-1.042	1.38
Relatedness	5.2492	1.18912	1	7	-0.688	0.519
Insight	4.937	1.39771	1	7	-0.53	-0.144
Arousal	4.6471	1.76734	1	7	-0.445	-0.687
Positive Affect	6.2229	0.97157	1	7	-1.993	6.155
Negative Affect	2.2105	1.66409	1	7	1.583	1.546
Feeling Moved	4.4241	1.43673	1	7	-0.275	-0.292
Cognitive Challenge	5.3034	1.47048	1	7	-0.86	0.38
Emotional Challenge	4.452	1.88983	1	7	-0.227	-1.059
Hedonic Motivation	5.7822	0.88498	1.83	7	-1.071	1.952
Eudaimonic Motivation	5.5093	1.08741	1	7	-1.02	2.011

Experience of enjoyment from board games

The model for enjoyment experience reported a correlation of R = .803 and R-square = .644 with 95% confidence interval [*0.5614165*, 0.6915737], *F* (12,310) = 46.783, $p < .001$ [see table 1.2 for specifics of the model]. The model explained 64.4% of the variance in enjoyment experienced for our sample. In terms of the SDT mechanisms, only competence [$\hat{\beta}_1 = .265, SE(\hat{\beta}_1) = 0.036,\ t(310) = 7.294,\ p < .001$] and autonomy [$\hat{\beta}_1 = .115, SE(\hat{\beta}_1) = 0.04,\ t(310) = 2.88,\ p < .005$] measures were significantly associated with enjoyment ratings. Unsurprisingly, positive affect [$\hat{\beta}_1 = 0.311, SE(\hat{\beta}_1) = 0.042,\ t(310) = 7.36,\ p < .001$] had the strongest impact on enjoyment while negative affect [$\hat{\beta}_1 = -0.04, SE(\hat{\beta}_1) = 0.019,\ t(310) = -2.157,\ p < .05$] and feelings of being moved [$\hat{\beta}_1 = -0.08, SE(\hat{\beta}_1) = 0.031,\ t(310) = -2.545,\ p < .05$] were associated negatively with enjoyment. Also in line with previous literature, hedonic motivation [$\hat{\beta}_1 = 0.15, SE(\hat{\beta}_1) = 0.045,\ t(310) = 3.358,\ p < .001$] was significant predictor of enjoyment from board game play for this sample.

Experience of Appreciation

The model for appreciation experience reported a correlation of R = .831 and R-square = .690 with 95% confidence interval [0.6153562, 0.7329402], *F* (12,310) = 57.535, $p < .001$ [see table 1.3 for specifics of the model]. The regression model for board game appreciation revealed, in addition to the competence [$\hat{\beta}_1 = 0.092, SE(\hat{\beta}_1) = 0.045,\ t(310) = 2.062,\ p < .05$] and autonomy [$\hat{\beta}_1 = 0.225, SE(\hat{\beta}_1) = 0.049,\ t(310) = 4.582,\ p < .001$] dimensions that were relevant for enjoyment, psychological need for insight [$\hat{\beta}_1 = 0.128, SE(\hat{\beta}_1) = 0.041,\ t(310) = 3.157,\ p < .005$] was significantly associated with the experience of appreciation. In line with extant work both positive affect [$\hat{\beta}_1 = 0.161, SE(\hat{\beta}_1) = 0.052,\ t(310) = 3.1,\ p < .005$] and

meaningful affect, in terms of feelings of being moved [$\hat{\beta}_1 = 0.245, SE(\hat{\beta}_1) = 0.039,\ t(310) = 6.355,\ p < .001$] predicted appreciation ratings.

Table 1.2: Regression Model examining the formation of enjoyment from board game play

	B	Std. Error	t	Sig.
(Constant)	2.053	0.228	9.008	<.001
Competence	**0.265**	**0.036**	**7.294**	**<.001**
Autonomy	**0.115**	**0.04**	**2.88**	**0.004**
Relatedness	-0.031	0.038	-0.833	0.406
Insight	0.022	0.033	0.654	0.514
Arousal	-0.003	0.02	-0.132	0.895
Positive Affect	**0.311**	**0.042**	**7.36**	**<.001**
Negative Affect	**-0.04**	**0.019**	**-2.157**	**0.032**
Feeling Moved	**-0.08**	**0.031**	**-2.545**	**0.011**
Cognitive Challenge	0.008	0.026	0.332	0.74
Emotional Challenge	0.031	0.019	1.651	0.1
Hedonic Motivation	**0.15**	**0.045**	**3.358**	**<.001**
Eudaimonic Motivation	-0.061	0.038	-1.621	0.106

F (12,310) = 46.783, p<.001, R = .803 and R-square = .664

Table 1.3: Regression model examining the formation of appreciation from board game play

	B	Std. Error	t	Sig.
(Constant)	0.416	0.281	1.482	0.139
Competence	**0.092**	**0.045**	**2.062**	**0.04**
Autonomy	**0.225**	**0.049**	**4.582**	**<.001**
Relatedness	0.053	0.046	1.148	0.252
Insight	**0.128**	**0.041**	**3.157**	**0.002**
Arousal	0.035	0.025	1.378	0.169
Positive Affect	**0.161**	**0.052**	**3.1**	**0.002**
Negative Affect	-0.028	0.023	-1.213	0.226
Feeling Moved	**0.245**	**0.039**	**6.355**	**<.001**
Cognitive Challenge	0.051	0.031	1.62	0.106
Emotional Challenge	0.038	0.023	1.613	0.108
Hedonic Motivation	-0.041	0.055	-0.739	0.46
Eudaimonic Motivation	-0.008	0.047	-0.163	0.871

F (12,310) = 57.535, p<.001, R = .831 and R-square = .690

Mediation Analysis

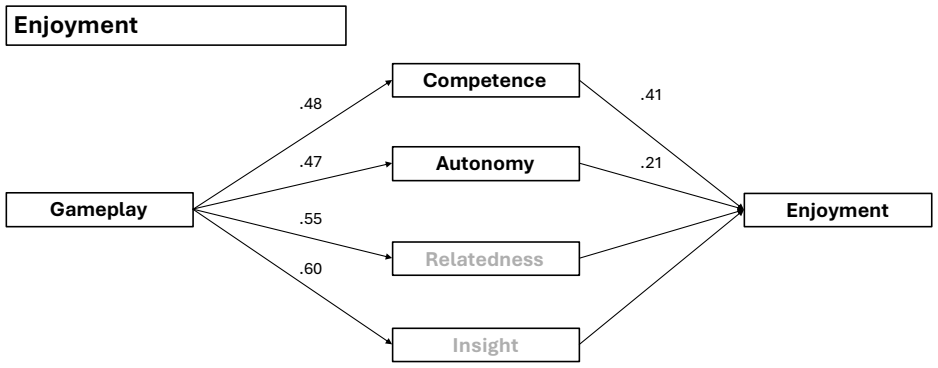
A serial mediation analysis was conducted to examine how each game element influenced enjoyment and appreciation experience through the mechanisms explored in the regression model. Specifically, the analysis investigated if gameplay, narrative, social context of play, and intuitiveness of the tangible materials of the games reviewed directly impacted the entertainment experience and whether these relationships were mediated by self-determination-related psychological gratifications. Based on previous literature, this examination was theoretically justified that medium features can, directly and indirectly, impact enjoyment and appreciation

appraisals and are associated with self-determination variables for video game play (e.g., (Oliver et al., 2016; Possler et al., 2023). Using the Hayes PROCESS macro (Model 4) in SPSS performed with 5,000 resamples (Hayes, 2022), a parallel mediation analysis was run with enjoyment and appreciation as the dependent variables and each board game element as independent variables. Psychological need satisfaction variables of autonomy, competence, relatedness, and insight were entered into the model as mediator variables.

Predicting the Enjoyment Experience

Gameplay had a small but significant direct effect (direct effect = 0.08, SE = 0.04, 95% CI = [0.0053, 0.1617]) on participants enjoyment when controlling for the mediators. Experience of competence during play significantly mediated the relationship between gameplay and enjoyment, with a significant indirect effect (indirect effect = 0.20, SE = 0.05, 95% CI = [0.1016, 0.3131]) and a significant direct effect (direct effect = 0.41, SE = 0.04, 95% CI = [0.3323, 0.4842]). Similarly, autonomy also had a significant mediation effect on the relationship between

Figure 1.1: Gameplay elements predicting enjoyment with SDT variables as mediators



Direct effect = 0.08, SE = 0.04, 95% CI = [0.0053, 0.1617]

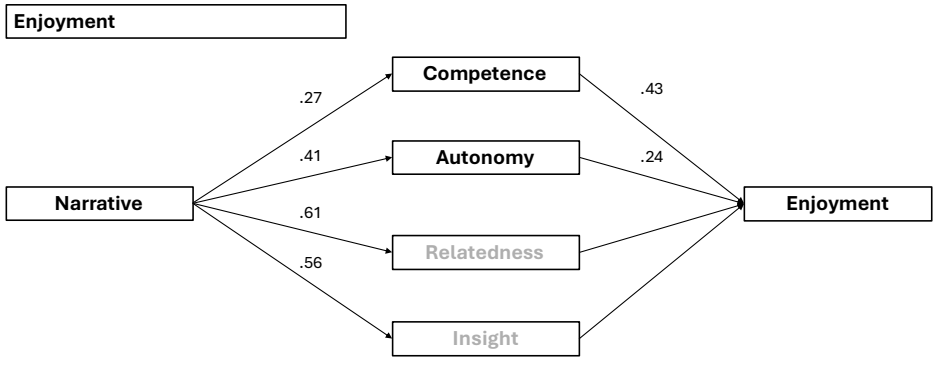
Indirect effect = 0.26, SE = 0.06, 95% CI = [0.1393, 0.3815]

Total effect = 0.34, SE = 0.04, 95% CI = [0.2597, 0.4192]

gameplay and enjoyment, with an indirect effect (indirect effect = 0.10, SE = 0.03, 95% CI = [0.0496, 0.1657]) and a direct effect (direct effect = 0.21, SE = 0.05, 95% CI = [0.1251, 0.3022]). However, relatedness or insight variables did not play a role in this relationship. Together, gameplay had a medium but significant total effect on enjoyment (total effect = 0.34, SE = 0.04, 95% CI = [0.2597, 0.4192]).

Narrative elements in board games had a small but significant negative direct effect on participants' enjoyment (direct effect = -0.07, SE = 0.03, 95% CI = [-0.1412, -0.0045]). Sense of competence significantly mediated the relationship between narrative and enjoyment, with a significant indirect effect (indirect effect = 0.12, SE = 0.03, 95% CI = [0.0548, 0.1868]) and a significant direct effect (direct effect = 0.43, SE = 0.04, 95% CI = [0.3603, 0.5061]). So did autonomy, significantly mediating the relationship between narrative and enjoyment, with a significant indirect effect (indirect effect = 0.10, SE = 0.03, 95% CI = [0.0527, 0.1558]) and a significant direct effect (direct effect = 0.24, SE = 0.05, 95% CI = [0.1506, 0.3285]). However,

Figure 1.2: Narrative elements predicting enjoyment with SDT variables as mediators



Direct effect = -0.07, SE = 0.03, 95% CI = [-0.1412, -0.0045]

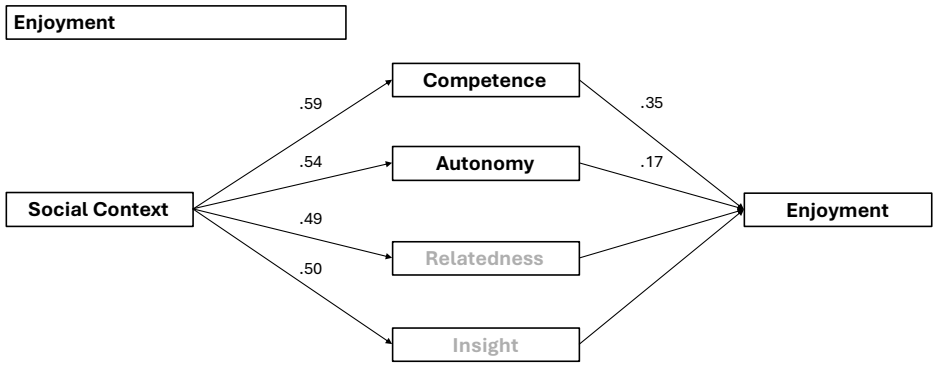
Indirect effect = 0.21, SE = 0.05, 95% CI = [0.1230, 0.3111]

Total effect = 0.14, SE = 0.03, 95% CI = [0.0724, 0.2033]

relatedness and insight variables did not significantly mediate the relationship between narrative and enjoyment, suggesting that competence and autonomy partially mediated the relationship between narrative and enjoyment with a small total effect (total effect = 0.14, SE = 0.03, 95% CI = [0.0724, 0.2033]).

The social context of play had a significant positive direct effect on participants' enjoyment when controlling for the needs of competence and autonomy (direct effect = 0.24, SE = 0.04, 95% CI = [0.1596, 0.3204]). Competence significantly mediated the relationship between social context and enjoyment, with a significant indirect effect (indirect effect = 0.21, SE = 0.05, 95% CI = [0.1087, 0.3116]) and a significant direct effect (direct effect = 0.35, SE = 0.04, 95% CI = [0.2746, 0.4243]). Sense of autonomy also emerged a significant mediating variable, with a significant indirect effect (indirect effect = 0.09, SE = 0.03, 95% CI = [0.0395, 0.1456]) and a significant direct effect (direct effect = 0.17, SE = 0.04, 95% CI = [0.0811, 0.2536]). Similarly to

Figure 1.3: Social context elements (collocated co-play) predicting enjoyment with SDT variables as mediators



Direct effect = 0.24, SE = 0.04, 95% CI = [0.1596, 0.3204]

Indirect effect = 0.26, SE = 0.06, 95% CI = [0.1494, 0.3669]

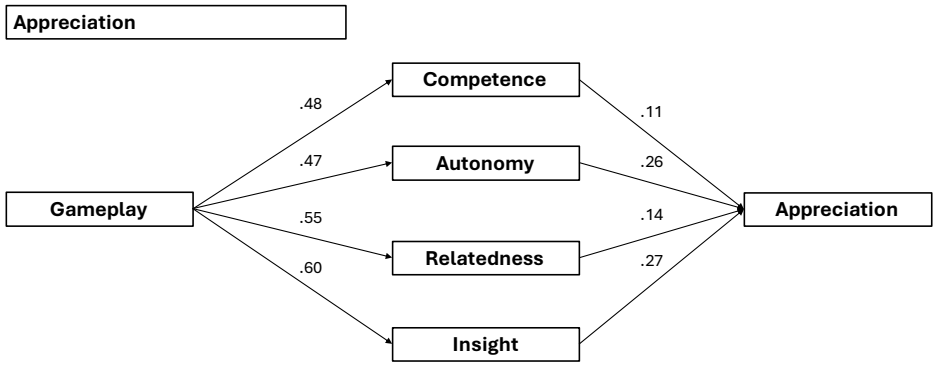
Total effect = 0.50, SE = 0.04, 95% CI = [0.4234, 0.5734]

the other two game elements, relatedness and insight variables did not significantly mediate the relationship between social context and enjoyment. But social context of play had the strongest total effect on enjoyment experience (total effect = 0.50, SE = 0.03, 95% CI = [0.4234, 0.5734]). Overall, competence and autonomy partially mediated the relationship between all three game elements and the experience of enjoyment.

Gameplay had a significant direct effect on the appreciation of the experience of playing board games (direct effect = 0.14, SE = 0.05, 95% CI = [0.0515, 0.2292]) suggesting that gameplay elements enhanced the appreciation of the play experience. All four need satisfaction variables significantly mediated the association. Competence had small but significant indirect (indirect effect = 0.05, SE = 0.03, 95% CI = [0.0082, 0.1149]) and a direct effect (direct effect = 0.11, SE = 0.04, 95% CI = [0.0252, 0.1979]). Autonomy had a slightly stronger significant mediating effect on the relationship (indirect effect = 0.12, SE = 0.04, 95% CI = [0.0583, 0.2037]) and a direct effect (direct effect = 0.26, SE = 0.05, 95% CI = [0.1621, 0.3633]). Relatedness contributed positively with significant but small indirect (indirect effect = 0.08, SE = 0.03, 95% CI = [0.0208, 0.1502]) and direct effect (direct effect = 0.14, SE = 0.04, 95% CI = [0.0512, 0.2382]). Insight had the strongest mediation effect among the mediators with an indirect (indirect effect = 0.16, SE = 0.04, 95% CI = [0.1024, 0.2497]) and a direct effect (direct effect = 0.27, SE = 0.04, 95% CI = [0.2026, 0.3463]). Together, gameplay had a substantial/stronger but significant total effect on appreciation (total effect = 0.56, SE = 0.04, 95% CI = [0.4645, 0.6610]).

Narrative had a significant positive direct effect on participants' appreciation (direct effect = 0.13, SE = 0.04, 95% CI = [0.0557, 0.2107]). Competence significantly mediated the

Figure 1.4: Gameplay elements predicting appreciation with SDT variables as mediators



Direct effect = 0.14, SE = 0.05, 95% CI = [0.0515, 0.2292]

Indirect effect = 0.42, SE = 0.07, 95% CI = [0.2918, 0.5805]

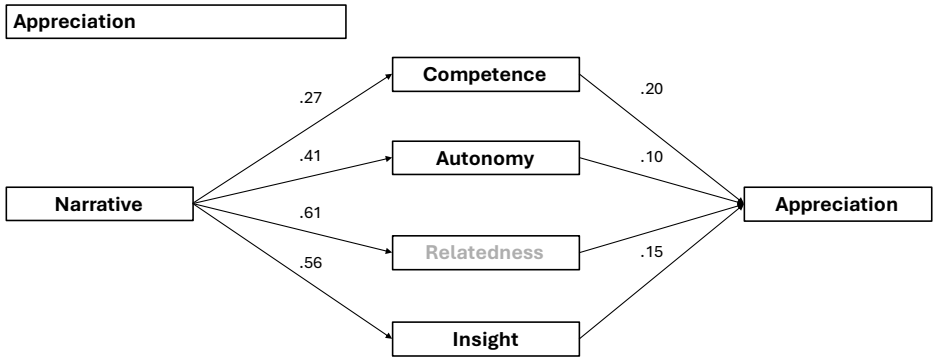
Total effect = 0.56, SE = 0.05, 95% CI = [0.4645, 0.6610]

relationship between narrative and appreciation, with a significant indirect (indirect effect = 0.04, SE = 0.02, 95% CI = [0.0118, 0.0744]) and direct effect (direct effect = 0.15, SE = 0.04, 95% CI = [0.0641, 0.2293]). Autonomy also significantly mediated the relationship, with an indirect effect of 0.10 (SE = 0.03, 95% CI = [0.0521, 0.1602]) and a direct effect of 0.26 (SE = 0.05, 95% CI = [0.1546, 0.3561]). Insight had an indirect effect 0.15 (SE = 0.03, 95% CI = [0.1035, 0.2142]) as well as an indirect effect 0.15 (SE = 0.27, 95% CI = [0.2025, 0.3457]) on the relationship. Surprisingly, relatedness did not exhibit any significant direct or indirect effects. Narrative had a smaller but comparable total effect on appreciation than gameplay (total effect = 0.49, SE = 0.04, 95% CI = [0.4151, 0.5566]).

Social context of play had a significant positive direct effect on participants' appreciation of the experience when controlling for the mediators (direct effect = 0.13, SE = 0.05, 95% CI = [0.0309, 0.2228]). Although competence had a significant direct effect (direct effect = 0.11, SE = 0.05, 95% CI = [0.0176, 0.1964]) on the relationship between social context and appreciation,

its indirect effect was not significant. The sense of autonomy also emerged as a significant mediating variable, with a significant indirect effect (indirect effect = 0.14, SE = 0.04, 95% CI = [0.0650, 0.2197]) and a significant direct effect (direct effect = 0.25, SE = 0.05, 95% CI = [0.1484, 0.3543]). Relatedness and insight variables significantly mediated the relationship

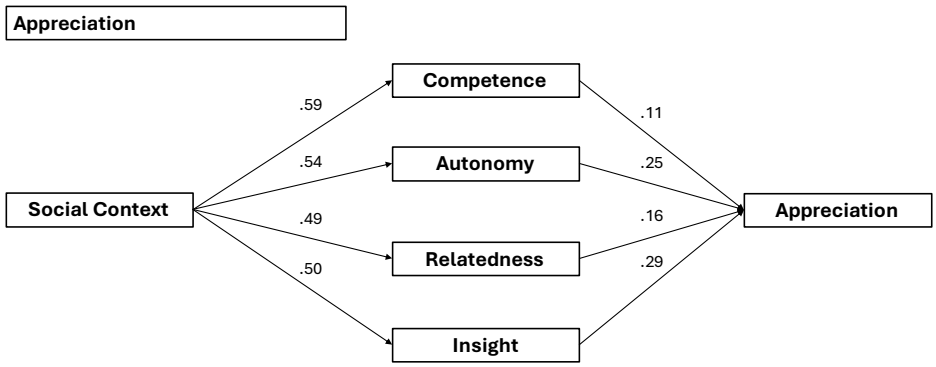
Figure 1.5: Narrative elements predicting appreciation with SDT variables as mediators



Direct effect = 0.13, SE = 0.04, 95% CI = [0.0557, 0.2107]
Indirect effect = 0.35, SE = 0.05, 95% CI = [0.2613, 0.4553]
Total effect = 0.49, SE = 0.04, 95% CI = [0.4151, 0.5566]

between social context and appreciation, with indirect effects of 0.08 (SE = 0.03, 95% CI = [0.0267, 0.1414]) and 0.14 (SE = 0.03, 95% CI = [0.0824, 0.2180]), respectively. But the two had slightly larger direct effects, with .16 (SE = .05, 95% CI = [0.0665, 0.2526]) for relatedness and .29 (SE = .04, 95% CI = [0.2141, 0.3573]) for insight. The social context of play element had the strongest total effect on the appreciation experience (total effect = 0.55, SE = 0.05, 95% CI = [0.4417, 0.6550]). Overall, competence, autonomy, relatedness, and insight partially mediated the relationship between social context and the experience of appreciation.

