In the Flux: A Constructivist Perspective on Effort and Emotions in Tabletop Games

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ABSTRACT

Playing games involves mental exertion, this includes strategizing and taking actions. Earlier research has primarily focused on objectively measuring and quantifying this effort. Such attempts do not consider the subjective nature of effort from different players' perspectives. This has resulted in a gap in our understanding of players' experience. Effort being an integral part of gameplay experience, this gap affects our understanding. To address this gap, we conducted an empirical study using qualitative methods from a constructivist viewpoint, which involved ten tabletop games of different genres. Our analysis of the collected data sheds light on the association between rules and players in relation to effort. We argue that effort emerges dynamically as players interact with the rules, indicating its nature of being in a "state of flux". This dynamic nature of effort is inextricably linked with fluctuating player emotions. These findings prepare the grounds for understanding the nuances of player experiences and emotions through the lens of effort within a constructivist framework.

Keywords

effort, subjective, experience, constructivist, methods, qualitative, tabletop

INTRODUCTION

Playing games requires *effort*, even though we do it for fun and entertainment purposes (Juul 2016). Games give rise to complex emotions, out of which effort is the central elements on which other experiences like immersion and frustration depend. Being one of the core aspects of play, effort is ubiquitously discussed both implicitly and explicitly by many authors. It has also been studied in association with other

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experiences in games like rewards (Elias et al. 2020). However, effort is omnipresent to an extent that we barely pause to think about it resulting in lack of study concentrating only on effort. Even if there are such studies, the idea of effort remains combined with terms like cognitive load and workload and get operationalized in quantitative terms. This approach tends to overlook the nuanced aspect of its experience. This study posits that to analyze an abstract concept like effort, there is a need to construct its meaning based on how it emerges as players interact with the game rules. We digress from the trend of quantification of effort and explore the mental exertions that take form of calculating, strategizing, and other related emotions like frustration and anticipation. For example, discussion about Chess being more mentally challenging than Ludo prompts unanswered questions such as 'How is Chess more challenging than Ludo' and 'How is the effort invested in strategizing, calculating, and mind-reading different in the two games?' To address such queries, our primary research question is:

"What is the qualitative nature of the experience of effort in board games?"

To address this question, we conducted an empirical study using ten tabletop games from a constructivist viewpoint. This study led to the development of codes and themes which are primarily inductive in nature highlighting the nature of effort in games. We outline four themes and illustrate them through excerpts embodying players' perception of effort as they interact with game rules.

Defining Effort in Games

Literature around effort has been pervasive, often adopting several conflated terms – playbour, involvement, attention, strategizing, planning, agency, struggle, and so forth – which partially define effort. *Playbour*, a term introduced by Kuklich (2005), refers to the labour players put into producing and modifying digital games. It consists of various investments in activities such as time investment, skill development, community engagement, modding, reviews, and streaming. This outlook on games essentially caters to the digital gaming community and is broader in its approach to player effort. A more narrowed-down view is that effort comprises of activities players undertake *to win* a game (Elias et al. 2020). The focus on winning define the boundaries, thus eliminating playbour activities that are beyond in-game performance, like reviews, streaming, and modding. Instead, it constitutes pre-game preparation, cost of playing, space and time required to play, motor-cognitive reflex, and various other facets. The effort to win and the broader concept of playbour neglect the exertion in games within a particular purview – *during* the gaming session.

Momentary in-game experiences of effort resonate with the concepts of *attention* and *involvement* (Calleja 2022). While attention centres on cognitive resources, involvement emphasizes the experiences players have while they direct their attention towards a game. Therefore, studies on attention often take positivist position, examining effort objectively. On the other hand, involvement focuses on the multiple dimensions of the subjective experience of the player, closely aligning with our approach. Players get involved in game as they *struggle* or perform *striving play*, which encapsulates challenges and obstacles, requiring mental and physical effort (Juul 2009; Nguyen 2021). Striving play in games necessitates active decision-making and autonomy in directing player's effort characterizing *agency*.

Players undergo experience of effort construed as struggle, striving, autonomy, involvement, and more, on both conscious and unconscious level. While player's mind remains actively involved during gameplay, their visible actions that are externally observable, do not fully depict the game-related mental effort. Engagement with game happens imperceptibly in the process of planning, strategizing, interpretation, anticipation, and decision (Aarseth 1997). This paper aims to bring attention to this hidden facet of mental exertion; our definition of effort aligns with this perspective:

> "Effort refers to conscious exertions that players perform during gameplay in order to achieve in-game objectives."