Figure 1.6: Social context of play (collocated co-play) elements predicting appreciation with SDT variables as mediators



Direct effect = 0.13, SE = 0.05, 95% CI = [0.0309, 0.2228]

Indirect effect = 0.42, SE = 0.08, 95% CI = [0.2694, 0.5698]

Total effect = 0.55, SE = 0.05, 95% CI = [0.4417, 0.6550]

Discussion

Patterns of significance in the examined variables in the regression models suggest a range of possibilities in the experience of enjoyment and appreciation from playing board games. The mediation models linking intrinsic medium features to outcome variables together support theoretically expected assumptions and several nuances of board game play. Findings first establish that the application of the theoretical framework and associated instruments examining the variables was justified in the context of board games. Measures applied exhibited robust internal validity for the current sample reporting their board game play experience. Fundamental relationships in the entertainment experience in general, established in the extant literature, between relevant variables such as enjoyment and positive affect or hedonic motivation remained consistent with expectations. The framework was useful in identifying the idiosyncrasies of analog play that make for a unique context of appreciation and meaningful emotions. Enjoyment in board games was predicted by affective and psychological factors similar to video games. Although further comparative analysis is required, in the current evidence, the lack of digital mediation did not interfere with the satisfaction of intrinsic needs in board games. Enjoyment from and appreciation of board game play was generally consistent with theoretical expectations in the extant literature on digital games with interesting caveats denoting the uniqueness of analog simulations.

The inclusion of affective and motivational factors with intrinsic need satisfaction variables in the regression model explained over half the variance in both the enjoyment and appreciation experiences. This is similar to previous literature that only focused on comparing hedonic variables of positive affect and arousal with need satisfaction of autonomy and

competence, with similar variance explained (Tamborini et al., 2010; Tamborini et al., 2011). The significance of the positive affect together with the satisfaction of autonomy and competence in the enjoyment of board games, suggest that the dynamic responses to naturally mapped actions produced by digital software are supplanted by players' distributed cognitive processes in manually operationalizing the simulation of the board game. This manual effort required for board games, despite being more heavy-handed (further discussed) than dynamic responses from video game systems, seems to provide an active enough experience to enhance the salience of self-determination variables. It is likely that the deliberative thinking required to understand and implement the rules and discursive cooperation required for play involves the players in the game in a manner parallel to experiencing presence in digital environments despite lacking the sensory cues and other digital affordances. The large effect size of positive affect in the regression model suggests that the deliberate effort required for analog play can be similarly satisfying as the experience of natural mapping of players' actions onto digital games.

While measures of enjoyment were strongly related to positive affect with a large unique variance explained, it also exhibited a small but inverse association with negative and meaningful affect. This suggests that entertainment experience from board game play may not be commonly associated with challenging, negative, or deep emotional experiences. Players are mostly interested in the game challenges, competing with other players, and having fun, which is also supported by the significance of hedonic motivations. Narrative-heavy gameplay may not be the most ideal for social activities. In fact, serious thematic expositions can get in the way of having fun as meaningful affect exhibited a low but significant negative impact predicting enjoyment. That is, the social dynamics of board game play do not seem to lend itself to having to negotiate deeper emotional experiences or even negative emotions, at least for the current

sample of players and in the reviewed games. With the significance of hedonic motivation, meaningful affect may actually interfere with enjoyment in an interactive social situation where players are looking for hedonic pleasure in playful competition (as most games reviewed were competitive).

The experience of appreciation of board games consisted of distinct patterns of need satisfaction and affective states. Meaningful affect explained the largest unique variance in the regression model for appreciation. Satisfaction of insight needs, in addition to autonomy and competence emerged as vital for appreciation. This suggests the importance of finding meaning or insight from gameplay in the entertainment continuum. That is, autonomy and competence may be sufficient for play activity to be pleasurable. But to move beyond hedonic responses, the game needs to deliver an experience of discovery and insight. Interestingly, while lack of pleasurable affect (i.e., inverse association of negative emotions) deterred enjoyment, both hedonic and non-hedonic affect co-occurred for the appreciation experience. Players who found their play experiences to be meaningful and appreciated the game reported both positive and meaningful affect. This co-occurrence of affective states further highlights the assumption that some degree of satisfaction or functional ease with the content is required for appreciation experience in addition to thought-provoking emotions. This is in line with the conceptualization of the enjoyment and appreciation continuum (Raney et al., 2020; Possler et al., 2023).

However, the non-significance of arousal for neither entertainment outcomes and the large effect size of positive affect in predicting enjoyment seems to suggest that player reports of interaction patterns in board games resemble that of a low interactivity media (Tamborini et al., 2011). This is in line with previous experimental findings suggesting a low interactivity media

environment may not lead to arousing experiences, whereas in higher interactivity conditions, it would account for larger variance than positive affect (Tamborini et al., 2011). Accordingly, however, it also resembles a low to medium interactivity condition as both autonomy and competence variables significantly predicted enjoyment. Thus, board games present a ludic context sufficiently demanding to the player that can influence the salience of core self-concepts (e.g., autonomy) that can predict the entertainment experience. Lack of digital mediation and the continuous requirement for manual moderation of game sessions may temper the arousal experience of play and competition in board games. The sense of effectance is spread out through rounds of play; thus, even if moments of excitement exist, they may not discreetly sustain long enough or dissipate fast. However, the presence of other co-players may uniquely enhance the satisfaction of the SDT mechanisms. Thus, the current evidence suggests that board games present low to medium levels of interactive affordance that can scaffold the activation of self-concepts.

The social context had the strongest total and direct effect on enjoyment and the largest indirect effect on appreciation among the three game elements. This indicates the critical role of collocated co-play in board game experiences. The significant mediation effect of relatedness between collocated co-play and appreciation emphasizes the importance of interactions that facilitate social bonds and/or connectedness or add a layer of security to an already existing one, which can be crucial for meaningful experiences in board games. However, game mechanics may introduce caveats as, as much as collaborative engagements can strengthen the feeling of connectedness, competitive dynamics among players may actually interfere with the sense of security in interpersonal interactions. The non-significance of relatedness in the relationship between social involvement and enjoyment, as well as in the regression model for appreciation,

hints towards this potential interference in competitive interactions with other co-players. This is very plausible as competitive aggression, even when playful, may get in the way of entertainment experiences. Not all players come with similar levels of interest in playing and willingness to put effort into learning the rules. They may vary in expertise, causing strains to the co-play dynamics. Competitive collocated co-play may influence a certain degree of independence in displaying mastery and competence over other players. Strategic moves during play often bring points for players at the expense of other players' points or resources. Thus, while satisfaction of competence needs that explained a large unique variance in enjoyment may be enhanced in board games due to the presence of other players, it may get in the way of feeling connected to other players, at least in competitive games.

Although narrative elements are generally understood to be vital in contributing to the meaning-making process or evoking meaningful outcomes, analog simulations may not lend themselves to such mechanisms. In the regression model, predicting enjoyment narrative elements had a small but negative direct impact. Without digital mediation, the exposition of non-linear narratives can be quite challenging for transportation into the narrative without sensory cues. In the absence of digital mediation, the story experience in board games lacks engagement with rich visual narrative worlds that enable environmental storytelling, cut scenes, and dialog simulations that impact engagement with story elements. Instead, additional effort is required to piece together the story through engagement with the material items. The additional effort required for the story exposition may reduce cognitive resources to further engage with narrative materials. The analog context presents further challenges for identification with "abstract ideas" of a character instead of digitally embodying a character's avatar. The lack of the possibility of identification with game characters through avatar embodiment hinders

transportation within the specific narrative. In fact, the non-significance of narrative elements predicting appreciation through relatedness may also point to the fact that many board games do not feature rich characters or story arcs, at least for the games reviewed in the current sample. Sporadic narrative exposures and a lack of avatar characters hinder building connections within the game. Co-construction of the narrative with others may add additional challenges of navigating and incorporating others' ideas and perspectives based on players' individual differences. Thus, narrative elements in board games may require careful integration with mechanics and social dynamics that influence plot progression while simultaneously satisfying a sense of autonomy and discovery of insights.

While narratives give meaning to playful actions as narratives also had a similar influence on insight needs in predicting appreciation, ludic interactions seem primary to bring to life the story and fill in the dramaturgical gaps in the sporadically built narrative experience in board games. The value of player actions determines the influence those actions are allowed to have on the narrative outcome. That is, if player choices are not meaningful, a rich narrative can still fail to deliver an appreciation experience. These findings add complexity to current evidence on fun and meaningful experiences in games where connections with players and in-game characters take precedence over gameplay mechanics in explaining meaningful experiences (Oliver et al., 2016; Rogers et al., 2017). Of note, the games reviewed in the current study are mostly competitively played; thus, players' opportunities for feeling connectedness may have been hindered by contentious play. Further and taken together, the findings imply that narratives in board games need to be intricately woven into gameplay in such a way that they enrich the player's experience without overshadowing the interactive and dynamic aspects of gameplay.

Participant's motivations played an interesting role in predicting entertainment experiences. Eudaimonic or non-hedonic motivation was not significant for either enjoyment or appreciation, implying having the motivations for eudaimonic entertainment may not be as important as the game's ability to facilitate the discovery of insights for players to appreciate a game. Players may come with truth-seeking motives, but it depends on the game whether they will find meaningful experiences. While eudaimonic motivations did not seem to be a precursor for finding meaningful experiences, participants' predilections towards hedonic entertainment predicted enjoyment during play. That is, though players come to play board games to have fun, they may come across meaningful experiences anyway through feeling connected with co-players and/or gaining insights through developing an understanding of the game mechanics in the process of play. That is, even if players do not approach board game play with the motivation to find meaning or experience non-hedonic gratification, they may encounter it nevertheless.

Together, these findings emphasize the importance of the deliberativeness associated with board game mechanics and the discursiveness of collocated co-play. While the social context of play strongly influenced enjoyment, both social context and gameplay mechanics similarly influenced the experience of appreciation in the mediation model. Gameplay elements predicted appreciation through all four SDT variables. Interestingly, gameplay had the strongest impact on the insight dimension, validating the assumption about the significance of the deliberative processing in supplanting the task of software to maintain analog interactivity – which to the least aids in a deeper understanding of the simulation system and to the most facilitates discovery of insights. The lack of digital mediation, in this case, did not seem to influence satisfaction of intrinsic needs significantly differently from digital games. Although the salience of these variables may be stronger in digital scenarios (through digital presence via natural mapping of

controllers), agency and effectance experienced in analog games can proffer similar patterns of enjoyment. In fact, the evidence is indicative of the fact that the deliberate effort required to function autonomously during analog play is satisfying in a manner similar to digital-mediated games. With the exception of the narrative element, the additional effort required for analog game play and interactions associated with collocated co-play influenced the satisfaction of intrinsic needs, at least for the games reviewed within this sample. Observing other co-players' playstyles, approach to game challenges, and perspectives about narrative themes influences player gratification. Discursive interactions with other players, therefore, aid in making sense of and developing an appreciation for the game.

IV. STUDY 2

Study 2 concerns whether and how eudaimonic entertainment in board games could influence cognitive elaboration, such as reflective thought and issue interest in socio-political topics. That is, it examined the potential of meaningful entertainment in stimulating thought-provoking experiences. To do so, first, it reviews theoretical work that examines the mechanisms behind the association between hedonic and eudaimonic affective states from entertainment. Second, it takes the experience of playing environmental board games in terms of the dual process of the entertainment framework to examine the potential of this commercially available genre in provoking reflective thought and issue interest about the environment. Games on climate change and environmental issues are increasingly a topic of interest amongst environmental and science communication scholars. Specifically, games can facilitate hands-on learning about the environment through active involvement rather than passive exposure (Wu and Lee, 2015) and reduce psychological distance to the climate crises through environmental perspective-taking (Ahn et al., 2016; Klein & Hilbig, 2018; Markowitz et al., 2018). Roleplay elements combined with interactive engagement in games influence knowledge gain about climate change causes, dynamics, and impacts (Rooney-Varga et al., 2018). Accordingly, player interaction with environmental models in games may help address the mismatch between the complexity of environmental issues and the public's mental models about climate change (Mendler de Suarez et al., 2012).

Alongside digital counterparts, climate change board games have gained academic interest as effective tools for community engagement with environmental science (Fjællingsdal & Klöckner, 2020). Interaction with board game-based simulations can enable systems thinking

to help players parse through the intricate dynamics of the interconnected parts of the environmental system and understand the complexities as a whole (Waddington & Fennewald, 2018). This is particularly useful in procedurally communicating complex environmental models that illustrate the science behind climate change crises because simulations require audiences to first learn the dynamics of the model as well as learn about the consequences of their interactions, choices, and decisions while playing (Hong et al., 2013). Such processes may lead to cognitive elaboration on the issues addressed in the games and may help address the mismatch with the public's mental models about climate change (Mendler de Suarez et al., 2012) and reduce psychological distance to climate crises through influencing knowledge about climate change causes, dynamics, and impacts (Rooney-Varga et al., 2018).

However, studies examining the potential of board games in communicating climate change tend to focus on the educational prospect and knowledge acquisition about environmental issues (Foltz et al., 2019). An unexplored area of research lies in how board game play can facilitate feelings of connection to nature, the environment, or the planet through eudaimonic experiences (Raney et al., 2020). Emerging scholarship in digital games suggests gameplay can facilitate eudaimonic experiences of being emotionally moved, introspection on one's beliefs, and a sense of elevation (Daneels et al., 2022) which might be influential in inducing pro-environmental behavior and empathic concerns for the environment. Specifically, eudaimonic experience in climate change games can help overcome audiences' social psychological barriers (Wolfe and Tubi, 2018) in dealing with negative emotions of fear, disgust, and horror resulting from images of catastrophes and extreme weather in climate change communication (O'Neill et al., 2013; Hart & Feldman, 2016) and reduce defenses of denial, distraction, and rationalization, that create resistance to adaptation, mitigation and policy initiatives (Hamilton & Kasser, 2009;

Feinberg & Willer, 2010; Hamilton, 2011; Hart, 2011). Therefore, this study examines how climate change board games can generate thought-provoking emotional responses and contemplation about the complexities of climate science models in commercially available environmental board games. It uses the eudaimonic media effects framework to explore how meaningful entertainment from this genre of board games fosters contemplation and impressions about environmental issues. It investigates the association between the various dimensions of player experience and the elemental characteristics of board games that may enable a deeper understanding of the crises, cognitive elaboration, and environmental interest.

Affect's Influence on Cognitive Processes

Affective and cognitive processes during media entertainment are closely intertwined such that depth of information processing emerges from the affective evaluation from initial exposure (Cupchik, 1995; Bartsch, & Oliver, 2011). For instance, hedonic or pleasurable entertainment media such as casual content with light themes, riveting content inducing a high degree of arousal, or even complex suspenseful dramatic expositions are processed using an automatic or heuristic approach that demands less effort. In any of these cases, audiences' attentional resources are too absorbed, motivational resources are too low or real-life concerns far removed to engage in cognitive elaboration. That is, hedonic affective experiences may come at the expense of cognitive depth and rational scrutiny (e.g., Busselle & Bilandzic, 2008). For instance, transportation into an engaging narrative through identification with story characters reduces the cognitive resources required for elaboration, such as counterarguing (Green et al., 2004; Busselle & Bilandzic, 2008).

The salience of non-hedonic affect (e.g., negative emotional experiences), on the other hand, can increase cognitive depth, leading to elaborate contemplations about the content (Bopp et al., 2016). But such negative media experiences can still be gratifying as when an audience experiences challenging information, the initial reaction may be renegotiated through meta-emotional appraisal processes in favor of personal growth or simply to maintain a positive mood (Oliver & Bartsch, 2010; Bartsch & Oliver, 2011). Empirical studies tend to suggest that affective involvement through moving/meaningful content tends to lead to more reflective thoughts and issue interests suggestive of elaborate forms of information processing (Bopp et al., 2016; Bartsch et al., 2014; Bartsch & Schneider, 2014; Weinmann, 2017). For instance,

experiencing cognitive, affective, or behavioral challenges due to the complexity of the content (Hartmann, 2013) media entertainment can lead to appreciation experiences (Bartsch & Hartmann, 2017). Similarly, moving films that keep the audience at a moderate level of arousal with negative valence, and a mixed affective state tend to lead to reflective thought and appreciation of the experience (Bartsch et al., 2014). For serious political entertainment, such meaningful affective states mediate reflective thought, leading to issue interest about the content (Bartsch & Schneider, 2014).

Reflective thoughts have been likened to intrapersonal deliberation of opinions and perspectives presented in media, involving critical appraisal of information, incorporation of novel ideas within existing schema, and even re-appraisal of mental models to update belief systems (Fishkin, 2011; Mansbridge, 2015; Mercier & Landemore, 2012; Weinmann & Vorderer, 2018; Weinmann, 2018). As opposed to interpersonal deliberations, which affords discursive debates and scrutiny of interlocutors' points of view, intrapersonal reflective thoughts may be susceptible to individual biases and fallacies (e.g., confirmation bias) (Mercier & Landemore, 2012). Nevertheless, as a media effect, reflective thought can be a preamble to more meaningful elaboration and facilitate issue interest and information seeking (e.g., climate change, (Choo, 2023) (Bartsch & Schneider, 2014; Weinmann & Vorderer, 2018).

In games, eudaimonic entertainment can influence reflective thought about the game itself, how the thwarted psychological needs for autonomy and competence may be restored, as well as about the content's relevance outside of the game – pro-social or environmental interests (Elson et al., 2014; Klimmt & Possler, 2020; Raney et al., 2020). Games can procedurally make claims about real-world systems that may contradict the player's existing mental model of said

system - thereby causing them to reflect on and possibly change their mental model (Bogost, 2007). Through deliberate participation, players explore a model to test hypotheses and draw their own conclusions, often unveiling intended/unintended consequences and causal relationships between relevant factors (Rejeski et al., 2015). Research on meaningful games suggests that play experiences can be positively appreciated in favor of gaining an insightful experience (Oliver et al., 2016). Specifically, the board game medium, with its demand for cognitive deliberation and social interaction through collocated co-play dimensions, makes it a site for participatory mediated deliberation (Weinmann & Vorderer, 2018), facilitating discursive social interactions which may provoke individuals to contemplate their own understandings through self-reflection or deliberation within (Weinmann, 2018).

In line with theories of motivated information processing, this study argues that simulated personal relevance through ludic engagement (e.g., understanding game mechanics, performing tasks, the effort required for manual and deliberative interactions) and experiencing meaningful affect (e.g., feeling moved by the game's narrative theme and feeling connected to player roles), and discursive interaction through social involvement in board games can lead to reflective thought. However, the depth and the usefulness of such contemplation depend on the type of reflection. Reflective thoughts during playing games occur on a continuum from frivolous to meaningful, leading to distinct levels of contemplative experiences (Fleck & Fitzpatrick's (2010). Players may be prompted to reflect on the gameplay, narrative elements, design aesthetics, and even on their own play styles (e.g., strategies, tactics), which can be innately enjoyable, providing for a rich and constructive meta-level engagement with the game (Mekler et al., 2018).

On the other end of the reflection range, games can facilitate the opportunity to relate the play experience to aspects of life outside the game world, which provide them with new insights into broader social issues outside of the game (Mekler et al., 2018; Whitby et al., 2019). However, while players do enjoy engaging in deliberative and discursive reflections, higher-level transformative experiences or critical personal growth with broader implications of their gameplay related to their lives outside of the game rarely happens (Mekler et al., 2018). Following the notion that challenging media content can lead to appreciation experiences (Hartmann, 2013; Bartsch & Hartmann, 2017) as well as its relevance for reflection as a media effect (Weinmann & Vorderer, 2018), research on video game players identified moments that facilitate endogenous and exogenous reflective thoughts relating to play experiences (Whitby et al., 2019). Endogenous reflections are limited to thinking about the game system, mechanics, and narratives and may lead players to change or update their understanding of the game or perceptions about game characters, as well as adapting play styles or strategies accordingly. Exogenous reflections go beyond the game and involve contemplation of contents' relevance outside of the media environment in the real world.

Despite this, extensive evidence exists regarding games' in general (and board games specifically) influence on learning and attitudes across domains including health, politics, environment, and a range of social issues (Wong et al., 2021; Foltz et al., 2019; Bayek et al., 2020), reflective contemplation as an outcome associated with appreciation experience remains underexamined. Thus, this study applies the entertainment theory framework to examine the experience of environmental board games and investigates whether and how eudaimonic appreciation from play can facilitate reflective thoughts and if such contemplations can result in issue interest in the environment and/or connectedness to nature. As discussed in previous

chapters, each game element has their own distinct impact on the entertainment experience and can influence reflective thoughts about the games as well as about their broader implications outside of the game.

The gameplay or ludic engagement in board games through the mechanics requires a complex set of cognitive processes ranging from learning the rules and implementing them manually to keeping track of and updating game states to off-loading and retrieving information on and off material objects to managing mood resources required to navigate cooperative social interactions required to progress play. Thus preserving an innate potential to facilitate reflective thoughts by thwarting players' self-determination needs and subverting familiar norms of the game form (Elson et al., 2014). That is, game mechanics on their own can impose reflective moments about the form of the game as well as on broader societal topics games might address through many possible ways. However, the demand for additional cognitive effort may reduce resources to navigate challenging emotions and willingness to further elaborate on message dynamics. However, the satisfaction of autonomy and competence through deliberation over and surmounting game challenges can replete both cognitive and affective resources (Reinecke et al., 2012).

Narrative experience, as discussed previously, can be tricky in board games. The non-discreet exposition due to lack of authorial control over narrative progress, low absorption potential due to the lack of digital mediation, and reliance on players' manual actions to update the game states and reveal plot development all create substantial challenges for compelling narrative experiences that can provoke meaningful reflection. However, this precise nature of board game narrative is a slower content revelation contrasting to linear or digital entertainment

that is conducive to a riveting absorption experience. As players wait for their turn and each round to complete, opportunities for inward contemplations about the game states and, essentially, the story progress are in abundance. This intrinsic feature of board game narratives can be likened to the slowing down of narrative pace in literary texts or films and even in virtual reality experiences to create the opportunity to contemplate and reflect (Cupchik, 1995; Bartsch & Schneider, 2014; Korrs, 2016). For instance, VR experiences for pro-social engagement where contemplative moments are built into the experience without further stimulating events yet observance of the characters' feelings that may arise from pseudo/semi-pause (Korrs, 2016). This structure of the narrative, at the same time, relieves the players' attentional resources required for analog play from time to time, as well as allows them to take reflective pauses to engage in the cognitive elaboration of the story content.

Collocated co-play impacts player performance and vigilance, which may be influential in elaborate processing. Observing others go through similar experiences can be validating of affective states and challenges experienced and influence satisfaction of relatedness and connectedness to others. Competitive friction, on the other hand, can lead to denial responses and reduce willingness to further engage – but as argued previously, thwarted needs autonomy and competence – especially arising through other players' actions could further motivate elaboration until needs are balanced. However, while board games theoretically present a site for interpersonal deliberations (e.g., war games), commercial games are primarily played for entertainment purposes. And a serious thematic exposition such as environmental crises may not be appropriate for a social activity like board game play. On the other hand, when participants are sufficiently motivated, board games can feature compelling and very serious narratives about life, death, suffering, and socio-moral dilemmas (Boothe, 2021). And navigating such complex

narrative themes collaboratively and competitively can be conducive to reflective thought and interests that go beyond the game.

Environmental communication research has grappled with an array of complexities associated with the topic and an even wider range of audience responses. A major cause of these diverse sets of responses is that, depending on the type of narrative and emotions evoked, message reception is often mediated by audiences' social psychological barriers (Wolfe and Tubi, 2018). Several factors interact with different affective dimensions including knowledge of environmental issues (Langford, 2002; Siegrist and Gutscher, 2006), personal experience with climate change consequences (Brugger et al., 2013), individualist worldviews (Morss et al., 2020), political leaning (You & Ju, 2020; Kim et al., 2020), distance from climate change impacts (Lorenzoni et al., 2006), culture, gender and social norms (Salas Reyes et al., 2021). For instance, personal experience with climate impacts plays a critical role in shaping affective responses. Those who have experienced climate change impacts firsthand tend to exhibit stronger emotional responses, which can influence their perception of risks and motivate action. In line with prior research, this study considers participants' beliefs, attitudes, and behaviors related to climate change and the environment overall.

Research Questions

Based on the above discussion, study 2 explores two research questions:

RQ_1: How are hedonic, non-hedonic affect, and intrinsic needs associated with enjoyment and appreciation of environmental board games?

RQ_2: How are hedonic, non-hedonic affect, and intrinsic needs associated reflective thought during playing environmental board games?

RQ_3: Does reflective thought experienced during playing environmental board games predict issue interest and connectedness to nature?

Method

Participants and Procedure

Data were collected using the survey platform Prolific. Only participants who had substantial experience playing board games and had specifically played one or more environmental, ecological, or nature-themed games were invited to participate. Three thousand respondents were screened through a pre-screening study that asked about participants' interest in board games. Based on their initial responses, five hundred and sixty-five invitations were sent out. Three hundred and sixty-two participants responded. The average duration for each response was 19.34 minutes. Due to the long duration of the survey two attention checks were placed approximately after the first and third quarters. Responses meeting either of the checks were kept for analysis, with only four respondents failing either. An additional quality check measure asked to identify participants' favorite board games where the only correct response was none of the above. Responses failing this check were removed (N=5).

After filtering out incompletes, duplicate submissions, failed verification, and attention checks N = 244 responses remained for the final analysis. The remaining respondents were predominantly heterosexual white North Americans, 78 male, 166 female, age 18–73, M = 34.31, SD = 9.07. The majority reside in the Northeast, South, Southeast, and Northwest regions of the US, as well as Canada. Most participants reported having a Bachelor's degree or some college experience and having some form of employment (full or part-time) with a median household income between $61,000-90,000.

After the pre-screening process, participants received an additional invite to participate in the study. Followed by an informed consent approval, they were again prompted to verify their

experience with board games. Specifically, they are asked if they ever played an environmentally themed board game, with a brief and broad definition to aid their understanding of the question. Next, they were asked to identify environmental games they had played and choose a single game to review for the study that they found most engaging, fun or meaningful. Most people reviewed the games Wingspan, Catan: Oil Spring, Photosynthesis, Forbidden Island, Photosynthesis, Spirit Island, Pandemic: On the Brink, Terraforming Mars among others.

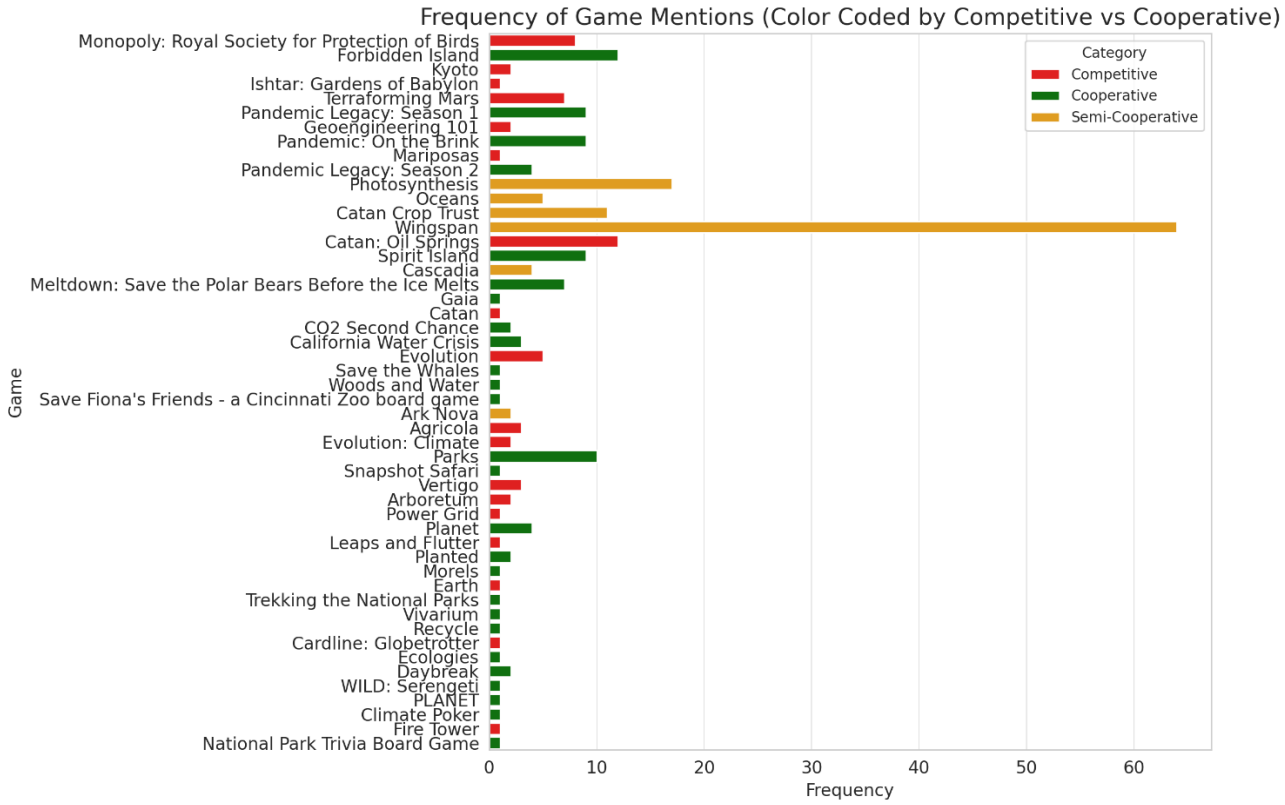
Games Reviewed

Participants described different types of environmental board games. These games can be categorized under different themes: Climate Change, Biodiversity, Agriculture and Resources, Nature Exploration, Pollution, and others. A common distinction drawn among board games based on play styles is whether the games are competitive or cooperative. The majority of the games reviewed were semi-cooperative or cooperative (about 78%). The most commonly mentioned games were Wingspan, Photosynthesis, Forbidden Island, Catan: Oil Springs, Catan Crop Trust, Parks, Pandemic Legacy: Season 1, Pandemic: On the Brink, Spirit Island, Monopoly: Royal Society for Protection of Birds, Terraforming Mars, Meltdown: Save the Polar Bears Before the Ice Melts, Oceans and Evolution, mentioned at least five times each. Both the thematic categorization and play styles (competitive vs cooperative) have important implications for the findings regarding play experiences which shall be discussed in later sections.

Table 2: Category of Environmental Themes Captured in Board Games in Study 1

Environmental Theme	Games
Climate Change	Kyoto, Meltdown: Save the Polar Bears Before the Ice Melts, Daybreak, CO2, CO2 Second Chance, Climate Poker, Evolution: Climate, Fire Tower, Geoengineering 101,
Biodiversity	Cascadia, Photosynthesis, Wingspan, Oceans, Spirit Island, Mariposas, Ark Nova, Save the Whales, Woods and Water, Snapshot Safari, Save Fiona's Friends - a Cincinnati Zoo board game, Ecologies, Evolution, Leaps and Flutter, Monopoly: Royal Society for Protection of Birds, Vivarium
Agriculture and Resources	Terraforming Mars, Catan Crop Trust, Agricola, Planted, Ishtar: Gardens of Babylon,
Nature Exploration	Parks, Planet, WILD: Serengeti, Trekking the National Parks, National Park Trivia Board Game, Arboretum, Cardline: Globetrotter, Earth, Morels,
Pollution	Catan: Oil Springs, California Water Crisis, Recycle
Other Themes	Forbidden Island, Gaia, Pandemic Legacy: Season 1, Pandemic Legacy: Season 2, Pandemic: On the Brink, Power Grid, Vertigo,

Figure 2.0: Frequency of Mentions of Competitive vs Collaborative Games



Measures

The survey asked participants to evaluate their experience of the environmental game they played primarily based on the hedonic, psychological needs, and eudaimonic gratifications. Players evaluated how they experienced the game mechanics, narratives, and aesthetic elements, as well as the social experience of play. Next, participants were asked to recall and rate their experience of the thoughts and emotions that occurred during and post gameplay, about the different aspects of the game or related real-life topics outside of the game. The survey then inquired if the gaming experience made them interested in further exploring the environmental topic of the game, as well as if the play experience helped them feel more connected to nature. A detailed description of the measures are outlined below.

Reflective-thought

To better understand the kind of thoughts provoked through eudaimonic entertainment experiences, the study employed two measures of reflective thought (Bartsch, 2012; Bartsch et al., 2014; Bartsch & Schneider, 2014; Mekler et al., 2018; Whitby et al., 2019). The first involved contemplation about the media experience. E.g., the mechanics, the narrative elements, and the dynamics of the play (Mekler et al., 2018; Whitby et al., 2019). Following the qualitative findings about players' experience of endogenous thoughts about play experience (Whitby et al., 2019), the study developed a four-item scale that evaluated players' reflectiveness about the play experience itself containing items like, "*The game challenges made me re-evaluate and change my play style*" and "*The challenges I experienced made me think about my understanding of the game.*" The scale was internally consistent (Cronbach's $\alpha = 0.762$, $M = 5.08$, $SD = 1.03$) for the

sample of environmental board game players and labeled as Endogenous reflective thought. Items were rated on a seven-point Likert scale ranging from strongly disagree to strongly agree.

The second measure of reflective thought evaluated the kind of socio-moral thoughts the entertainment experience triggered beyond the game's theme and the experience of play (Bartsch & Schneider, 2014). Labeled as Exogenous Reflective-thought, the measure used items developed by Bartsch (2012) and further applied in Bartsch et al. (2014) and Bartsch & Schneider (2014). The original scale developed for traditional media experience (e.g., moving films) was adapted for environmental board game play experience with 5-items on a seven-point Likert scale ranging from strongly disagree to strongly agree. The five items formed an internally consistent scale that evaluated players' contemplations about environmental issues beyond the game (Cronbach's $\alpha = 0.931$, $M = 5.01$, $SD = 1.30$). Sample items included "*The game made me think about important environmental issues*" and "*The game made me think about myself in relation to nature*."

Issue-interest

To measure whether playing the environmental game influenced participants interest in the issue the game dealt with the study employed the issue-interest scale (Bartsch & Schneider, 2014; LaMarre & Landreville, 2009). The measure has been previous applied in context of political entertainment to examine whether exposure to such shows induces political interest among audiences. Participants were asked to rate their inquisitiveness about the topic of a news article, in terms of if they found each of the articles to be "interesting," "worthwhile," and "informative" (Bartsch & Schneider's (2014). In line with previous research, the measure was adapted for this to ask participants to rate how did playing the game make them feel about the

environmental issue/topic of the game? The question asked participants to rate whether they felt "interested", "captivated" and "intrigued" about the topic of the game (LaMarre & Landreville, 2009) with strongly disagree = 1 and strongly agree = 7. These items formed an internally consistent scale (Cronbach's α = .928, M = 5.47, SD = 1.27). In addition, participants were asked to recall post-play information seeking behavior using a one-item measure that asked, "Thinking about the time period following playing the game you reviewed: How much did you actively look for information about issues related to the environment, ecology, climate change, and global warming on television, newspapers, magazines, the internet, social media, or from family, friends, and relevant professionals?" and rate their response on a 7-item Likert scale from None at all = 1 to A great deal = 7 (Bigsby & Hovick, 2018).

Connectedness to Nature

Besides environmental board games' potential to intrigue issue-interest among players the study was interested in examining whether the gameplay result in more affective outcomes such as feelings of connectedness to nature. A previously established measure was adapted from Mayer & Frantz (2004) and Ahn et al., (2016). The seven-item measure had a strong internal consistency (Cronbach's α = .944, M = 4.70, SD = 1.39). Example items included, "*Playing the game made me feel a sense of oneness with the natural world around me"* and "*Playing the game gave me an understanding of how human actions affect the natural world*."

Hedonic Affect

Hedonic affect from playing environmental board games were examined using two different measures arousal, and positive affect (Tamborini et al., 2010). The gratification of arousal needs was measured using three-item Likert-type scales. The items for arousal asked

participants to rate the prompt, "*Playing the game was ...*," "arousing (energetic)," "exciting," and "stimulating." The three-item scale had a strong reliability score (Cronbach's α = 0.868, M = 5.58, SD = .94). Experience of positive affect from playing were probed through adapting items from IJsselsteijn et al.'s (2009) list of game experience measures. Example items included, "*I felt good*," "*I felt happy,*" "*I felt content*." The measure had a robus internal consistency (Cronbach's α = 0.921, M = 5.88, SD = .88). All scales were measured on a seven-point Likert scale with strongly disagree = 1 to strongly agree = 7.

Satisfaction of Self-determination Needs

The satisfaction of self-determination needs of competence, autonomy, and relatedness were measured using the proprietary video game Player Experience of Need Satisfaction (PENS) scale (Ryan et al., 2006; Oliver et al., 2016). Each need was measured using three-item Likert-type subscales from the complete PENS scale. A sample item for autonomy need satisfaction was: "*The game provided me with interesting choices and options.*" (Cronbach's α = 0.874, M = 5.74, SD = .92). An item for competence included "*My ability to play the game was well matched with the game's challenges*" (Cronbach's α = 0.911, M = 5.52, SD = 1.05) and relatedness included "*I found the relationships I formed with game character(s) in this game important*" (Cronbach's α = 0.952, M = 4.27, SD = 1.41). The satisfaction of insight needs was included as one of the key psychological variables associated appreciation of entertainment experience and identified as a key predictor of meaningfulness. The three-item scale was applied as originally conceptualized and developed (Oliver et al., 2016). An example item included, "*Playing the game has given me new insights into life*" (Cronbach's α = 0.836, M = 4.35, SD = 1.28). The four measures for self-determination need satisfaction overall exhibited a robust

internal consistency for the sample. All items were measured on a seven-point Likert scale ranging from strongly disagree = 1 to strongly agree = 7.

Eudaimonic Affect

To examine the nature of eudaimonic emotions experienced by players the study employed three different measures. The first was *negative affect*, concerned with the degree to which players rated the their experience to be disagreeable or unpleasant. The three-item measure included "*I found it tiresome, I felt annoyed, I felt irritable"* (Cronbach's $\alpha = 0.859$, $M = 2.11$, $SD = 1.09$) and was adapted from (IJsselsteijn et al.'s 2009). In early literature on appreciation experience of entertainment, eudaimonic or meaningful emotion were conceptualized as the co-existence of negative and positive affect labeled as mixed affective states (Bartsch et al., 2011). Subsequent literature substantially expanded the breadth of the categories of affective experiences during entertainment to include emotions like feeling moved, tender, poignant, awe and elevation. Based on the nature of board games, considering the possibilities of affective states from analog play this study measured eudaimonic emotions in terms of feeling moved, tender and poignant, developing a three-item measure labeled as *Meaningful Affect* (Bartsch et al., 2014; Oliver et al., 2016). The items had a strong internal consistency (Cronbach's $\alpha = 0.848$, $M = 3.89$, $SD = 1.21$).

Finally, to capture an additional dimension of eudaimonic emotion the study employed a measure of the experience of challenge, the contention players perceive and the amount of effort they have to put into processing information that are inconsistent with their existing schema about both the game as well as it's narrative theme (Bartsch & Hartmann, 2017). In accordance with previous literature, the experience of *Challenge* was measured using a four-item scale that

included items like, "*I felt cognitively challenged"* and "*I felt emotionally challenged*" (Cronbach's α = 0.7, M = 5.00, SD = .97) (IJsselsteijn et al.'s 2009; Bartsch & Hartmann, 2017). All items were measured on a seven-point Likert scale ranging from strongly disagree = 1 to strongly agree = 7.

Entertainment Gratification

Enjoyment was measured using a five-item scale with a strong reliability score (Cronbach's α = 0.944, M = 6.10, SD = .89). Example items included, "*I enjoyed playing the game"* and "*It was fun to play the game"* (Oliver et al., 2016; Oliver & Bartsch, 2010). Appreciation was measured using a four-item scale (Cronbach's α = 0.834, M = 5.27, SD = 1.04). Example items included, "*I appreciated playing the game"* and "*The game was thought-provoking"* (Oliver et al., 2016; Oliver & Bartsch, 2010). All items were measured on a seven-point Likert scale ranging from strongly disagree = 1 to strongly agree = 7.

Entertainment Motivation

Entertainment motivations can have strong impact the experience of content exposure and how information is processed. Therefore, the survey asked participants to describe their entertainment preferences. Motivation for entertainment exposure was examined in terms of audience's hedonic and eudaimonic predilections towards media fare (Oliver and Raney, 2011; Cohen 2016). The measure for hedonic motivation included six-items (Cronbach's α = 0.805, M = 5.65, SD = .82) including, "*My favorite kinds of media experiences are happy and positive*" and "*It's important to me that I have fun when engaging with entertainment content.*" The measure for eudaimonic motivation also included six-items (Cronbach's α = 0.929, M = 5.77, SD = 1.04), including "*I like entertainment that challenges my way of seeing the world*" and "*I like*

media experiences that make me more reflective." Both measures were adapted from previous research and were measured on a seven-point Likert scale ranging from strongly disagree = 1 to strongly agree = 7 (Oliver and Raney, 2011; Cohen 2016).

Environment Related Attitudes

As public perceptions regarding the environment in the current times are heavily mediatized this study accounted for participants' predilections towards environmental issues in general, including measures that examined participants' climate related general perceptions as well as political orientation (Gregersen et al., 2020). To understand the level of concern about the effect of climate change participants were asked to respond to the question "*How worried or anxious are you about the effects of climate change*?" by rating their perceptions using slider scale ranging from 1 (Not at all worried) to 7 (Extremely worried) (Gregersen et al., 2020). Similarly, to gauge the extent to which respondents perceived the severity of environmental related issues the survey prompted participants to rate the question "*How good or bad do you think the impact of climate change will be on people across the world*?" on a slider scale ranging from 1 (Extremely bad) to 7 (Extremely good) (Gregersen et al., 2020). Further, two prompts assessed participants' beliefs regarding the anthropogenic nature of climate change. Participants were asked to rate whether they thought climate change is caused by "*Natural Processes*" or "*Human Activity*" on a seven-point Likert scale ranging from strongly disagree = 1 to strongly agree = 7 (Gregersen et al., 2020). Finally, respondents' political orientation was measured using the prompt: "In politics people sometimes talk of 'left' and 'right.' Using this slider, where would you place yourself on this scale, where 1 means the left and 7 means the right?" (Gregersen et al., 2020).

Game Characteristics

Participants' experience of the elemental features of board games: mechanics, narratives, aesthetics, and social context of play were examined using measures developed in previous literature that discussed game involvement (Calleja et al., 2016) or experience of intrinsic characteristics of the medium (Elson et al., 2014). In line with this literature, this study measured experience with intrinsic elements in terms of involvement with gameplay, narrative, and social context elements. Gameplay measured engagement with the game's mechanics and rules using a five-item scale (Cronbach's $\alpha = 0.778$, $M = 5.82$, $SD = .73$) that included items such as, "*I was fully concentrated on reaching the goals of the mission*" (Calleja et al., 2016) and "*The rules of the game featured an optimal balance of difficulty and skills*" (Elson et al., 2014). Narrative involvement measured engagement with the overall theme of the game and story elements using a five-item scale. Example items included, "*At times, I felt transported into the thematic/story world*" (Green & Jenkins, 2014), and "*The game narrative fully captured my attention*" (Calleja et al., 2016). The items formed a reliable measure with high internal consistency (Cronbach's $\alpha = 0.895$, $M = 4.96$, $SD = 1.20$). Aesthetic involvement evaluated the influence of the material design of environmental board games, adapting a six-item measure used in the context of persuasive games (Thielsch & Niesenhaus, 2017). The validity of the items was empirically established in previous work to evaluate the aesthetic experience of visuals on the web (Thielsch & Niesenhaus, 2017). Rated from strongly disagree to disagree, the measure had a solid internal consistency (Cronbach's $\alpha = 0.861$, $M = 6.22$, $SD = .74$). Example item included, "*The color composition was attractive,*" "*The aesthetics of the layout seemed professionally designed,"* and "*The design of the game material went well with the theme."* The social experience of playing board games was captured in terms of the seven-item social involvement scale (Barbara, 2017)

(Cronbach's α = 0.772, M = 5.51, SD = .78) developed and validated for user experience of analog games. Sample items included, "*I felt connected to the other players while playing the game"* and "*Our actions depended on each other's actions."* All items were measured on a seven-point Likert scale ranging from strongly disagree = 1 to strongly agree = 7.