Conscious exertions emphasize the experiences related to mental exertions that players can acknowledge and recognize during gameplay. For instance, in Chess, each move is a product of strategic planning and careful analysis of the board and opponent. Players engage in conscious thought processes that correspond with their overarching goal which is typically checkmating the opponent's king. The mental efforts persist throughout the game as players adapt their strategies based on the evolving game state. Therefore, effort is necessary to work through the ambiguity generated by open structure of games to have a *play experience* (Sharp et al. 2019). However, discovering nature of latent mental effort needs suitable method.

Methods to study effort and Constructivist approach

In the examination of in-game effort, the attention is frequently directed towards assessing it in connection with factors such as the perception of reward, game balance, immersion, and pertinent aspect of players' experience (Bowman et al. 2021; Franco-Watkins et al. 2011). Such studies focus on operationalization of effort by borrowing its understanding from psychology and neuroscience, often incorporating measurements and metrics to capture effort in terms of *cognitive demand* or *mental workload* (McFarland 2023; Sevcenko et al. 2021). Following similar approach, when participants are queried about their experience of effort, they typically initiate their response by quantifying the perceived amount of effort, using descriptors such as 'more,' 'less,' or numerical ratings like 'six out of ten' (Author year). Quantifying effort enables to offer a concise and straightforward assessment. Despite requiring calculations, strategizing, and face-reading, which is mentally taxing, qualitative characteristics of effort in games often go unnoticed and, hence, uncaptured. Furthermore, the perception of conscious exertions varies not only across different players but also at different points of time within the same gameplay session.

To capture player experiences like effort, methods that are predominantly employed include psychophysiological methods such as skin conductance, cardiovascular response, eye blink, pupil diameter, and muscle activity. However, such technique fail to acknowledge the unique palette of emotions offered by games entailing disappointment, apprehension, and anticipation (Cowley et. 2013; Nacke 2008; Isbister 2017). Self-reported surveys like NASA TLX fall short in explaining the reasons behind players' perceived amount of performance, frustration, and effort particularly because they are not tailored for analysing games. Certain studies are done in field of psychology using games as means to inquire into players' mind as they interact with games (Muehlbacher et al. 2009). Some studies, specifically in the domain which lies at the intersection of mathematics and economics, focus solely on game rules to comprehend effort (Anderson et al. 2001; Reichmann et al. 2008). By nature, these studies lie in a spectrum where players and rules are at the extreme end. Experiences

in games, however, emerge out of complex interplay between rules and players. These experiences are inherently subjective and closely intertwined with each player's unique perspective and situations.

Therefore, by adopting a qualitative approach within the constructivist framework, this research aspires to explore players' experiences and how they construct their understanding of mental effort as they engage with games. The constructivist framework enables an in-depth exploration of how players actively construct meaning within the gameplay environment (Fosnot 2013). It recognizes that players are not mere rule followers but rather active participants who engage with these rules to craft their distinctive experiences.

Why Tabletop Games?

The idea of games, being not universal, takes multiple forms. Anything digital, interactive, or used for amusement gets called a game. In this study, we focus on games with two or more players centered around thinking skills and decision-making, where each player's move significantly affects game dynamics. Our definition of games closely aligns with Juul's, who describes games as "a rule-based formal system." According to his description, players' role in a game is to influence the gameplay; because of their actions, they feel emotionally attached to the outcome (Juul 2011). Although this explanation is written in the context of video games, it resonates with tabletop games in essence. Moreover, dynamics afforded by tabletop games are more of an emergent nature rather than progressive (Juul 2002) giving rise to unpredictable game states with minimal rules, necessitating diverse and unique efforts across multiple scenarios. Hence, we use tabletop games for our study to explore versatile emergent game states. This choice is also grounded in their simplicity and limited prior research.

METHODOLOGY

A series of qualitative empirical studies were adopted iteratively to explore the experience of mental effort in the context of tabletop games (Author Year). The primary objective was to gather data regarding players' perception of mental effort, aiming to discern the most suitable methods for collecting specific types of data.

In selecting tabletop games, a deliberate effort was made to include diverse genres. This approach facilitated an exploration of different natures of mental effort in different genres. Hence, the chosen games span across various categories, from party games to abstract strategy games. These selections were made without imposing any restrictions and included games that vary in complexity, reliance on luck, and levels of social interaction. Table 1 shows the selected games, their mechanics, time taken to play the game, and number of players. This study's participants comprised college students between the ages of 18 and 30. There was a diverse range of participants regarding their experience with tabletop games. Some participants were relatively new, while others had extensive exposure. To ensure biases based on previous experience do not influence their experience, we ensured that none of the participants had played the selected games before. To recruit participants, we employed a combination of word-of-mouth and social media platforms, where those who expressed interest were invited to participate.