Results

To examine the entertainment experience from environmental board game, study 2 replicated the regression models for enjoyment and appreciation gratifications. Similar to study 1, hedonic and non-hedonic affect, and intrinsic needs were accounted for in both models. To inspect the influence of these dimension on player experience we submitted all dependent variables into separate models with enjoyment and appreciation as outcome variables. Results suggest distinct experience dimensions shaped enjoyment and appreciation for environmental board games.

Entertainment in Environmental Board Games

The regression model for enjoyment experience reported a correlation of R = .839 and R-square = .703 with 95% confidence interval [0.6178434, 0.7498317], F (11,233) = 50.162, $p < .001$ [see table 2.2 for specifics of the model]. The model explained 70.3% of the variance in enjoyment experienced for the study sample. The model for appreciation explained 67.2% of the variance in the experience of appreciation, with a correlation of R = .820 and R-square = .672 with 95% confidence interval [0.5802916, 0.7225414], F (11,233) = 43.467, $p < .001$ [see table 2.3 for specifics of the model]. Autonomy [$\hat{\beta}_1 = 0.184, SE(\hat{\beta}_1) = 0.045, t(233) = 4.085, p < .001$] and relatedness [$\hat{\beta}_1 = -0.11, SE(\hat{\beta}_1) = 0.03, t(233) = -3.729, p < .001$] were the two self-determination variables that significantly predicted enjoyment experience whereas only the insight [$\hat{\beta}_1 = 0.145, SE(\hat{\beta}_1) = 0.043, t(233) = 3.377, p < .001$] dimension was associated with appreciation of environmental board games. The competence dimension was not significant for either category of entertainment gratifications examined for this genre.

Table 2.1 Descriptive Statistics for Study 2

	Mean	SD	Min	Max	Skewness	Kurtosis
Enjoyment	6.1008	0.88935	1	7	-1.934	6.736
Appreciation	5.2684	1.04511	1	7	-0.676	0.689
Competence	5.5219	1.05408	1	7	-1.425	2.952
Autonomy	5.735	0.92512	2.33	7	-0.873	1.232
Relatedness	4.2814	1.41164	1	7	-0.411	-0.175
Insight	4.3607	1.27125	1	7	-0.368	-0.131
Arousal	5.5833	0.94614	1.33	7	-1.266	2.912
Positive Affect	5.8866	0.8803	1.33	7	-1.445	4.439
Negative Affect	2.0956	1.07682	1	6.33	1.341	2.112
Meaningful Affect	3.8907	1.2092	1	7	-0.217	-0.154
Challenge	5.0072	0.96875	1	7	-0.597	1.123
Hedonic Motivation	5.6516	0.81524	3.17	7	-0.559	-0.047
Eudaimonic Motivation	5.6926	1.04549	1.17	7	-1.339	2.597
Issue Interest	5.4003	1.19195	1	7	-0.962	1.299
Connectedness to Nature	4.7049	1.39016	1	7	-0.528	-0.138
Endogenous Reflective Thought	5.0789	1.03049	1.75	7	-0.588	0.346
Exogenous Reflective Thought	5.0074	1.29505	1	7	-0.557	0.123
Political Orientation	2.84	1.709	1	7	0.693	-0.51
Worries about Climate Change	5.5	1.56	1	7	-1.256	1.208
Perception of CC Severity	3.11	2.155	1	7	0.627	-1.145
CC is a Natural Process	4.27	1.605	1	7	-0.399	-0.674
CC is Anthropogenic	6.52	0.953	1	7	-3.161	13.321

In terms of affective states, hedonic pleasure was significantly associated with enjoyment both in terms of arousal [$\hat{\beta}_1 = 0.192, SE(\hat{\beta}_1) = 0.048,\ t(233) = 4.037,\ p < .001$] as well as positive affect [$\hat{\beta}_1 = 0.376, SE(\hat{\beta}_1) = 0.054,\ t(233) = 6.935,\ p < .001$], with the largest impact within the model. However, neither were associated with the appreciation experience.

Negative affect had an inverse significant impact on both enjoyment [$\hat{\beta}_1 = -0.229, SE(\hat{\beta}_1) = 0.042, t(233) = -5.457, p < .001$] appreciation [$\hat{\beta}_1 = -0.112, SE(\hat{\beta}_1) = 0.052, t(233) = -2.169, p < .05$] models. On the other hand, meaningful affect was only significant in predicting appreciation but had the strongest impact in among other statistically significant predictors [$\hat{\beta}_1 = 0.318, SE(\hat{\beta}_1) = 0.044, t(233) = 7.226, p < .001$]. Furthermore, challenge as an experience dimension significantly predicted appreciation but not enjoyment [$\hat{\beta}_1 = 0.145, SE(\hat{\beta}_1) = 0.057, t(233) = 2.566, p < .05$]. In terms of predilection towards entertainment experiences, only eudaimonic Motivation [$\hat{\beta}_1 = 0.224, SE(\hat{\beta}_1) = 0.043, t(233) = 5.188, p < .001$] had any significant impact on appreciation of environmental games. Hedonic motivations did not emerge relevant for either regression models.

Reflective Thought

The regression models for both endogenous and exogenous reflective thoughts explained roughly about 50% of the variance explained in reflective thoughts experienced by players while playing environmental board games. The regression model for endogenous reflective thought reported a correlation of R = .701 and R-square = .491 with 95% confidence interval [0.3712161, 0.5574034], *F* (11,233) = 20.432, $p < .001$ [see table 2.4 for specifics of the model] and the model for exogenous reflective thought reported a correlation of R = .712 and R-square = .507 with 95% confidence interval [0.3889468, 0.5724486], *F* (11,233) = 21.773, $p < .001$ [see table 2.5 for specifics of the model]. In line with extant literature on motivated information processing, factors associated with hedonic or pleasurable gratifications were not associated with cognitive elaboration, as measured in terms of reflective thought. However, due to the nature of the study

Table 2.3: Regression model examining the appreciation of environmental board games

	B	Std. Error	t	Sig.
(Constant)	1.287	0.568	2.267	0.024
Competence	-0.078	0.046	-1.706	0.089
Autonomy	0.033	0.055	0.598	0.55
Relatedness	0.06	0.036	1.636	0.103
Insight	**0.145**	**0.043**	**3.377**	**<.001**
Arousal	0.014	0.059	0.237	0.813
Positive Affect	0.037	0.067	0.55	0.583
Negative Affect	**-0.112**	**0.052**	**-2.169**	**0.031**
Meaningful Affect	**0.318**	**0.044**	**7.226**	**<.001**
Challenge	**0.145**	**0.057**	**2.566**	**0.011**
Hedonic Motivation	0.007	0.049	0.133	0.894
Eudaimonic Motivation	**0.224**	**0.043**	**5.188**	**<.001**

F (11,233) = 43.467, p<.001, R = .820 and R-square = .672

Table 2.4: Regression model predicting endogenous reflective thought

	B	Std. Error	t	Sig.
(Constant)	0.461	0.698	0.661	0.509
Competence	0.025	0.056	0.434	0.664
Autonomy	**0.205**	**0.068**	**3.008**	**0.003**
Relatedness	0.09	0.045	2.009	0.046
Insight	**0.126**	**0.053**	**2.391**	**0.018**
Arousal	0.001	0.072	0.013	0.99
Positive Affect	-0.064	0.082	-0.785	0.433
Negative Affect	0.035	0.064	0.543	0.587
Meaningful Affect	**0.119**	**0.054**	**2.202**	**0.029**
Challenge	**0.271**	**0.07**	**3.884**	**<.001**
Hedonic Motivation	-0.01	0.061	-0.157	0.875
Eudaimonic Motivation	**0.159**	**0.053**	**2.997**	**0.003**

F (11,233) = 20.432, p<.001, R = .701 and R-square = .491

Table 2.5: Regression model predicting exogenous reflective thought

	B	Std. Error	t	Sig.
(Constant)	1.899	0.863	2.201	0.029
Competence	-0.029	0.07	-0.41	0.682
Autonomy	-0.058	0.084	-0.683	0.496
Relatedness	**0.24**	**0.055**	**4.325**	**<.001**
Insight	**0.361**	**0.065**	**5.516**	**<.001**
Arousal	0.018	0.089	0.201	0.841
Positive Affect	-0.007	0.102	-0.067	0.947
Negative Affect	-0.052	0.079	-0.667	0.506
Meaningful Affect	**0.196**	**0.067**	**2.924**	**0.004**
Challenge	-0.134	0.086	-1.55	0.123
Hedonic Motivation	-0.051	0.075	-0.684	0.495
Eudaimonic Motivation	**0.219**	**0.066**	**3.339**	**<.001**

F (11,233) = 21.773, p<.001, R = .712 and R-square = .507

non-significance of these variables in the current models cannot be linked to their irrelevance to elaborate processing during board game play. But both self-determination variables and meaningful emotions played a significant role in influencing reflective thoughts about both type of reflective thoughts.

Motivation for meaningful entertainment in general, and satisfaction of insight needs and experiencing meaningful emotions during play were common predictors for both categories of reflective thought. However, experience of autonomy [$\hat{\beta}_1 = 0.205, SE(\hat{\beta}_1) = 0.068, t(233) = 3.008, p < .005$] was only significant for reflective thoughts about the game content and play experience while the relatedness dimension [$\hat{\beta}_1 = 0.240, SE(\hat{\beta}_1) = 0.055, t(233) = 4.325, p < .001$] significant for contemplations about the implications about the games' themes

outside of the game world. Experiencing insight [$\hat{\beta}_1 = 0.126, SE(\hat{\beta}_1) = 0.053, t(233) = 2.391, p < .05$] had a weaker effect on endogenous reflective thought than exogenous ones [$\hat{\beta}_1 = 0.361, SE(\hat{\beta}_1) = 0.065, t(233) = 5.516, p < .001$]. Meaningful emotions also predicted both endogenous [$\hat{\beta}_1 = 0.119, SE(\hat{\beta}_1) = 0.054, t(233) = 2.202, p < .05$] and exogenous [$\hat{\beta}_1 = 0.196, SE(\hat{\beta}_1) = 0.067, t(233) = 2.924, p < .005$] reflective thought. Although hedonic entertainment motivation did not impact reflective thought, participants' interest in meaningful or truth-seeking entertainment led to both endogenous [$\hat{\beta}_1 = 0.159, SE(\hat{\beta}_1) = 0.053, t(233) = 2.997, p < .005$] and exogenous [$\hat{\beta}_1 = 0.219, SE(\hat{\beta}_1) = 0.066, t(233) = 3.339, p < .001$] contemplations. Most importantly, in keeping with the appreciation of environmental board games experience of emotional and cognitive challenges influence endogenous reflective thought [$\hat{\beta}_1 = 0.271, SE(\hat{\beta}_1) = 0.07, t(233) = 3.884, p < .001$] but did not lead to introspection beyond the game.

Issue-Interest and Connectedness to Nature

Finally, the study was interested in exploring if entertainment outcomes from playing environmental board games could incite interest in environmental issues and emotions related to nature. For this examination participants' environment related inclinations were also submitted for a regression evaluation. Post-play issue interest as a result of the entertainment experience was established through a significant linear model with a correlation of R = .808 and R-square = .652 with 95% confidence interval [0.5563353, 0.7047878], F (11,233) = 39.548, $p < .001$ [see table 2.6 for specifics of the model]. Both enjoyment [$\hat{\beta}_1 = 0.177, SE(\hat{\beta}_1) = 0.061, t(233) = 2.913, p < .005$] and appreciation [$\hat{\beta}_1 = 0.420, SE(\hat{\beta}_1) = 0.073, t(233) = 5.717, p < .001$]

were significant predictors of environmental interest with appreciation having a much stronger effect. An equally strong impact was exhibited by

exogenous reflective thought [$\hat{\beta}_1 = 0.400, SE(\hat{\beta}_1) = 0.052, t(233) = 7.66, p < .001$]. In terms of participants' personal biases only beliefs about climate change's anthropogenic nature [$\hat{\beta}_1 = 0.168, SE(\hat{\beta}_1) = 0.057, t(233) = 2.959, p < .005$] had a significant relationship with environmental games inciting interest in thematic topics beyond the game. However, political orientation or climate anxiety or perception of the severity of the impact of climate change was not a significant factor. The analysis for connectedness to nature reported a significant model with a correlation of R = .834 and R-square = .695 with 95% confidence interval [0.6081083, 0.7428126], *F* (11,233) = 48.069, $p < .001$ [see table 2.7 for specifics of the model]. However, only appreciation of the game appreciation [$\hat{\beta}_1 = 0.612, SE(\hat{\beta}_1) = 0.08, t(233) = 7.636, p < .001$] and exogenous reflective thought [$\hat{\beta}_1 = 0.536, SE(\hat{\beta}_1) = 0.057, t(233) = 9.41, p < .001$] significantly predicted feelings of attachment with nature.

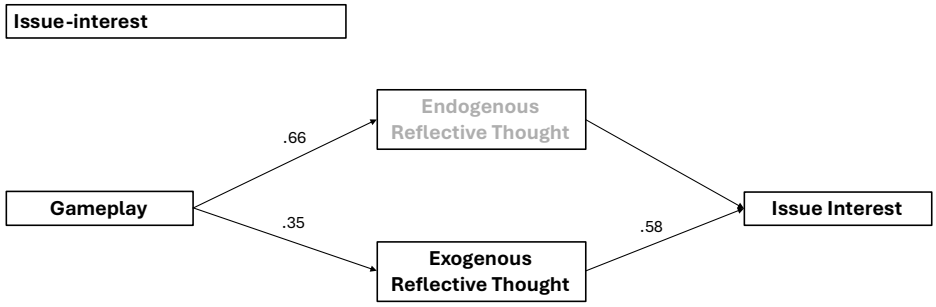
Mediation Analysis

Using the Hayes PROCESS macro (Model 4) in SPSS a parallel mediation analysis was run performed with 5,000 resamples (Hayes, 2022) with environmental Issue Interest and feelings of Connectedness to the Nature as the outcome variables. The independent variables represent participants' engagement with four game elements: gameplay, narrative elements, involvement with the aesthetics design of games, and social involvement during play. There are two mediators. First, endogenous reflective thought that evaluates players contemplation about the game itself and the play experience, whether and how the game led them to re/appraise their play style or made them reflect on their understanding of the game's topic/theme/mechanic. The

second mediator variable exogenous reflective thought measured if and whether playing the environmental games that the participants reviewed provoked thoughts about the environmental themes presented in the game and the implications of game's environmental thematic topic outside of the game.

Gameplay had a moderate but significant direct effect on environmental issue interest (direct effect = 0.31, SE = 0.0786, 95% CI = [0.1515, 0.4613]). Exogenous reflective thoughts showed a significant mediation effect (indirect effect = 0.2012, SE = 0.0721, 95% CI = [0.0671, 0.3473]) and a strong direct effect (direct effect = 0.58, SE = 0.05, 95% CI = [0.4854, 0.6707]). Although endogenous reflective did not have a significant effect, gameplay had a strong total impact on environmental issue interest through reflective thought (effect = 0.58, SE = 0.10, 95% CI = [0.3851, 0.7683]) including significant total indirect effect (effect = 0.27, SE = 0.09, 95% CI = [0.1107, 0.4478]). Gameplay did not have a direct influence on feelings of connectedness to nature. Mediation effect emerged from exogenous reflective thought only with a significant indirect (indirect effect = 0.28, SE = 0.10, 95% CI = [0.0985, 0.4741]) and a strong direct effect (direct effect = 0.80, SE = 0.05, 95% CI = [0.7001, 0.9071]) on nature connectedness. Gameplay had a significant total effect on nature connectedness (total effect = 0.35, SE = 0.12, 95% CI = [0.1189, 0.5886]) with a significant total indirect effect (indirect effect = 0.31, SE = 0.11, 95% CI = [0.1139, 0.5260]).

Figure 3.1: Gameplay elements predicting issue interest with reflective thoughts as mediator variables



Direct effect = 0.31, SE = 0.08, 95% CI = [0.1515, 0.4613]

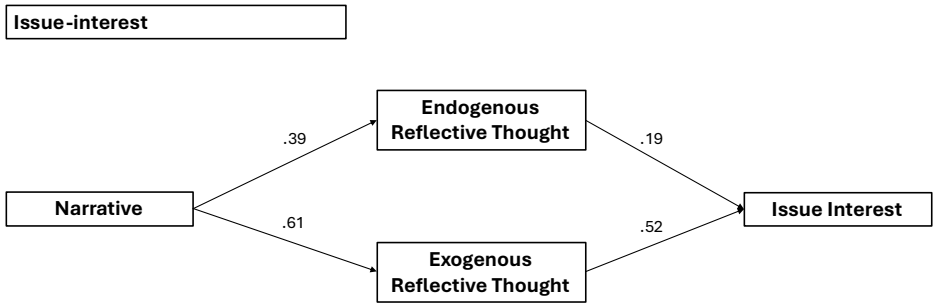
Indirect effect = 0.27, SE = 0.09, 95% CI = [0.1107, 0.4478]

Total effect = 0.58, SE = 0.10, 95% CI = [0.3851, 0.7683]

Narrative elements did not have a direct effect on issue interest. However, exogenous reflective thought significantly influenced the outcome indirectly (indirect effect = 0.32, SE = 0.0520, 95% CI = [0.2264, 0.4285]) and with a strong direct effect (direct effect = 0.52, SE = 0.05, 95% CI = [0.4135, 0.6231]). So did endogenous reflective thought, with a small but significant indirect (indirect effect = 0.08, SE = 0.03, 95% CI = [0.0160, 0.1414]) and direct effect (direct effect = 0.19, SE = 0.06, 95% CI = [0.0712, 0.3144]). There was a significant total effect (effect = 0.50, SE = 0.05, 95% CI = [0.3909, 0.6068]) and an indirect effect (indirect effect = 0.39, SE = 0.06, 95% CI = [0.2897, 0.5105]) of narrative elements on environmental issue interest. Therefore, there was a full mediation effect. However, narrative elements had a significant direct impact on nature connectedness (direct effect = 0.25, SE = 0.06, 95% CI = [0.1389, 0.3615]). A substantial mediation effect was observed (total indirect effect = 0.43, SE = 0.06, 95% CI = [0.3179, 0.5523]), predominantly through exogenous reflective thought. While endogenous reflective thought's impact was not significant, exogenous reflective thought significantly influenced nature connectedness (indirect effect = 0.43, SE = 0.05, 95% CI =

[0.3286, 0.5395]). A strong total effect of the mediation model was observed (total effect = 0.68, SE = 0.06, 95% CI = [0.5612, 0.7969]) on nature connectedness.

Figure 3.2: Narrative elements predicting issue interest with reflective thoughts as mediator variables

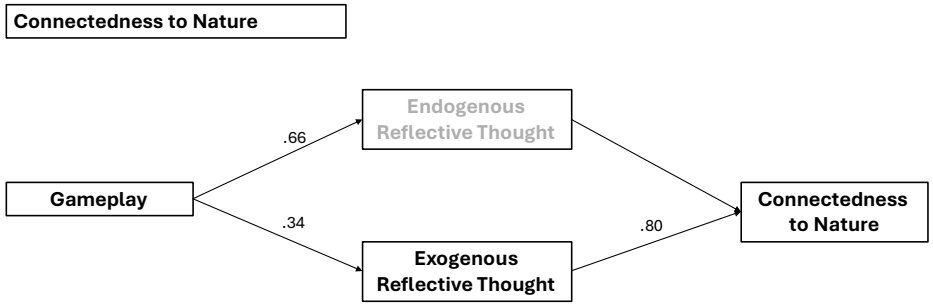


Direct effect = n/a
Indirect effect = 0.39, SE = 0.06, 95% CI = [0.2897, 0.5105]
Total effect = 0.50, SE = 0.05, 95% CI = [0.3909, 0.6068]

Aesthetic design had a significant direct impact (effect = 0.22, SE = 0.07, 95% CI = [0.0785, 0.3668]) on environmental issue interest. Exogenous reflective had a significant indirect (indirect effect = 0.16, SE = 0.06, 95% CI = [0.0378, 0.2899]) and direct effect (direct effect = 0.57, SE = 0.05, 95% CI = [0.4726, 0.6596]). Endogenous reflective had a significant indirect (indirect effect = 0.07, SE = 0.04, 95% CI = [0.0095, 0.1518]) and direct effect (direct effect = 0.17, SE = 0.06, 95% CI = [0.0426, 0.2875]). Aesthetic involvement had a significant total (total effect = 0.45, SE = 0.10, 95% CI = [0.2555, 0.6461]) and indirect effect (indirect effect = 0.23, SE = 0.08, 95% CI = [0.0859, 0.3955]) on issue interest. Aesthetic design did not have direct impact on connectedness to nature. Only exogenous reflective thoughts had a mediation effect (indirect effect = 0.22, SE = 0.09, 95% CI = [0.0597, 0.4212]) and a direct effect (direct effect = 0.80, SE = 0.05, 95% CI = [0.7007, 0.9061]). A significant total (total effect = 0.36, SE = 0.12,

95% CI = [0.1266, 0.5925]) and indirect effect (total indirect effect = 0.24, SE = 0.10, 95% CI = [0.0638, 0.4456]) was observed.

Figure 4.1: Gameplay elements predicting connectedness to nature with reflective thoughts as mediators



Direct effect = n/a

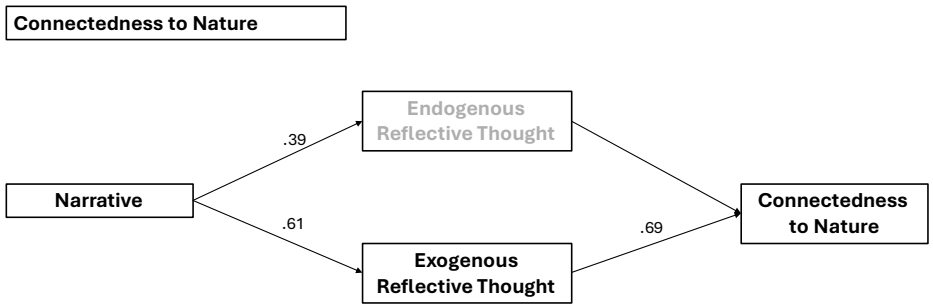
Indirect effect = 0.31, SE = 0.11, 95% CI = [0.1139, 0.5260]

Total effect = 0.35, SE = 0.12, 95% CI = [0.1189, 0.5886]

Social involvement had a direct effect significant on environmental issue interest (effect = 0.15, SE = 0.07, 95% CI = [0.0064, 0.2920]). Exogenous reflective thought had a significant indirect effect (indirect effect = 0.13, SE = 0.06, 95% CI = [0.0007, 0.2481]) and a direct effect (direct effect = 0.17, SE = 0.07, 95% CI = [0.0397, 0.2960]). Endogenous reflective thought had a significant indirect effect (indirect effect = 0.09, SE = 0.04, 95% CI = [0.0056, 0.1762]) and a direct effect (direct effect = 0.57, SE = 0.05, 95% CI = [0.4781, 0.6679]). Social involvement had a significant total effect (effect = 0.36, SE = 0.10, 95% CI = [0.1725, 0.5483]) and an indirect effect (effect = 0.21, SE = 0.08, 95% CI = [0.0447, 0.3767]). The relationship between the independent and dependent variables were partially mediated Social interaction during play did not have a direct impact on feelings of connectedness to nature when controlling for the mediating variables. Only exogenous reflective thoughts had a significant direct impact on nature connectedness (direct effect = 0.80, SE = 0.05, 95% CI = [0.6972, 0.9046]) but the indirect effect

was not significant. While the total effect of social involvement was not significant the total indirect effect was significant (effect = 0.21, SE = 0.10, 95% CI = [0.0159, 0.4024]).

Figure 4.2: Narrative elements predicting connectedness to nature with reflective thoughts as mediators



Direct effect = 0.25, SE = 0.06, 95% CI = [0.1389, 0.3615]
Indirect effect = 0.43, SE = 0.06, 95% CI = [0.3179, 0.5523]
Total effect = 0.68, SE = 0.06, 95% CI = [0.5612, 0.7969]

All figures for Study 2 are presented in Appendix B.

Discussion

Significance patterns of variables in the entertainment experience of environmental games were generally consistent with theoretical expectations with caveats that are representative of the case for this specific genre, the sample of respondents, and the games reviewed. The specific sample characteristics, such as liberal political ideology, perception of the anthropogenic nature of climate issues, concerns about the climate, and most importantly, board game literacy, likely influenced the nature of their engagement with environmental games as well as the manner they reported their experiences in the survey. The games reported also tend to lean towards more cooperative to semi-cooperative play styles and mechanics. Although player demographics in the study were similar, whether participants played the game with other similar-minded players remains unknown. As a result, the hedonic, non-hedonic, and affective gratifications were distinct from the general board game play experience. Besides revealing idiosyncrasies of environmental board games findings from the results of the second study exhibit how the same variables that predicted appreciation of environmental board games also predicted reflective thoughts about the game as well as its themes' real-world implications, suggesting that appreciation of entertainment content can be associated with cognitive elaboration.

Consistent with theoretical assumptions in the extant literature, variables related to hedonic affect were significantly associated with entertainment. The enjoyment of environmental board games stemmed from a combination of positive affect and arousal, and satisfaction of autonomy needs. Pleasurable affect had a strong positive effect, explaining a large unique variance in the overall model. Experiencing cognitive and emotional arousal during play was

also significant, indicating that commercially available environmental board games are just as fun and exciting. Theoretically, the coincidence of the significance of positive affect and arousal points to a demanding nature of environmental board games similar to a low to medium interactivity digital counterpart. Interaction with environmental simulation in board games can actually be a pleasurable activity despite the deliberate effort required to unpack and operationalize the themes and the mechanics of the games. Unlike general board games, the non-significance of an inverse relationship of enjoyment with meaningful affect may suggest that heavy themes such as environmental conservation issues may actually be fodder for collaborative intellectual enjoyment. Sample characteristics and games reviewed constrain the demographics of players to which this assumption may be applicable. That is, the manual effort required to engage players' cognitive processes when they manage the operations of the board game seems to provide a satisfying and active experience. The co-occurrence of positive and meaningful affective states again hints towards the plausibility of the assumption of hedonic and eudaimonic cycles during play sessions. A moderate level of hedonic entertainment experience is necessary in order to enable their eudaimonic counterparts, specifically when it comes to political media content (Roth et al., 2014; Roth et al., 2017). As emphasized by Roth et al. (2017), this is in line with previous research in positive psychology (e.g., Waterman, 1993; Waterman, Schwartz, & Conti, 2008), which assumes hedonic well-being to be an essential precondition of eudaimonic well-being.

The negative association of the self-determination variable of relatedness with enjoyment was most curious. As the games reviewed were cooperative in nature, players' individual performance was reliant on others. Thus, disagreements in making moves or differences in how to play the game can thwart feelings of being connected with others. Maintaining cooperative

behavior, e.g., implicit rules (Bergström, 2010), while gaining an understanding of the rules and learning to collaborate to play the game may interfere with the enjoyment experience. Further, exhibiting the nuanced nature of environmental board game play, experiencing any degree of competence did not emerge as a significant precondition for enjoyment or appreciation of environmental board games. Again, this could be attributed to the fact that the majority of the games reported in the study were semi-cooperative or cooperative in nature. Thus, players' individual competence in playing the games may have been impacted by overall group competence of playing against the game and not against each other.

The significance of negative affect in the appreciation experience suggests meaningful experiences in environmental simulations can involve negative affective states without interfering with eudaimonic gratifications. Interestingly, the mean for this composite variable was on the lower end, meaning players did not perhaps have negative experiences with the games they reported. Rather, play experiences leading to negative emotions (e.g., quality of mechanics, narratives) may interfere with appreciation of environmental board games. Given the player experience levels of the sample, negative encounters may steer them away from allocating substantial resources to be able to appreciate the game, implying that sub-par gaming experience may fail to engage players in any meaningful or thought-provoking manner. The low mean or the inverse significance of negative affect does not necessarily imply the kind of negative emotions generally discussed in environmental communication literature but may simply imply participants treated environmentally themed games as other fun and pleasurable games. Combined with the cooperative nature of the games, it makes sense that players did not appreciate negative emotions when playing with others - which actually helps explain the inverse significance of relatedness for enjoyment. This is distinct from the findings about general board

games, where appreciation was associated with positive affective states alongside moving emotions when playing competitively. However, neither arousal nor positive affect was associated with the appreciation of these games.

Appreciation of environmental board games was found to be primarily associated with experiencing satisfaction of insight needs. That is, environmental board games can and do deliver the experience of discovery of insights in meaningful ways. The challenges these games present may conflict with player expectations – e.g., unable to beat the game due to high difficulty levels or complexity of dynamics of the simulation. As a result, insights may arise from challenging experiences which was also a significant factor in the model predicting appreciation. This is consistent with literature on challenging media experiences (Hartmann & Bartsch, 2017). In line with theoretical expectations, narrative elements had a direct influence on appreciation, as did the aesthetic elements (Bopp et al., 2021), which is a novel finding for the study. The satisfaction of insight needs mediated every model in combination or association with other SDT variables based on the game element. Generally, for the medium, the significance of the relationship between insight needs and appreciation provides converging evidence with study 1 in confirming the relevance of the deliberativeness associated with engagement that is associated with the meaning-making process during play and can be particularly satisfying for players. Of importance to this argument is the significantly large impact of meaningful affect in the appreciation experience suggesting environmental board games may indeed be sites for meaningful experience, at least for players with similar demographics as the sample of the study. The larger effect size than the first study also suggests the specific environmental theme may be particularly meaningful for certain groups of board game players.

Enjoyment of environmental board games was linked to all game elements and mediated via all the SDT variables. Only the mediation models linking gameplay and aesthetic elements of environmental games with enjoyment partially mediated the relationship. Together with the large effect sizes of gameplay on the SDT variables, it highlights the crucial importance of environmental mechanics in the enjoyment process. The associations between social context and narrative elements with enjoyment, however, are fully mediated by the intrinsic need satisfaction variables, implying an enjoyment experience independent of the direct influence of the two game elements. It may be the case that the players are more interested in mechanics, strategies, and resource management (as is common for Euro-style games) that narrative and social interactions' influence is superseded by gameplay. Interestingly, however, the appreciation of environmental board games was not directly influenced by game mechanics or the social context of play but rather by narrative elements, which is in line with extant literature.

Relatedly, eudaimonic motivations for entertainment experience, in general, were also a strong predictor of appreciation, which further qualifies the meaningful impact of environmental board games on a very specific type of audience. However, none of the motivation variables were significant for the enjoyment experience. This was different from general board game players, where hedonic motivations were significant for enjoyment, but none were significant for appreciation, suggesting for general games, participants seemed to be ending up finding meaningful experiences regardless of whether they were looking for it or not. The non-significance of either variable for enjoyment may also be due to sample-related issues, as participants already came with a high degree of interest in board games, to begin with. As opposed to study 1, participants who played board games in general for fun exhibited a

significant hedonic motivation. Thus, it also made sense that competence and autonomy had large, unique variances in explaining the enjoyment experience.

Reflective Thought

Factors that emerged as significant in the regression model for endogenous reflective thought were consistent with theoretical expectations. Feelings of being challenged had the largest impact, suggesting that reflective thoughts about the game were generally influenced by the difficulty level – when players felt cognitively challenged, as well as when they experienced conflicts with their mental models of gaming conventions, that is, when their play strategies were not successful. Specifically, the significant association of the sense of autonomy further substantiates that moments that aided or hindered independent functioning during play facilitated reflection about the game. Discovering insights influenced thoughts about the game and players' choices that led to the moment. On the other hand, choices that helped negotiate challenges experienced may have led to new insights about their understanding of the game. Similarly, reflections about the game and adapting to the game by thinking through play choices aided in restoring any hindrance to feelings of autonomy. In terms of the affective dimensions associated with play, meaningful emotions experienced during play led players to think about the game, how their actions shaped the play, and vice-versa. Suggesting that environmental board games can incite thought-provoking reflections about the games' simulations by facilitating meaningful emotions. However, having a predisposition to think about media entertainment deeply was a necessary factor for players to engage in contemplative information processing, as eudaimonic motivations played a significant role in the regression model.

Reflective thoughts about the real-world implications of the games' environmental topics and themes were primarily reliant upon players' experience of the self-determination concepts. First, the insight dimension had the largest impact on contemplations about the broader implications of the environmental theme addressed by the game. As players gained insight about the environment from the game simulation, it allowed their reflections to move beyond the game. The second important factor was how connected they felt to their character roles, as well as the associated tasks and goals they had to perform in that role. Unsurprisingly, moving emotions during play provoked thoughts about the implication of simulation and the behaviors players engaged in in terms of their real-world repercussions. Again, eudaimonic motivations had a strong impact on whether players' reflections would go beyond the game to contemplate the significance of environmental topics for society at large.

The fact that challenge was not significant for exogenous reflective thought was curious because, theoretically, environmental communication has faced difficulties with challenging emotions that the audience experiences during exposure. However, in this case, the influence of challenging experiences on reflective contemplations during exposure was limited to content. It may be because the experience of challenge was less related to the negative emotions discussed in environmental communication literature and limited to how the environmental games subverted players' expectations about the game and the outcomes of their own play strategies in dealing with the difficulty. This can be vital, as our sample characteristics include a high level of literacy of the medium. Despite this, this pattern of challenging experiences may speak to the unique nature of the design of the simulations and interactions in environmental board games. Popular press literature and game reviews would substantiate this notion that some environmental games, particularly the ones that simulate climate change-related crises and are

developed to maintain scientific accuracy, can be quite difficult to win over and require multiple plays to gain competency over the dynamics of the play. Together, the endogenous and exogenous models could explain the full range of variances in reflective thoughts experienced by players, with each model explaining roughly fifty percent of the variance explained for contemplative reflections reported by players. For both models, satisfaction of the insight needs, experiencing meaningful emotions and eudaimonic entertainment motivations had a significant impact.

Issue Interest and Nature Connectedness

Whether players were intrigued about the environmental issue or topic focused on the games' themes primarily predicted by an appreciation of the game and the degree of reflective thought outside of the game world, they experienced. This finding establishes the association of appreciation of entertainment content and reflective thoughts about it in the context of environmental board games, similar to the extant literature on political entertainment. It also indicates that appreciation of media entertainment can be associated with elaborate forms of cognitive processing. That is, experiencing meaningful or moving emotions does not interfere with rational scrutiny of media content. In fact, when complemented with real-life beliefs regarding the topic of the game, affective states associated with appreciation experiences may aid in contemplative reflection even beyond the entertainment context. Enjoyment was also significant in predicting issue interest but had a smaller impact than appreciation. Despite this, it may be imperative to experience some degree of enjoyment that facilitates affective resources required to elaborate processing, particularly when content demands effortful processing and/or involves challenging emotions. The belief that climate change is an anthropogenic process was

also significant, with equal contribution to predicting issue interest as enjoyment. For the specific demographics of the study's sample, it makes intuitive sense. Given the importance of connections with players' in-game character roles in provoking thoughts about the environmental issue in real life, the sense of responsibility they feel in reality about the environment is relevant to being interested in the topics. The appreciation experience and reflective thought about the real-world implications of the games' environmental themes had a strong, significant impact on whether the experience led the players to feel a connection toward nature. Both variables exhibited fairly large effect sizes. And the model had a decent explanatory capacity to predict connectedness to nature. However, the non-significance of all other entertainment variables or factors relevant to personal attitudes about the environment may imply that some of this effect may emerge from participants' already existing favorable attitudes towards the environment.

Game Elements and Down-stream Effects

In terms of identifying individual board game elements' influence on downstream effects of playing environmental board games via cognitive elaboration, the mediation analysis revealed the direct and indirect effects of mechanics, narrative, social context, and aesthetic elements on issue interest and connectedness to nature. Gameplay had the largest direct effect on inciting interest in environmental issues, followed by game aesthetics and social involvement. Interestingly, narrative elements did not exhibit any direct effect. With the exception of endogenous reflective thought not having any mediation effect on the relationship between gameplay and issue interest, all other game elements significantly predicted environmental interest mediated by both exogenous and endogenous reflective thoughts players experienced during play. This might indicate that endogenous reflections about gameplay might be more

introspective and about players' own play styles, strategies, and planning adaptive measures to perform game tasks. On the other hand, the overall narrative theme, design of play materials, and social interactions may support discursive attention on environmental topics as issues relevant both within and outside of the game. The mediation model on the association between narratives and issue interested was fully mediated by reflective thoughts as there was no direct effect of this game element of environmental interests. The rest of the mediation models for issue interest were partially mediated by reflective thoughts. On the other hand, gameplay, aesthetic experience, and social context have no direct effect on nature connectedness in the mediation model. Only narrative elements had a significant direct impact on this variable. Only exogenous reflective thought mediated the relationship between game elements and nature connectedness.

V. OVERALL DISCUSSION

Using two empirical investigations, the study examines the affective and psychological processes that drive audiences to engage in contemplative thoughts about media entertainment. Specifically, the examination focused on emotions arising from playing analog games with other collocated co-players and considered the role of hedonic (pleasurable affect and arousal), non-hedonic (intrinsic psychological need satisfaction), and eudaimonic (meaningful affect) gratifications in inciting reflective thought. The evidence suggests appreciation of board games as a result of a combination of psychological and emotional gratifications can provoke reflective thought and rational scrutiny.

The two studies reported in this thesis trace the connection between intrinsic need satisfaction, affective states, and entertainment experience while playing board games. The investigation followed contemporary approaches to studying meaningful experiences in video games relying on literature from primarily media psychological tradition (e.g., Oliver et al., 2016). It contributes to the area of research by introducing the context of board games. Borrowing from game studies and human communication interaction research, it analyzes the intrinsic features of board games and links them to players' experiences of meaningfulness, identifying mechanisms and describing the idiosyncrasies of the media in facilitating such a phenomenon (e.g., Oliver et al., 2016; Klimmt & Possler, 2019). Given the prominence of self-determination theory (Ryan & Deci, 2000) and its extensive application in contemporary gaming research (Tyack & Mekler, 2020), the theoretical lens was justified for this examination. While similar and comprehensive models specific to digital video games have been developed, they are

fundamentally rooted in the SDT framework. This approach also allowed for exploratorily scrutinizing an area without much prior research to follow.

Study 1 examined the formation of entertainment experience in analog media, specifically addressing two primary questions: how enjoyment and appreciation of board games are related to hedonic, non-hedonic, and eudaimonic gratifications, and how do board game elements influence the experience of enjoyment and appreciation? Overall, findings exhibit a distinct salience of intrinsic need satisfaction and meaningful affect for hedonic and eudaimonic outcomes. Consistent with theoretical expectations, the social context component of collocated co-play in board games had the strongest effect on enjoyment. Also, contrasting appreciation in digital games – involvement with gameplay influenced more meaningful emotions than narratives, suggesting analog interactivity's shortcomings in delivering compelling narratives. At the same time, the negative significance of narrative elements in association with enjoyment indicates an interference of tasks required to understand and manifest the thematic plot in the enjoyment process. That is, the additional effort required in board games may negatively impact enjoyment when narrative elements become too complex to process.

The relationship between affective states and enjoyment provides evidence for our findings' alignment with extant knowledge. Similarly, the association of competence and autonomy with enjoyment resonates with current literature defining enjoyment and further speaks to the fit of the data to the exploratory model. Our findings exhibit distinct patterns of needs of satisfaction for enjoyment and appreciation experience during playing board games and point to various idiosyncrasies of the board game medium in the formation of meaningful experiences through relatedness needs. The intrinsic feature of collocated co-play played a

substantial role in influencing enjoyment. The satisfaction of autonomy and competence needs is primarily related to enjoyment from play. The non-discreet nature of narrative elements in board games may not be as conducive to enjoyable experiences of identification and transportation, and it exhibits a negative association with enjoyment. However, as indicated by the indirect effects in the mediation model, narrative elements can still aid in the experience of autonomy and competence in predicting enjoyment as they support the understanding of the game systems by explicating rules and adding meaning to the tasks. Gameplay and social context appeared to be key factors associated with the experience of appreciation in board games, more so than narrative elements. This is a distinct finding from previous literature where narrative is identified as influencing meaningful responses. Hedonic enjoyment and non-hedonic appreciation can be distinguished based on the dimensions of need satisfaction. While autonomy and competence needs mediated enjoyment, satisfaction of relatedness and insight needs were imperative for appreciation in addition to autonomy and competence. This indicates that satisfaction of autonomy and competence may be sufficient enough to account for enjoyment beyond arousal and positive affect. However, for an experience to achieve a deeper level of engagement that facilitates appreciation of the meaning produced by the content, it may require satisfaction of additional needs for relatedness and insight.

Study 2 presented evidence suggesting that environmental board games have the potential to provide players with meaningful insights and discoveries. The challenges presented by these games, such as high difficulty levels or complex dynamics, may lead to unexpected insights and contribute to the overall appreciation of the game. These in-game challenges can also instigate reflective thought about the game as well as the broader implications of the environmental system presented in the game. Study 2 provides converging evidence with Study 1 confirming

that deliberativeness associated with board game play can facilitate a thought-provoking meaning-making process that can be satisfying for players. However, meaningful experiences in environmental board games were also reliant on the truth-seeking entertainment motivations of players.

Positive affect explained a larger variance in enjoyment in Study 1, while arousal was not significant. Both hedonic needs were significant in study 2 accounting for a fairly large unique variance in enjoyment experience in environmental board games. While this may initially imply that board games are generally not as demanding to player actions and thus may not satisfy arousal needs (Tamborini et al., 2011), a closer look at the distinct sample demographics and types of games participants reviewed in the study reveals the idiosyncrasies. Interestingly, the experience of competitive board games seemed less arousing to players than cooperative games. Competence accounted for both enjoyment and appreciation experiences for general board game players playing competitive games. In contrast, it was not a significant factor for more experienced players, who reported playing cooperative environmental games despite experiencing a fairly high level of challenge that was related to the appreciation of the game as well as reflective thoughts about the gameplay. On the other hand, experienced players' arousal needs were satisfied, which was related to enjoying cooperative games. However, the specific environmental theme of board games was a topic of interest that this sample population pursued. Thus, board game literacy may contribute to the finding of divergent experiences of player demand exerted by different types of games. Together, findings from the two studies demonstrate that board games exert a substantial degree of user demand on players and that analog media can facilitate a compelling enough simulated environment for players to manipulate and feel a sense of effectance (Tamborini et al., 2011). The nature of the interaction, thematic tropes, and player

experience with the medium draws the boundary conditions for the potential entertainment phenomenon.