Games	Mechanics	Time	Players
Catan (Teuber, K. 1995)	Dice rolling, Hexagonal Grid, Modular Board, Income, Negotiation, Network and Route Building, Race, Random Production, Trading, Variable Set Up	60-120	3-4
Azul (Kiesling, M. 2017)	End-Game Bonuses, Open Drafting, Pattern Building, Tile Placement, Turn Order- Claim Action	30-45	2-4
Secret Hitler (Temkin, M., Boxleiter, M., and Maranges, T. 2016)	Hidden roles, Player Elimination, Team-Based Games, Traitor Game, Voting	45-60	5-10
*Splendor (*Andre, M. 2014)	Contracts, Open Drafting, Race, Set Collection	30	2-4
Fungi (Povis, B. 2012)	Hand Management, Open Drafting, Set Collection	30	2
Patchwork (Rosenberg, U. 2014)	Grid Coverage, Income, Open Drafting, Rondel, Square Grid, Tile Placement, Turn Order - Stat Based, Turn Order - Time Track, Victory Points as a Resource	15-30	2
Telestrations (Uncredited. 2009)	Drawing, Paper-and-Pencil	30	4-8
Hanabi (Bauza, A. 2010)	Communication Limits, Cooperative Game, Hand Management, Memory, Set Collection	25	2-5
Codenames (Chvatil, V. 2015)	Communication limit, memory, push your luck, team-based	15	2-8
Codenames: Pictures (Chvatil, V. 2016)	Communication limit, memory, push your luck, team-based	15	2-8

Table 1: Games used for the empirical study, their important mechanics, average game-play length, and number of players.

The data was collected over a span of two months with each session lasting for about 3 hours. Given the substantial time commitment involved in playing games, engaging in discussions, and participating in interviews, we took measures to ensure a flexible and relaxed atmosphere during the sessions. These sessions were designed to be comfortable and accommodating, allowing participants to express themselves openly and participate actively. Additionally, we provided incentives to participants, such as snacks and beverages. These incentives were instrumental in maintaining participants' comfort and motivation throughout both the gameplay and data collection phases. By creating an environment conducive to open expression, we

aimed to collect authentic data that could provide valuable insights into the subjective experience of mental effort.

The data collection process was structured to ensure that all participants were made aware of the game mechanics and rules before engaging in gameplay. Players filled informed consent form before gameplay sessions were initiated. At the beginning, a familiarization phase was incorporated, allowing participants to engage in 1-2 trial rounds of the specific game being studied. This approach aimed to guarantee that all participants had a grasp of the game mechanics (as the selected games were new to them), enabling them to immerse themselves fully in the subsequent gameplay. The actual data collection phase commenced after the familiarization phase. The specific setup for data collection varied according to the type of data being gathered, acknowledging the diverse range of methodologies employed. For methods involving written responses and experience sampling, participants were provided with blank notebooks to document their experiences. Participants recorded their thoughts, emotions, and observations related to their subjective experiences of mental effort during gameplay. In addition to written responses, verbal interviews were conducted using mobile phones to record audio. This mixed approach ensured the capture of both 'during gameplay' and 'post-gameplay' data, providing an understanding of players' experiences and perceptions of mental effort as well as evaluating affordances of each of these methods.

The research approach was iterative, where data analysis and methods continuously informed one another. This dynamic interaction between research methods and data analysis strengthened the overall research framework, substantially enhancing the understanding of effort. Each method brought its unique strengths and addressed its inherent limitations, contributing to the development of a robust study. By capitalizing on the strengths of individual methods and addressing their limitations, this research aimed to contribute significantly to the body of knowledge regarding the nature of experience of mental effort. Table 2 shows the post gameplay and during gameplay methods of data collection that were employed, issues identified, and the primary nature of data that was obtained from each of the methods.