Board games can and do provide rich, meaningful experiences to players. These non-hedonic gratifications are associated with both self-determination variables as well as eudaimonic affective responses. This examination allowed the scrutiny of the nuances social contexts add to the formation of hedonic or eudaimonic enjoyment. The evidence presented suggests the relevance of self-determination theory in explaining entertainment experience in analog media as well. Autonomy and competence can reliably predict enjoyment from analog play. For meaningful experience to emerge, the need satisfaction of insight and relatedness is crucial. Form features of the medium are related to entertainment similar to digital video games. Gameplay mechanics and collocated co-play elements reliably influenced SDT variables. However, narrative elements exhibited different patterns of satisfaction. The analog nature of the board game medium interferes with the discreet experience of narrative flow. So, relatedness from narrative elements may not occur reliably, especially for games without story characters. However, narrative elements remain key for meaning-making and inferring insights. The social context of competition or cooperation within players varies in the extent to which players feel connected to each other or experience effectance. Competitive play consistently facilitates satisfaction of competence but seems to interfere with relatedness experience. On the other hand, cooperative play may interfere with finding a sense of competence or feeling effective. The need for competence was not a significant factor for the sample of environmental board games, which were dominantly cooperative in nature.

Players generally come to board game play with a substantial motivation for hedonic pleasure, fun, and enjoyment. However, they can come across meaningful experiences regardless of whether they are looking for one. On the other hand, for thought-provoking experiences from board gameplay that go beyond the game world, eudaimonic motivations are an important criterion. Thus, whether environmental board games can influence reflection about the game itself or the play experience or even broader implications of the game content in the real world – is contingent upon players having a predilection towards seeking meaningful experience. While several factors influence contemplation about the content itself, certain experiences may lead to thinking about the broader implications of the theme of the content. Ultimately, the current evidence supports the assumption that appreciation of media entertainment is associated with cognitive elaboration of and about the content as well as its broader impact. Motivation for the consumption of serious forms of entertainment, as well as finding pleasures in dwelling truth-seeking and challenging media engagement, is key for cognitive elaboration. Endogenous reflections, that is, thoughts about the game content, are more driven when players feel challenged or play conventions and general expectations are thwarted by the game (Mekler et al., 2018; Whitby et al., 2019). When players are faced with a challenging moment and one of discovery of insights that have eluded the exposure thus far, players tend to contemplate on the game state, their own strategies, and plan to adapt play accordingly. Experiencing a sense of autonomy in navigating the game rules and independent functionality seems to be a precursor for this process. However, exogenous reflections, thoughts related to the game contents' real-world repercussions seem to be linked to meaningful emotions experienced during play, along with discovery of insights and feeling connected to other players. Discovery of insights plays a stronger role in this process, explaining the largest unique variance in the regression model. That

is, the thematic rhetoric emerging from play and the strength of the ludic engagement to reveal that is crucial for issue elaboration. However, inciting interests about the subject matter of an entertainment experience relies on both enjoyment and appreciation of the experience as well as reflective contemplation about the content.

Despite early assumptions of these needs in terms of a hierarchical model where hedonic and non-hedonic needs were placed as lower and higher order gratifications (Vorderer, 2009), empirical evidence from subsequent studies have established hedonic and non-hedonic needs predicting enjoyment from media content lie on a continuum, co-occur, overlap and may arise in layers and cycles. That is, they are independently able to predict enjoyment from and appreciation of entertainment as well as synergically inform the experience of meaningfulness. For instance, autonomy and competence, together with arousal and affect, can predict enjoyment of media content while independently explaining unique variances in entertainment ratings (Tamborini et al., 2011). In fact, recent continuum models of entertainment emphasize the importance of considering enjoyment during play in terms of hedonic and eudaimonic cycles (e.g., Possler et al., 2023). That is, a certain degree of hedonic pleasure may be required to get the players engaged. And multiple cycles of this pleasurable experience could exist as players overcome challenges at different levels (Bopp et al., 2018). As a result, the sense of effectance over game challenges may aid in the satisfaction of autonomy and competence, complementing the hedonic cycles. But when an engagement also satisfies players' need for relatedness and insights, players start to experience the eudaimonic cycle. This assumption aligns well with how media enjoyment is conceptualized as layered experiences where audiences can traverse through cycles of casual and elaborative processing depending primarily on the affective states they endure during entertainment exposure (Bartsch & Oliver, 2011).

The immediate feedback loops in video games through the satisfaction of making a choice (i.e., experiencing autonomy) and seeing the action play out successfully (experiencing competence) provide the initial engagement hooks. These initial hedonic cycles may function as the gateway to deeper, more meaningful interactions down the line. As games come in several levels, they may be more conducive to switching from hedonic to eudaimonic cycles. However, this can be observed in narrative arcs in long-form content, such as films. For example, a horror film does not keep the audience on their toes at all times, rather building towards and away from moments of scare. Back to the example of games, every time players overcome a challenge or make a meaningful choice, they may experience a burst of hedonic pleasure. It keeps them engaged and motivated to proceed. But as the game progresses and the player invests more time and emotion into it, the potential for deeper, more eudaimonic experiences tends to increase. This is where relatedness and insight come into play. With substantial exposure time spent on the game, the connections players make with characters start to deepen and even more secure. Even when playing with other players, overcoming hurdles throughout a game can elevate the experience from just "having fun" to something more profound as they come out triumphant towards the end of the game.

As the story progresses, stakes in the narrative exposition begin to rise, player decisions inherit more meaning, and players begin to gain insights not only about the game, its story, and characters but about themselves, too, through observing the consequences of their choices. These insights may take the form of illumination or awareness about life or the human condition through a media experience and can facilitate deeply rewarding gratification. Overall, hedonic and eudaimonic experience cycles can exist within a single gaming experience. It's possible for a player to oscillate between hedonic and eudaimonic experiences or even experience them

simultaneously. For example, mastering a game mechanic (hedonic) might lead to a deeper understanding of a game's narrative or a connection with a character (eudaimonic). The intertwined nature of these cycles is what makes the appreciation experiences so rich and rewarding.

To recapitulate, meaningful experiences in board games can be very complex and dependent on stringent boundary conditions. For instance, type of play, players' experience, entertainment motivations, etc. Gameplay elements scaffold the interactive potential of the medium, from competition to collaboration, determining the nature of the interaction between the collocated co-players. The lack of digital mediation reduces the narrative's strength, rendering deliberative and discursive actions required to maintain the play operations as central to the appreciation experience. While co-play makes for a fun experience, game mechanics' prowess to connect players' actions and interactions meaningfully to the game's resolution facilitates appreciation experience. Hedonic and eudaimonic gratification come in cycles; in fact, a degree of enjoyment may be necessary for appreciation experiences. The experience of appreciation is associated with reflective thought as a form of cognitive elaboration. While reflective thought about content is fairly common, especially when they challenge the audience and proffer insights that the audience can explore autonomously. However, contemplation beyond the content and about the real-world repercussions depends on not only meaningful emotions or experiences of insights but also feelings of connectedness to others. Hedonic and eudaimonic gratifications from environmental board games can facilitate reflective thoughts regarding the environment that can inspire environmental issue interest among players. Similarly, appreciation of games leading to cognitive elaboration about the broader implication of the games' themes can facilitate feelings of connectedness to nature.

The study is the first of its kind investigating meaningful experiences in board games and identifying conditions conducive to eudaimonic entertainment in analog media. Findings based on the theoretical framework revealed the importance of deliberativeness associated with gameplay that scaffolds the interactive potential of the medium. This can be true across formats and genres. Any interaction, even in abstraction, for example, passively consuming a film, can tap into the audiences' SDT needs as long as the content engages the viewer in meaningful deliberation that activates their self-concepts (Koole et al., 2006). But importantly, for board games, the discursive deliberation (Weinmann, 2018) required for play can be useful for community engagement around socio-political or environmental topics (Fjællingsdal & Klöckner, 2020).

Another theoretical caveat about meaningful experience in board games is the fact that board games do not lend themselves to rich narrative expositions, whereas deliberations that lead to cognitive elaboration in video games emerge from story elements. Further, the experience of appreciation is associated with reflective thought as a form of cognitive elaboration. While reflective thought about content is fairly common, especially when they challenge the audience and proffer insights that the audience can explore autonomously. However, contemplation beyond the content and about the real-world repercussions depends on not only meaningful emotions or experiences of insights but also feelings of connectedness to others. Hedonic and eudaimonic gratifications from environmental board games can facilitate reflective thoughts regarding the environment that can inspire environmental issue interest among players. Similarly, appreciation of games leading to cognitive elaboration about the broader implication of the games' theme can facilitate feelings of connectedness to nature. The evidence presented supports

the assumption that enjoyment and appreciation may appear in sequences. A heuristic level of information engagement may be a precursor for a more deliberative appraisal of information.

VI. LIMITATIONs

There are several limitations across the study's design, instruments, literature consulted, and the sample that qualifies the findings from the evidence collected. A major limitation of the study is the theoretical lens. It is limited to the extant work in media psychology that solely focuses on digital video games. A seemingly natural next step to extend this framework to analog games could have been to take a qualitative approach and allow for the nuances to emerge inductively through board game players' experiences of play. But it would have been an endeavor to conquer completely uncharted territory. On the other hand, taking the deductive lens approach aided in identifying areas where the explanatory power of the current theoretical lens could be improved. Conceptualization of user demands in board games and their agentic value needs further examination of what conditions dictate low to high interactions that, in terms, increase the salience of satisfying psychological needs. The current approach benefits future research by informing any subsequent investigations with the points of contentions that currently exist. Player experience and literacy of analog media present a significant point of variation in the experience of need satisfaction. Scrutinizing the contrasting nature of competitive and cooperative interaction would reveal further nuances of conditions that are conducive to feeling effectance and meaningfulness. Investigations on board game enjoyment should focus on understanding how different game genres and mechanics influence demand on players and, in turn, shape the experience of meaningfulness.

Due to the cross-sectional nature of the study, the evidence presented cannot claim causality in the relationships explored. An experimental framework would have been ideal to explore such causality. However, such a finding would be limited to the context of the

intervention, and any discernible effect can only be claimed for the specific stimulus used. Contrarily, the current approach can allow for more generalizable claims about the media form and the specific genre theme of environmental games. That is, the claims of the observed effects are independent of a singular designer prowess and rather deduced from player experience in ecologically heterogeneous settings. However, data is dependent on participants recalling past game experiences rather than playing games in real-time during the study, which was not a feasible approach for the kind of analysis conducted. However, as a result, recall bias exists in the data. However, accounting for limitations of the recall approach, there is a fair degree of ecological validity to the experiences reported that are based on natural settings where participants selectively choose to expose themselves to the entertainment. In addition, this approach is validated in existing studies on entertainment experience in games (e.g., Oliver et al., 2016; Kümpel & Unkel, 2017).

The reported sample for both studies is very homogeneous and comes with the established qualifications naturally associated with online panel studies. Due to the nature of the study design, both investigations required participants with a certain degree of familiarity and experience with board games. Thus, while the screening processes ensured that the studies included appropriate participants, it also meant that respondents came with a degree of board game literacy that may not be generalizable to the overall population. For study 2 specifically, the sample demographics are very narrowly defined. Thus, the downstream effects identified are limited to the specific category of subjects that participated in the study. The two groups reported on very disparate types of games. As our findings suggest, entertainment experiences can vary vastly simply based on the fact whether players are competing against each other or collaborating with each other. Therefore, while measures like competence needs pointed out the influence of

the specific genre of environmental games, some of these differences may simply be specific to the nature of the play dynamics. Again, while the study allowed for more generalizable insights into the player experience of meaningfulness, the diversity of games reported may account for some or many of the distinctions identified in the findings.

There are several measurement issues in the study. Most importantly, these measures are adapted from studies on digital games. While the literature review establishes the relevance of these measures for the analog contexts, there might be transfer issues as the findings clearly delineate the idiosyncratic distinctions between the two counterparts. An initial study aimed at measurement development for the investigation would have been ideal. However, such an approach was beyond the scope of the study. Instead, from the findings, the study identifies potential issues that may exist in the current measures. For instance, the measurement for relatedness only asks about characters in the game and not about other players. For board games as well as multiplayer online games, it does not make it explicit whether involvement with other players is also included within this measure. Thus, some of the theoretical inconsistencies found for this variable could be associated with this transfer issue. Future research should examine the validity of this measure for multiplayer social interactions and make necessary alterations to capture the breadth of possibilities across different media contexts.

VII. CONCLUSIONS

This study examined the formation of meaningful entertainment experiences in board games. Following the tradition of research exploring linear and interactive digital media, this presents evidence of meaningful experience in analog games. It uses the entertainment theory framework to examine the experience of playing environmental board games. Specifically, focused on three over-arching questions. First, how do hedonic, non-hedonic, and eudaimonic mechanisms of entertainment experiences predict enjoyment and appreciation of board games? Second, how are board game elements linked to the experience of enjoyment and appreciation? Third, can eudaimonic experiences from playing environmental board games influence cognitive elaboration and lead to reflective thoughts about the environment? It explores whether such cognitive elaboration can lead to environmental issue interest, and connectedness to nature among players. In doing so, the study marks the first attempt to explain modern analog media using a media psychological framework. It contributes to the area of literature frequented by scholarship in HCI, entertainment psychology, game studies, positive psychology, and information science. It presents empirical evidence for the self-determination theory's universality in explaining outcomes of media entertainment and how substrates of psychological gratification are associated with information processing in board games.

In examining the research questions, the study collected data from two different samples. First, from general board game players, about their motivations and habits of playing board games as well as the specific experience of a board game participants found to be particularly enjoyable or meaningful. Second, it took stock of the play experience of environmental board games by asking players to review and describe the game elements and associated gratifications

they achieved. The two studies provide converging evidence for the entertainment experiences in analog play and points of deviation that isolate the idiosyncrasies that arise from the intrinsic elements of the analog medium. Board games as media present analog simulations with low to medium levels of interactive environment. Board game play encompasses a form of deliberative discursiveness with collocated co-players distinctly influencing the formation of meaningful entertainment in board games from other media. For example, while enjoyment experiences were broadly explained by player satisfaction of autonomy and competence, eudaimonic experiences required the gratification of insight and relatedness as well. The deliberativeness associated with board game play in understanding and running the operation of an analog procedural system is demanding enough for players that it has the ability to influence the sense of autonomy and effectance. A second but equally important dimension of collocated co-play in board games enables discursive co-construction of games' thematic exposition that requires both inter and intrapersonal deliberation. Based on the evidence, the study argues that this discursive deliberation first allows insights to emerge from playful actions and observing their consequences, and second, reflective contemplations about the game simulation and its broader implications beyond the game.

The evidence further establishes the involvement of self-concepts (i.e., SDT variables) related to the person as an individual and in relation to others in the entertainment experience. It seems hedonic and eudaimonic experiences may occur in cycles throughout media exposure based on the satisfaction of innate psychological needs. A degree of hedonic engagement through the sense of autonomy and competence functions as a precursor to engaging in deeper invocation in media fare. Hedonic cycles can transform into eudaimonic cycles as entertainment experiences gratify needs that drive feeling connected to others as well as the larger meaning of human

existence, relatedness, and insight. This experience is particularly salient for interactive media and the current study provides evidence of the significance of this framework for analog game contexts, absent in extant literature. Players' motivations (Kosa & Spronck, 2019) play a crucial role here. Whether they seek hedonic entertainment or are interested in meaningful media experiences shapes the outcomes. The findings suggest that players generally come to play board games with hedonic motivations but may find eudaimonic experiences given the game can facilitate the activation of self-determination concepts through the discovery of insights and connections. However, for an entertainment experience to influence reflective contemplations about it and its broader implications, eudaimonic motivations are a necessary precursor. This revelation can inform climate science communication by meaningfully engaging audiences in communities or classrooms. There may exist a motivational threshold to involve the audience in deep forms of cognitive elaboration about strategic messaging (e.g., information seeking), but to provoke reflective thought about the experience, a pleasurable experience of play may suffice.

The findings of the study emphasize the utility of meaningful media entertainment in influencing cognitive elaboration. The second part of this thesis explored the theoretical integration of the dual process of entertainment model with motivated information processing to examine how meaningful entertainment during board game play could potentially facilitate eudaimonic appreciation and reflective thought about the environment and, in turn, a sense of connectedness to nature and pro-environmental interests. The evidence is suggestive of the veracity of the assumptions that appreciation of media entertainment is associated with cognitive elaboration of and about the content as well as its broader impact.

The analog context of board games extends the dual process of entertainment model by presenting evidence that suggests the distinct combinations of gratifications that form appreciation vs enjoyment experiences, the relationship between appreciation and cognitive elaboration, the contingency of subtle pleasure as antecedents of thought-provoking engagement and the role of motivation in the gratifications reported. Furthermore, the evidence supports analog simulation design principles that can influence players environmental issue interest and information seeking behavior about the environment (Hmielowski et al., 2018; Choo, 2023), that embody ethically sensitive design values (Schrier & Gibson, 2010), direct attention of niche groups to climate science topics (Hart et al., 2015), and even aid in depoliticizing climate science perceptions (McCright & Dunlap, 2011).

The examination of player experience of environmental board games revealed that playable environmental models have substantial science rhetoric value. In line with previous research, this study also finds analog environmental simulation can be a productive tool for community engagement with topics about the environment, ecology and nature, and issues regarding its conservation (Fjællingsdal & Klöckner, 2020). The ludic information processing in board games can aid players in negotiating defensive information processing through activation of the self-concepts related to volition and effectance. In media entertainment the activation of these core human needs leads to affective resources that can facilitate deliberate and effortful cognitive elaboration in favor of new insights to emerge from the experience (e.g., Bartsch & Beth Oliver, 2011). In addition, environmental board games can facilitate meaningful emotions and issue interest about the environment through reflective contemplations.

These findings lay the groundwork for research on environmental communication (as well as other forms of strategic communication) that can use eudaimonic entertainment to aid audiences to deliberate on the content. Ultimately, environmental board games may serve to engage audiences in ways that impede defensive responses, ease dissonances of worldviews, and increase reliance on audiences' own deliberative faculties (Chapman, 2016; Xue et al., 2016; Wolfe & Tubi, 2018; Salas Reyes et al., 2021). The evidence reveals the ways meaningful experiences in games can enhance cognitive depth in information processing and motivate elaborate processing in dealing with the affective challenges of environmental science communication. These findings pave the way for interdisciplinary investigations in the integration of affective science into climate change messaging and environmental communication overall (Chapman, 2017; Hornsey & Fielding, 2016).

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Appendix A: Tables and Mediation Models for Study 1

Table 1.1: Descriptive Statistics for Study 1

	Mean	SD	Min	Max	Skewness	Kurtosis
Enjymnt	6.428	0.82307	1.25	7	-2.707	10.702
Appreciation	5.5209	1.08551	1	7	-0.913	1.178
Competence	5.9257	1.05408	1	7	-1.706	4.344
Autonomy	5.7554	1.0254	1	7	-1.042	1.38
Relatedness	5.2492	1.18912	1	7	-0.688	0.519
Insight	4.937	1.39771	1	7	-0.53	-0.144
Arousal	4.6471	1.76734	1	7	-0.445	-0.687
Positive Affect	6.2229	0.97157	1	7	-1.993	6.155
Negative Affect	2.2105	1.66409	1	7	1.583	1.546
Feeling Moved	4.4241	1.43673	1	7	-0.275	-0.292
Cognitive Challenge	5.3034	1.47048	1	7	-0.86	0.38
Emotional Challenge	4.452	1.88983	1	7	-0.227	-1.059
Hedonic Motivation	5.7822	0.88498	1.83	7	-1.071	1.952
Eudaimonic Motivation	5.5093	1.08741	1	7	-1.02	2.011

Table 1.2: Regression Model examining the formation of enjoyment from board game play

	B	Std. Error	t	Sig.
(Constant)	2.053	0.228	9.008	<.001
Competence	**0.265**	**0.036**	**7.294**	**<.001**
Autonomy	**0.115**	**0.04**	**2.88**	**0.004**
Relatedness	-0.031	0.038	-0.833	0.406
Insight	0.022	0.033	0.654	0.514
Arousal	-0.003	0.02	-0.132	0.895
Positive Affect	**0.311**	**0.042**	**7.36**	**<.001**
Negative Affect	**-0.04**	**0.019**	**-2.157**	**0.032**
Feeling Moved	**-0.08**	**0.031**	**-2.545**	**0.011**
Cognitive Challenge	0.008	0.026	0.332	0.74
Emotional Challenge	0.031	0.019	1.651	0.1
Hedonic Motivation	**0.15**	**0.045**	**3.358**	**<.001**
Eudaimonic Motivation	-0.061	0.038	-1.621	0.106

F (12,310) = 46.783, p<.001, R = .803 and R-square = .664

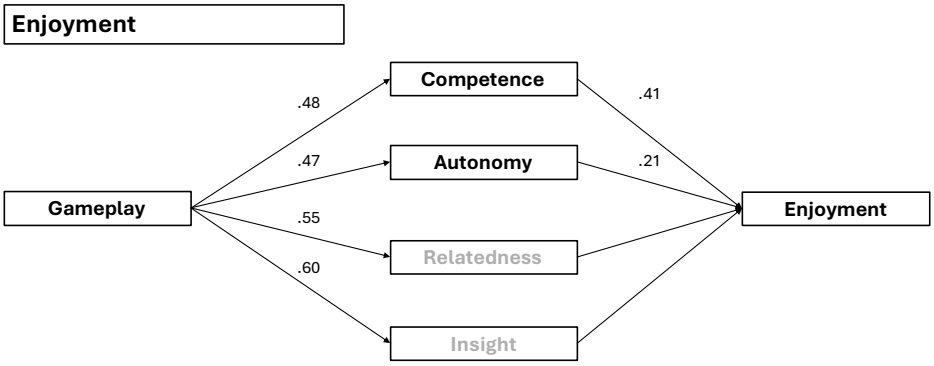
Table 1.3: Regression model examining the formation of appreciation from board game play

	B	Std. Error	t	Sig.
(Constant)	0.416	0.281	1.482	0.139
Competence	**0.092**	**0.045**	**2.062**	**0.04**
Autonomy	**0.225**	**0.049**	**4.582**	**<.001**
Relatedness	0.053	0.046	1.148	0.252
Insight	**0.128**	**0.041**	**3.157**	**0.002**
Arousal	0.035	0.025	1.378	0.169
Positive Affect	**0.161**	**0.052**	**3.1**	**0.002**
Negative Affect	-0.028	0.023	-1.213	0.226
Feeling Moved	**0.245**	**0.039**	**6.355**	**<.001**
Cognitive Challenge	0.051	0.031	1.62	0.106
Emotional Challenge	0.038	0.023	1.613	0.108
Hedonic Motivation	-0.041	0.055	-0.739	0.46
Eudaimonic Motivation	-0.008	0.047	-0.163	0.871

F (12,310) = 57.535, p<.001, R = .831 and R-square = .690

Mediation Models Linking Game Elements to Enjoyment as the Outcome Variable

Figure 1.1: Gameplay elements predicting enjoyment with SDT variables as mediators

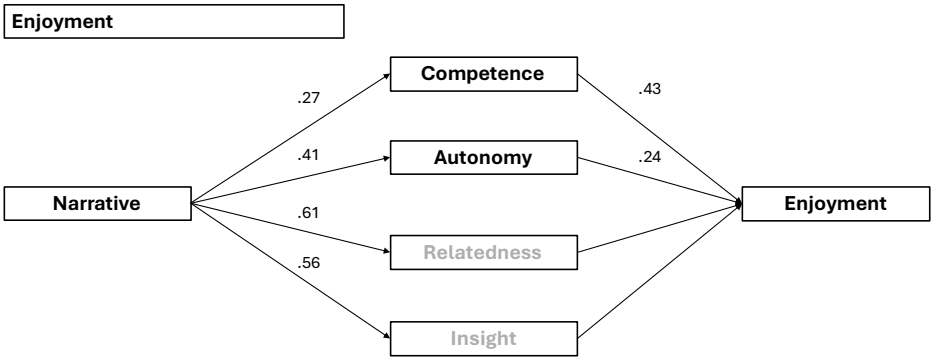


Direct effect = 0.08, SE = 0.04, 95% CI = [0.0053, 0.1617]

Indirect effect = 0.26, SE = 0.06, 95% CI = [0.1393, 0.3815]

Total effect = 0.34, SE = 0.04, 95% CI = [0.2597, 0.4192]

Figure 1.2: Narrative elements predicting enjoyment with SDT variables as mediators

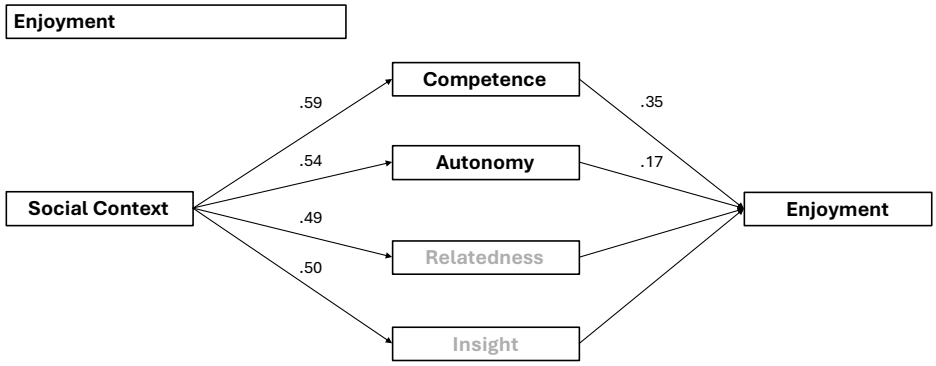


Direct effect = -0.07, SE = 0.03, 95% CI = [-0.1412, -0.0045]

Indirect effect = 0.21, SE = 0.05, 95% CI = [0.1230, 0.3111]

Total effect = 0.14, SE = 0.03, 95% CI = [0.0724, 0.2033]

Figure 1.3: Social context elements (collocated co-play) predicting enjoyment with SDT variables as mediators



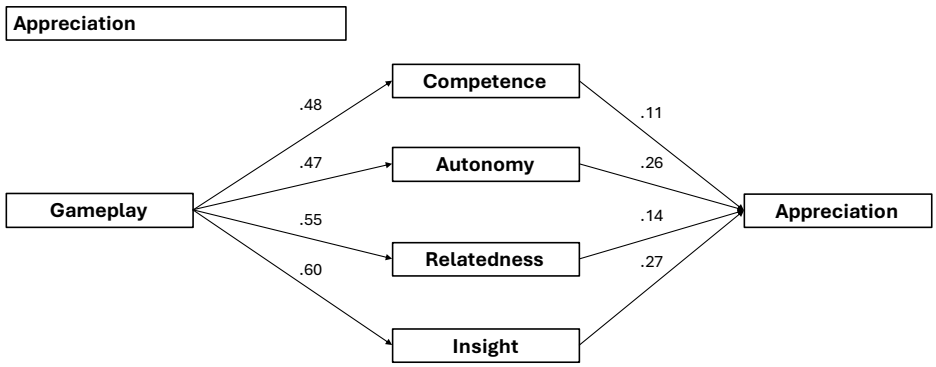
Direct effect = 0.24, SE = 0.04, 95% CI = [0.1596, 0.3204]

Indirect effect = 0.26, SE = 0.06, 95% CI = [0.1494, 0.3669]

Total effect = 0.50, SE = 0.04, 95% CI = [0.4234, 0.5734]

Mediation Models Linking Game Elements to Appreciation as the Outcome Variable

Figure 1.4: Gameplay elements predicting appreciation with SDT variables as mediators

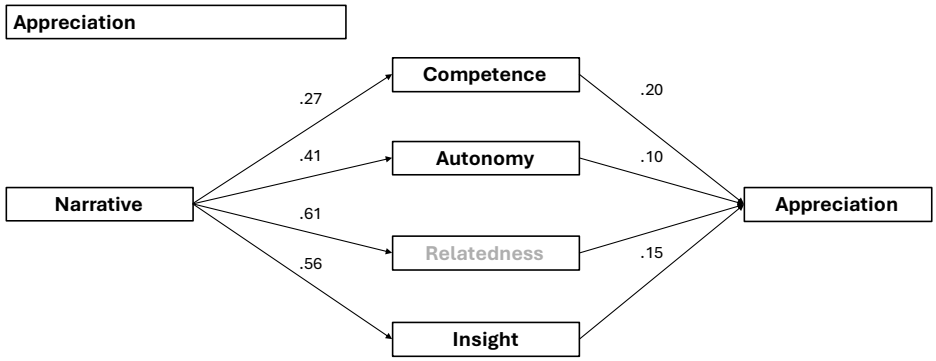


Direct effect = 0.14, SE = 0.05, 95% CI = [0.0515, 0.2292]

Indirect effect = 0.42, SE = 0.07, 95% CI = [0.2918, 0.5805]

Total effect = 0.56, SE = 0.05, 95% CI = [0.4645, 0.6610]

Figure 1.5: Narrative elements predicting appreciation with SDT variables as mediators

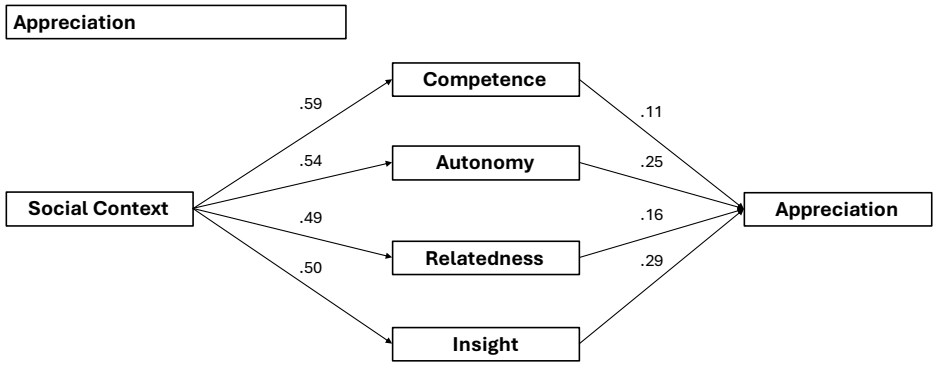


Direct effect = 0.13, SE = 0.04, 95% CI = [0.0557, 0.2107]

Indirect effect = 0.35, SE = 0.05, 95% CI = [0.2613, 0.4553]

Total effect = 0.49, SE = 0.04, 95% CI = [0.4151, 0.5566]

Figure 1.6: Social context of play (collocated co-play) elements predicting appreciation with SDT variables as mediators



Direct effect = 0.13, SE = 0.05, 95% CI = [0.0309, 0.2228]

Indirect effect = 0.42, SE = 0.08, 95% CI = [0.2694, 0.5698]

Total effect = 0.55, SE = 0.05, 95% CI = [0.4417, 0.6550]

Appendix B: Tables and Mediation Models for Study 2

Table 2.1 Descriptive Statistics for Study 2

	Mean	SD	Min	Max	Skewness	Kurtosis
Enjoyment	6.1008	0.88935	1	7	-1.934	6.736
Appreciation	5.2684	1.04511	1	7	-0.676	0.689
Competence	5.5219	1.05408	1	7	-1.425	2.952
Autonomy	5.735	0.92512	2.33	7	-0.873	1.232
Relatedness	4.2814	1.41164	1	7	-0.411	-0.175
Insight	4.3607	1.27125	1	7	-0.368	-0.131
Arousal	5.5833	0.94614	1.33	7	-1.266	2.912
Positive Affect	5.8866	0.8803	1.33	7	-1.445	4.439
Negative Affect	2.0956	1.07682	1	6.33	1.341	2.112
Meaningful Affect	3.8907	1.2092	1	7	-0.217	-0.154
Challenge	5.0072	0.96875	1	7	-0.597	1.123
Hedonic Motivation	5.6516	0.81524	3.17	7	-0.559	-0.047
Eudaimonic Motivation	5.6926	1.04549	1.17	7	-1.339	2.597
Issue Interest	5.4003	1.19195	1	7	-0.962	1.299
Connectedness to Nature	4.7049	1.39016	1	7	-0.528	-0.138
Endogenous Reflective Thought	5.0789	1.03049	1.75	7	-0.588	0.346
Exogenous Reflective Thought	5.0074	1.29505	1	7	-0.557	0.123
Political Orientation	2.84	1.709	1	7	0.693	-0.51
Worries about Climate Change	5.5	1.56	1	7	-1.256	1.208
Perception of CC Severity	3.11	2.155	1	7	0.627	-1.145
CC is a Natural Process	4.27	1.605	1	7	-0.399	-0.674
CC is Anthropogenic	6.52	0.953	1	7	-3.161	13.321

Table 2.2: Regression model examining the enjoyment from environmental board games

	B	Std. Error	t	Sig.
(Constant)	2.514	0.461	5.452	<.001
Competence	-0.017	0.037	-0.456	0.649
Autonomy	**0.184**	**0.045**	**4.085**	**<.001**
Relatedness	**-0.11**	**0.03**	**-3.729**	**<.001**
Insight	0.042	0.035	1.187	0.236
Arousal	**0.192**	**0.048**	**4.037**	**<.001**
Positive Affect	**0.376**	**0.054**	**6.935**	**<.001**
Negative Affect	**-0.229**	**0.042**	**-5.457**	**<.001**
Meaningful Affect	-0.018	0.036	-0.501	0.617
Challenge	0.089	0.046	1.932	0.055
Hedonic Motivation	-0.036	0.04	-0.91	0.364

Eudaimonic Motivation	-0.011	0.035	-0.316	0.753

F (11,233) = 50.162, p<.001, R = .839 and R-square = .703

Table 2.3: Regression model examining the appreciation of environmental board games

	B	Std. Error	t	Sig.
(Constant)	1.287	0.568	2.267	0.024
Competence	-0.078	0.046	-1.706	0.089
Autonomy	0.033	0.055	0.598	0.55
Relatedness	0.06	0.036	1.636	0.103
Insight	**0.145**	**0.043**	**3.377**	**<.001**
Arousal	0.014	0.059	0.237	0.813
Positive Affect	0.037	0.067	0.55	0.583
Negative Affect	**-0.112**	**0.052**	**-2.169**	**0.031**
Meaningful Affect	**0.318**	**0.044**	**7.226**	**<.001**
Challenge	**0.145**	**0.057**	**2.566**	**0.011**
Hedonic Motivation	0.007	0.049	0.133	0.894
Eudaimonic Motivation	**0.224**	**0.043**	**5.188**	**<.001**

F (11,233) = 43.467, p<.001, R = .820 and R-square = .672

Table 2.4: Regression model predicting endogenous reflective-thought

	B	Std. Error	t	Sig.
(Constant)	0.461	0.698	0.661	0.509
Competence	0.025	0.056	0.434	0.664
Autonomy	**0.205**	**0.068**	**3.008**	**0.003**
Relatedness	0.09	0.045	2.009	0.046
Insight	**0.126**	**0.053**	**2.391**	**0.018**
Arousal	0.001	0.072	0.013	0.99
Positive Affect	-0.064	0.082	-0.785	0.433
Negative Affect	0.035	0.064	0.543	0.587
Meaningful Affect	**0.119**	**0.054**	**2.202**	**0.029**
Challenge	**0.271**	**0.07**	**3.884**	**<.001**
Hedonic Motivation	-0.01	0.061	-0.157	0.875
Eudaimonic Motivation	**0.159**	**0.053**	**2.997**	**0.003**

F (11,233) = 20.432, p<.001, R = .701 and R-square = .491

Table 2.5: Regression model predicting exogenous reflective-thought

	B	Std. Error	t	Sig.
(Constant)	1.899	0.863	2.201	0.029
Competence	-0.029	0.07	-0.41	0.682
Autonomy	-0.058	0.084	-0.683	0.496
Relatedness	**0.24**	**0.055**	**4.325**	**<.001**
Insight	**0.361**	**0.065**	**5.516**	**<.001**
Arousal	0.018	0.089	0.201	0.841
Positive Affect	-0.007	0.102	-0.067	0.947
Negative Affect	-0.052	0.079	-0.667	0.506
Meaningful Affect	**0.196**	**0.067**	**2.924**	**0.004**
Challenge	-0.134	0.086	-1.55	0.123
Hedonic Motivation	-0.051	0.075	-0.684	0.495
Eudaimonic Motivation	**0.219**	**0.066**	**3.339**	**<.001**

F (11,233) = 21.773, p<.001, R = .712 and R-square = .507

Table 2.6: Regression model predicting issue-interest experienced

	B	Std. Error	t	Sig.
(Constant)	-1.049	0.65	-1.614	0.108
Enjoyment	**0.177**	**0.061**	**2.913**	**0.004**
Appreciation	**0.42**	**0.073**	**5.717**	**<.001**
Endogenous Reflective Thought	0.032	0.059	0.539	0.591
Exogenous Reflective Thought	**0.4**	**0.052**	**7.66**	**<.001**
Hedonic Motivatoin	0.036	0.058	0.617	0.538
Eudaimonic Motivation	0.015	0.055	0.268	0.789
Political Orientation	0.016	0.032	0.513	0.609
Worries about Climate Change	-0.053	0.036	-1.451	0.148
Perception of CC Severity	-0.03	0.022	-1.319	0.188
CC is a Natural Process	-0.012	0.03	-0.41	0.682
CC is Anthropogenic	**0.168**	**0.057**	**2.959**	**0.003**

F (11,233) = 39.548, p<.001, R = .808 and R-square = .652

Table 2.7: Regression model predicting connectedness to nature experienced

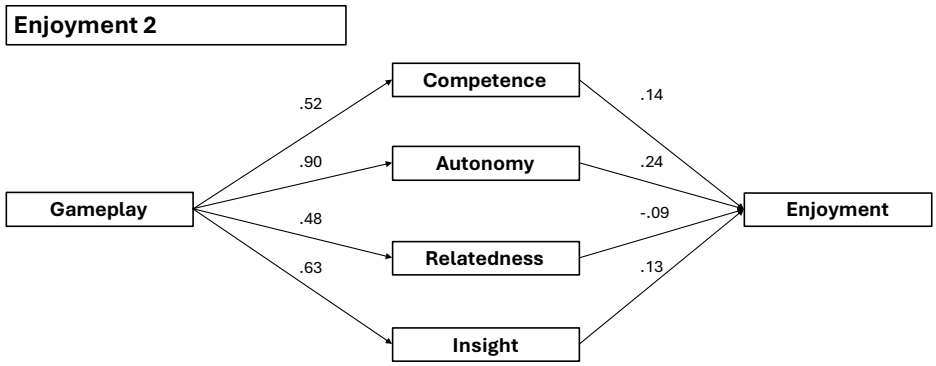
	B	Std. Error	t	Sig.
(Constant)	-0.733	0.71	-1.033	0.303

Enjoyment	-0.122	0.067	-1.827	0.069
Appreciation	**0.612**	**0.08**	**7.636**	**<.001**
Endogenous Reflective Thought	-0.104	0.065	-1.596	0.112
Exogenous Reflective Thought	**0.536**	**0.057**	**9.41**	**<.001**
Hedonic Motivatoin	0.024	0.063	0.384	0.701
Eudaimonic Motivation	0.033	0.06	0.55	0.583
Political Orientation	0.044	0.035	1.285	0.2
Worries about Climate Change	0.007	0.04	0.169	0.866
Perception of CC Severity	0.019	0.025	0.788	0.431
CC is a Natural Process	-0.005	0.033	-0.146	0.884
CC is Anthropogenic	0.042	0.062	0.669	0.504

F (11,233) = 48.069, p<.001, R = .834 and R-square = .695

Mediation Models Linking Game Elements to Enjoyment of Environmental Board Games

Figure 2.1: Gameplay elements predicting enjoyment of environmental board games with SDT variables as mediators

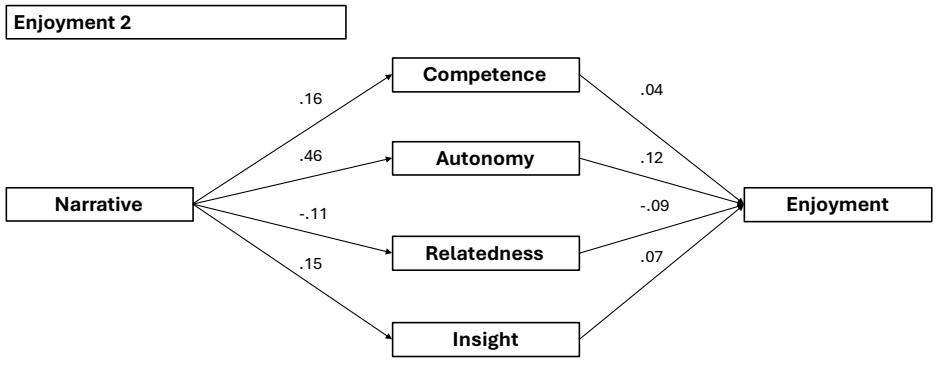


Direct effect = 0.45, SE = 0.08, 95% CI = [0.2917, 0.6071]

Indirect effect = 0.33, SE = 0.07, 95% CI = [0.1964, 0.4604]

Total effect = 0.77, SE = 0.06, 95% CI = [0.6570, 0.8918]

Figure 2.2: Narrative elements predicting enjoyment of environmental board games SDT variables as mediators

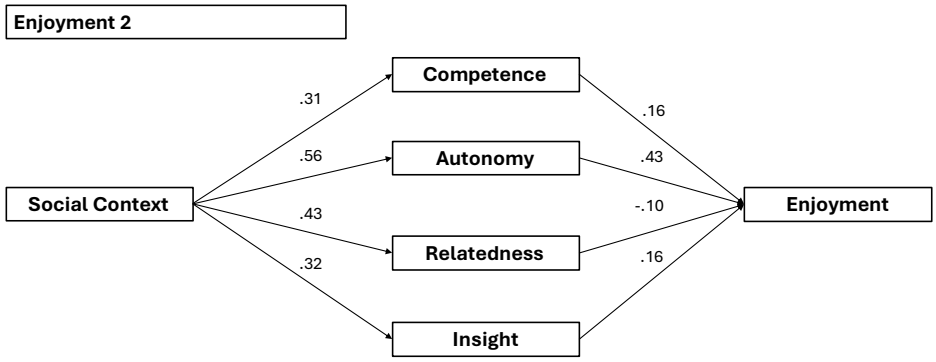


Direct effect = 0.05, SE = 0.05, 95% CI = [-.0568, .1476]

Indirect effect = 0.14, SE = 0.06, 95% CI = [0.0258, 0.2733]

Total effect = 0.19, SE = 0.05, 95% CI = [0.0950, 0.2756]

Figure 2.3: Social Context elements predicting enjoyment of environmental board games SDT variables as mediators

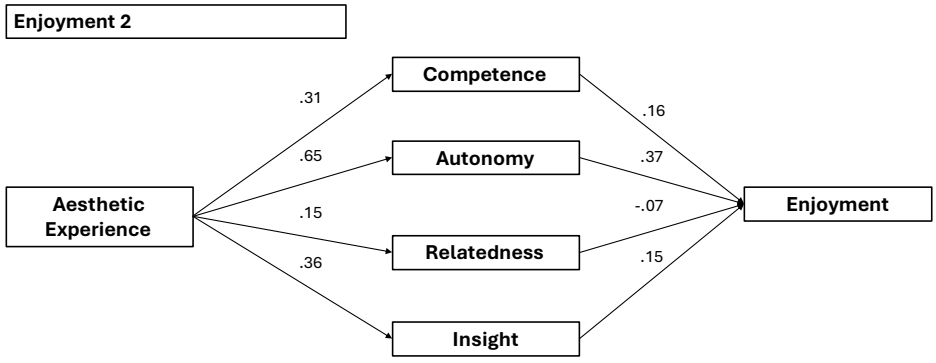


Direct effect = 0.09, SE = 0.06, 95% CI = [-.0356, .2128]

Indirect effect = 0.30, SE = 0.06, 95% CI = [0. 1998, 0.4132]

Total effect = 0.39, SE = 0.05, 95% CI = [0. 2557, 0. 5267]

Figure 2.4: Aesthetic elements predicting enjoyment of environmental board games SDT variables as mediators



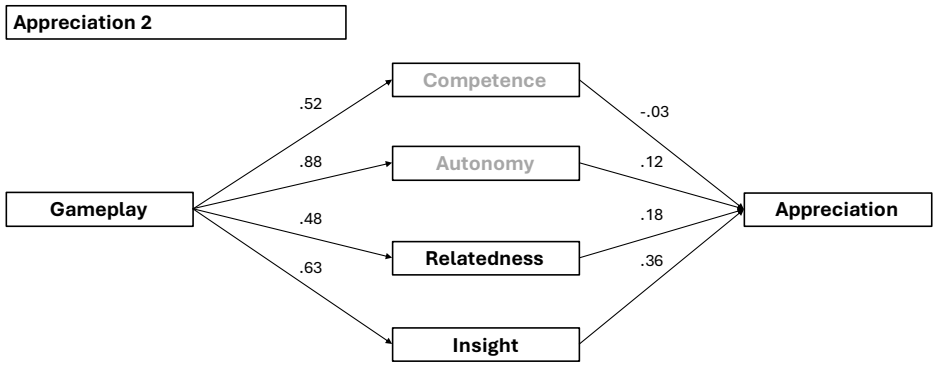
Direct effect = 0.23, SE = 0.07, 95% CI = [.1025, .3665]

Indirect effect = 0.33, SE = 0.05, 95% CI = [0.2348, 0.4486]

Total effect = 0.57, SE = 0.07, 95% CI = [0.4338, 0.7013]

Mediation Models Linking Game Elements to Appreciation of Environmental Board Games

Figure 2.5: Gameplay elements predicting appreciation of environmental board games with SDT variables as mediators

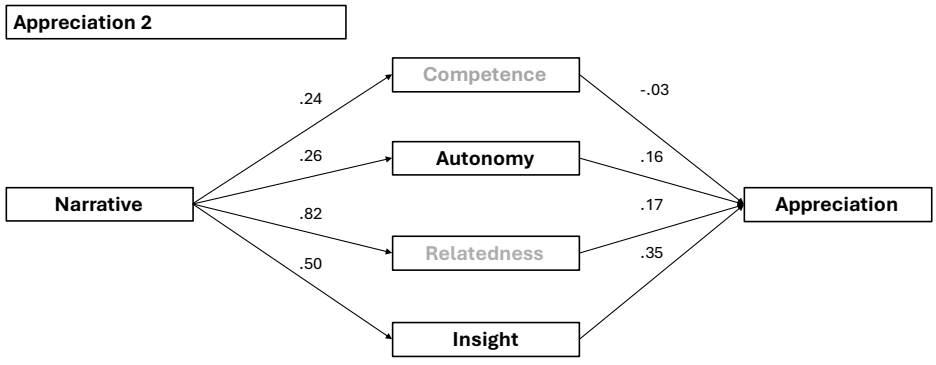


Direct effect = 0.14, SE = 0.10, 95% CI = [-.0489, 0.3281]

Indirect effect = 0.41, SE = 0.10, 95% CI = [0.2269, 0.6076]

Total effect = 0.55, SE = 0.08, 95% CI = [0.3835, 0.7150]

Figure 2.6: Narrative elements predicting appreciation of environmental board games with SDT variables as mediators

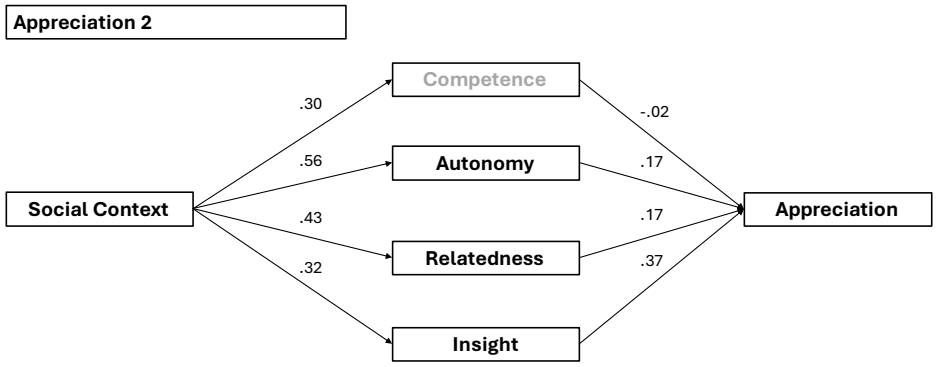


Direct effect = 0.21, SE = 0.06, 95% CI = [0.0974, 0. 3220]

Indirect effect = 0.27, SE = 0.05, 95% CI = [0.1612, 0.3862]

Total effect = 0.48, SE = 0.05, 95% CI = [0.3859, 0.5689]

Figure 2.7: Social context elements predicting appreciation of environmental board games with SDT variables as mediators

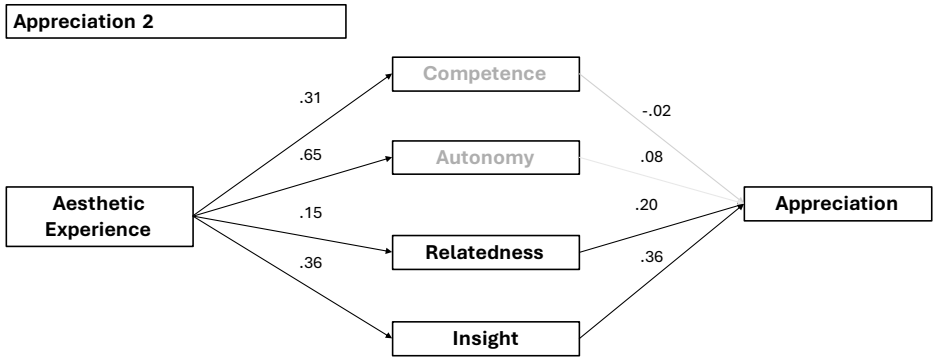


Direct effect = 0.06, SE = 0.07, 95% CI = [-.0764, .2046]

Indirect effect = 0.28, SE = 0.07, 95% CI = [0.1413, 0.4360]

Total effect = 0.35, SE = 0.08, 95% CI = [0. 1836, 0.5110]

Figure 2.8: Aesthetic elements predicting appreciation of environmental board games with SDT variables as mediators



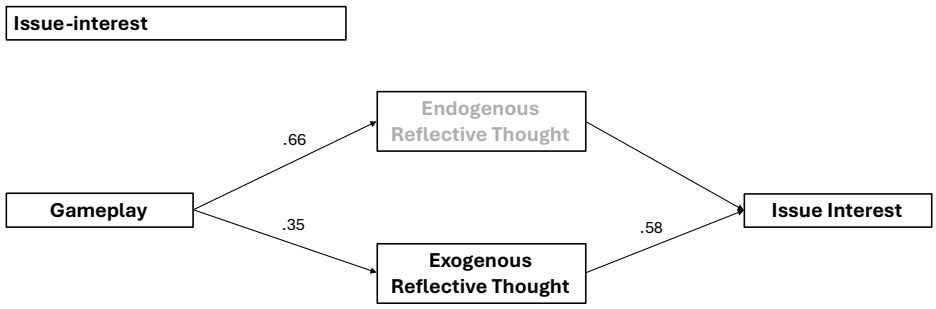
Direct effect = 0.26, SE = 0.08, 95% CI = [.1146, .4125]

Indirect effect = 0.21, SE = 0.07, 95% CI = [0.0667, 0.3493]

Total effect = 0.47, SE = 0.09, 95% CI = [0.3008, 0.6373]

Mediation Models Linking Game Elements to Environmental Issue Interest with Reflective Thoughts as Mediator Variables

Figure 3.1: Gameplay elements predicting issue interest with reflective thoughts as mediator variables

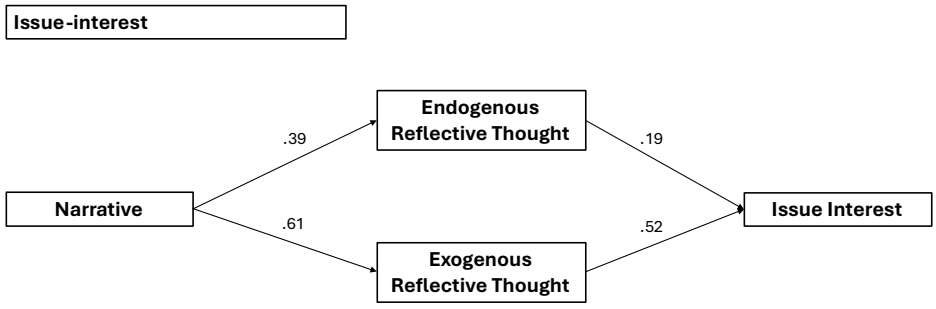


Direct effect = 0.31, SE = 0.08, 95% CI = [0.1515, 0.4613]

Indirect effect = 0.27, SE = 0.09, 95% CI = [0.1107, 0.4478]

Total effect = 0.58, SE = 0.10, 95% CI = [0.3851, 0.7683]

Figure 3.2: Narrative elements predicting issue interest with reflective thoughts as mediator variables

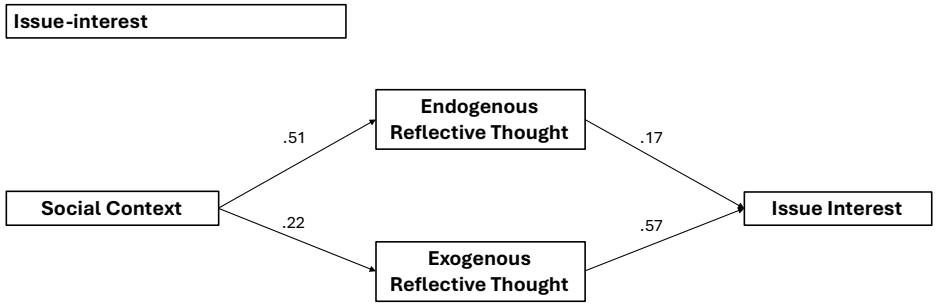


Direct effect = n/a

Indirect effect = 0.39, SE = 0.06, 95% CI = [0.2897, 0.5105]

Total effect = 0.50, SE = 0.05, 95% CI = [0.3909, 0.6068]

Figure 3.3: Social context elements predicting issue interest with reflective thoughts as mediator variables

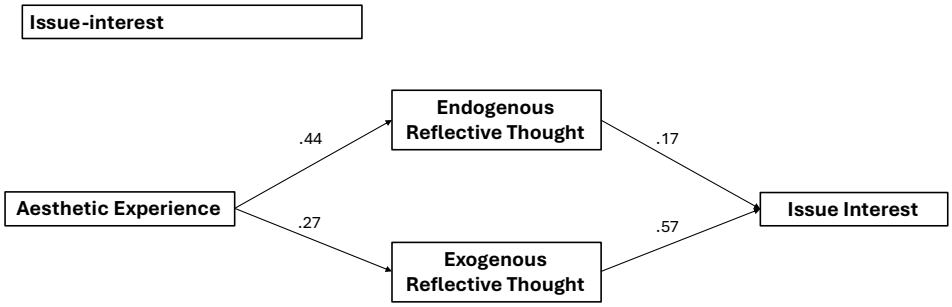


Direct effect = 0.15, SE = 0.07, 95% CI = [0.0064, 0.2920]

Indirect effect = 0.21, SE = 0.08, 95% CI = [0.0447, 0.3767]

Total effect = 0.36, SE = 0.10, 95% CI = [0.1725, 0.5483]

Figure 3.4: Aesthetic elements predicting issue interest with reflective thoughts as mediator variables



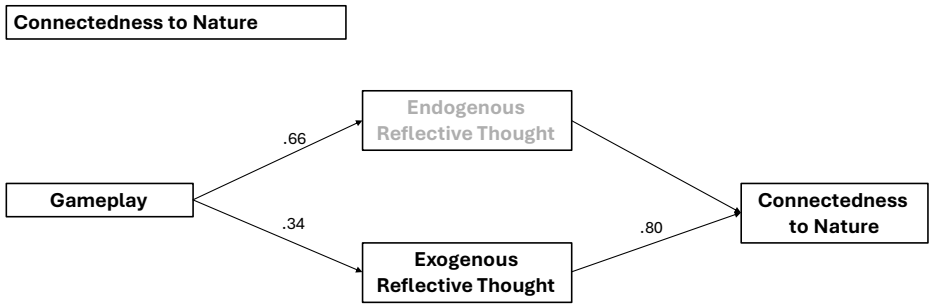
Direct effect = 0.22, SE = 0.07, 95% CI = [0.0785, 0.3668]

Indirect effect = 0.23, SE = 0.08, 95% CI = [0.0859, 0.3955]

Total effect = 0.45, SE = 0.10, 95% CI = [0.2555, 0.6461]

Mediation Models Linking Game Elements to Environmental Connectedness to Nature with Reflective Thoughts as Mediator Variables

Figure 4.1: Gameplay elements predicting connectedness to nature with reflective thoughts as mediators

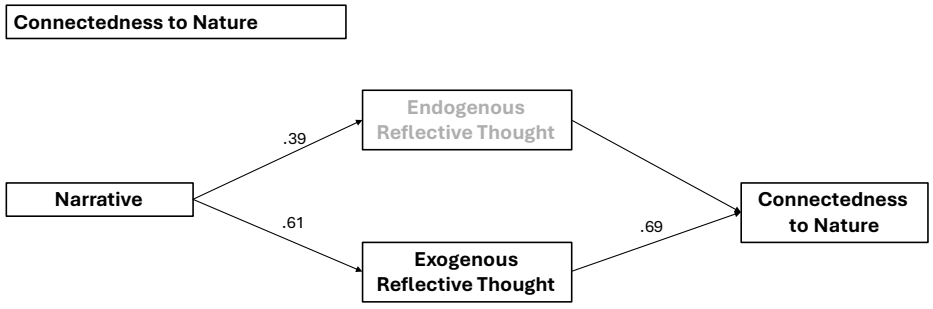


Direct effect = n/a

Indirect effect = 0.31, SE = 0.11, 95% CI = [0.1139, 0.5260]

Total effect = 0.35, SE = 0.12, 95% CI = [0.1189, 0.5886]

Figure 4.2: Narrative elements predicting connectedness to nature with reflective thoughts as mediators

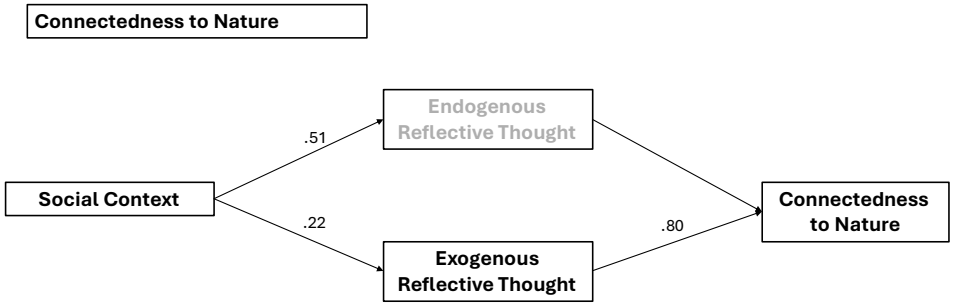


Direct effect = 0.25, SE = 0.06, 95% CI = [0.1389, 0.3615]

Indirect effect = 0.43, SE = 0.06, 95% CI = [0.3179, 0.5523]

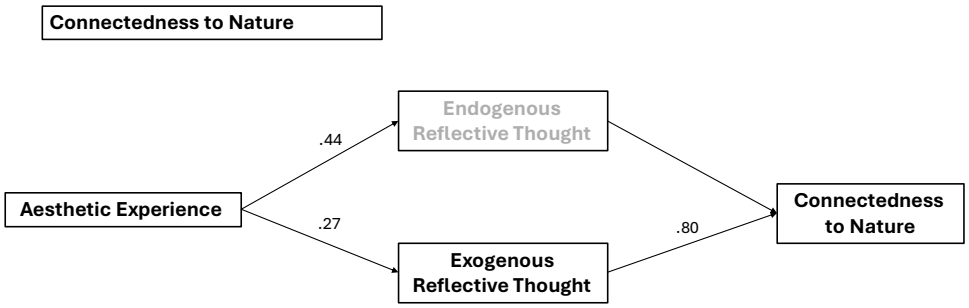
Total effect = 0.68, SE = 0.06, 95% CI = [0.5612, 0.7969]

Figure 4.3: Social context elements predicting connectedness to nature with reflective thoughts as mediators



Direct effect = n/a
Indirect effect = 0.21, SE = 0.10, 95% CI = [0.0159, 0.4024]
Total effect = n/a

Figure 4.4: Aesthetic elements predicting connectedness to nature with reflective thoughts as mediators



Direct effect = n/a
Indirect effect = 0.24, SE = 0.10, 95% CI = [0.0638, 0.4456]
Total effect = 0.36, SE = 0.12, 95% CI = [0.1266, 0.5925]

Appendix C: Study Instruments and Measures

Measures from Surveys

1. **Enjoyment**
    a. I enjoyed playing the game.
    b. It was fun to play the game.
    c. I had a good time playing the game.
    d. The game was entertaining.
    e. I experienced a lot of pleasure while playing.
2. **Appreciation**
    a. I appreciated playing the game.
    b. I was moved by the game.
    c. The game was thought-provoking.
    d. I found this game to be meaningful.
    e. I found navigating the complexity of the game satisfying.
3. **Endogenous Reflective Thought**

    Please rate the following statements regarding your play experience.

    1. The game challenges made me re-evaluate and change my play style.
    2. The challenges I experienced made me think about my understanding of the game.
    3. The game made me think about its environmental theme more deeply.
    4. The narrative revelation challenged me to think about its mechanics.
4. **Exogenous Reflective Thought**

    Please rate the following statements regarding your play experience.

    1. The game encouraged me to focus on important things about the environment.
    2. The game inspired new insights.
    3. The game made me think about important environmental issues.
    4. The game made me think about myself in relation to nature.
    5. The game encouraged me to stick up for things that I find important to the environment.
5. **Issue Interest**

How did playing the game make you feel about the environmental issue/topic of the game?

1. Interested
2. Captivated
3. Intrigued

6. **Connectedness to the Nature**
    1. Playing the game made me feel a sense of oneness with the natural world around me.
    2. The play experience made me think of the natural world as a community to which I belong.
    3. It helped me recognize and appreciate the intelligence of other living organisms.
    4. The game made me feel part of a larger cyclical process of living.
    5. Playing the game gave me an understanding of how human actions affect the natural world.
    6. It made me feel part of the web of life.
    7. The game Made me feel embedded within the broader natural world.
7. **Evaluation of Gameplay Mechanics**
    1. I was fully concentrated on reaching the goals of the mission.
    2. I was interested in the mission of the game.
    3. The rules of the game featured an optimal balance of difficulty and skills.
    4. The game provided a lot of choices and flexibility for applying different strategies.
    5. The rules of the game complemented the story/thematic experience well.
8. **Evaluation of Narrative Elements**
    1. At times, I felt transported into the thematic/story world.
    2. I was able to identify with the character I was playing.
    3. I felt a sense of responsibility for the character I was playing.
    4. The game narrative fully captured my attention.
    5. I was interested in the game's story.
9. **Evaluation of Social Context of Play**
    1. I felt empathy towards other players
    2. I felt connected to the other players while playing the game.
    3. I found it enjoyable to be with the other players.

4. I was affected by the moods of other players.
5. Our actions depended on each other's actions.
6. We paid attention to each other's play.
7. What one player did affected other players.

10. Hedonic Affect

1. Arousal
    a. This game was... ‘‘arousing,’’ ‘‘exciting,’’ and ‘‘stimulating.’’
2. Absorption
    a. ‘‘This game was...’’ ‘‘interesting,’’ ‘‘absorbing,’’ and ‘‘engaging.’’
3. Positive Affect
    a. I felt good
    b. I felt happy
    c. I felt content
    d. It put me in a good mood.
    e. I found the experience impressive.

11. Non-hedonic Need Satisfaction

1. Competence
    a. I felt competent at the game.
    b. I felt very capable and effective when playing.
    c. My ability to play the game was well matched with the game's challenges.
2. Autonomy
    a. The game provided me with interesting choices and options.
    b. The game let you do interesting things.
    c. I experienced a lot of freedom in the game.
3. Insights
    a. Playing the game has given me new insights into life.
    b. Playing the game has made me wiser.
    c. Playing the game has enriched my life in some way.
4. Relatability
    a. I found the relationships I formed with game character(s) in this game fulfilling.

b. I found the relationships I formed with game character(s) in this game important.
c. I felt connected to the game character(s).

1.

12. Eudaimonic Affect

1. Negative affect
    a. I felt bored.
    b. I found it tiresome.
    c. I thought about other things.
    d. I felt annoyed.
    e. I felt irritable.
2. Meaningful Affect
    a. Moved
    b. Tender
    c. Poignant
3. Challenge
    a. I felt cognitively challenged.
    b. I felt emotionally challenged.
    c. I felt stimulated.
    d. I felt incited.

13. Hedonic Motivation

1. It's important to me that I have fun when engaging with entertainment content.
2. Media content that makes me laugh is among my favorites.
3. I find that even simple content can be enjoyable as long as they are fun.
4. I like media content that may be considered ''silly'' or ''shallow'' if they can make me laugh and have a good time.
5. For me, the best media experiences are ones that are entertaining.
6. My favorite kinds of media experiences are happy and positive.

14. Eudaimonic Motivation

1. I like entertainment that challenges my way of seeing the world.
2. I like media experiences that make me more reflective.

3. I like media content that focuses on meaningful human conditions.
4. My favorite kinds of entertainment are the ones that make me think.
5. I am very moved by content that is about people's search for greater understanding in life.
6. I like entertainment experiences that have profound meanings or messages to convey.