Retrospective/Post Gameplay	**Issues**	**Affordances**
Individual interviews	Practical feasibility - time consuming for longer and multiplayer games, researcher's bias	Effort quantification within and across games, 'What' constitutes perception of effort (events, actions, and decisions), Comparison across different games
Focus group	Unequal participant engagement, lack of unique perspectives	Distillation of complex ideas, Comparison across different games
Written responses-third person	Lack of in-depth insights	Captures individual differences about 'what' demanded effort in games, Comparison across different games
Written responses-first person	Priority given to salient events only	Memorable events and related emotions, Comparison across different games

During Gameplay		
Experience sampling	Unequal participant engagement	Moment-to-moment experiences (even monotonous ones), related emotions

Table 2: Summary of the results of evaluation of method (Author Year)

RESULTS

Thematic analysis was conducted after the data collection phase. It started with open and axial coding, followed by identifying themes. Codes were primarily inductive. The ideas obtained were triangulated across different games and methods. The process of theme identification involved back-and-forth movement between the data, codes, and emerging themes. Multiple themes were identified that explain the experiential dimensions of effort, such as attributing the amount of effort to reward and uncertainty, quantifying and relatively comparing effort across different games, perceiving effort as a resource, and more. This paper highlights four important themes describing the dynamic emergence of effort as players interact with game rules – rules channel effort, players' autonomy in effort, effort exists in a state of flux, and effort-emotion concomitance.

Effort and Rules (Channeling)

Rules are tools that sculpt players' experiences (Calleja 2022). Rules created by designers establish the limitations and possibilities of actions and decisions. Calleja's distinction between restrictive and generative rules describes games as having generative rules that enable players to act. These generative and enabling aspects of rules allude to the idea that rules create a fertile ground for players' effort. By examining rules from the perspective of effort, we observe that apart from being generative, rules also *channel* player effort. If rules generate possibilities for action, we contend that they also steer effort by generating thoughts and emotions that propel actions.

To illustrate our argument, we examine two games - *Fungi* and *Splendor*. We explore how the concept of *resource scarcity* manifests in these games, highlighting the role of rules and how they lead to distinct experiences of player effort. Fungi includes primary mechanics of set collection, open drafting, and hand management. Players collect and manage cards to maximize their score. These rules set the premise for players to decide which mushrooms to collect and plan future possibilities based on available cards and speculation of the opponent's strategies. Players describe effort through the articulation of their experiences centred around a complex decision space generated by games' rules:

> "At the start, you are kind of trying to take over one kind of mushroom so that you can monopolize on it but turns out as a surprise when your opponent is also trying to collect the same type of mushrooms to ruin yours, or he actually has more of them, it gets very uncertain as to collect which mushroom. But I think because you can at least see the cards ahead, you have to strategize and guess what will the opponent choose, and can you manage to get the card you want? And there are several variables for that like sticks, night cards, pans, fly agaric which gives much freedom for what to do."

In this scenario, a player explains effort through his mental processes, including strategies, short-term goals, game state analysis, anticipation, uncertainties, and multiplicity of choices. All the thinking that goes into making decisions and taking actions are generated within the framework that the rules afford. Similarly, in Splendor, players aim to collect gem cards to earn points. On their turn, they can take gem tokens, reserve gem cards, or purchase them using gem tokens. The game is won by accumulating a certain number of points, typically 15, achieved by collecting gem cards of varying point values and arranging them in sets. Detailing his experience with this game, one player explained:

> "... gather as many cards in the beginning as you can, reserve to sabotage and race to get what card you want."

Like Fungi, Splendor also revolves around resource scarcity, requiring players to channel their efforts into managing specific resources—gem cards in Splendor and mushroom cards in Fungi.

By channeling, we mean that rules not only create space for players' actions but also give direction to players' thoughts for taking such actions. For example, in the game of Fungi, players have limited options for collecting mushrooms, and they must strategically choose cards based on their potential score values and cards already available to them. This creates a sense of resource scarcity, compelling players to make judicious decisions. In contrast, in Splendor, resource scarcity takes on a different form. While there is no direct limitation on the available number of gem cards, the scarcity arises from the competition among players to acquire the most valuable cards. It is a competition for scarce high-value opportunities rather than a direct limitation on the number of available resource cards. In this way, different rules for the display and drawing of cards create different scenarios for the manifestation of competition around resource scarcity. As a result, players direct their effort differently. While in Fungi, the effort lies in optimizing the limited resources at hand to score points, the effort in Splendor is to outmaneuver opponents by acquiring the most valuable cards. The table below summarizes how rules channel effort differently in resource management in Fungi and Splendor.

Aspect	Fungi (Morels)	Splendor
Type of Resource	Mushroom Cards	Gem Cards
Central Display Rule	Limited number of mushroom cards available in the central display. Players choose from these.	Market of gem cards with different values; players can take from this market.
Card Drawing Rule	Players draw cards from the deck or decay pile, both of which have finite resources.	1-4 Players can take gem cards from the market, and the number of each type is limited.
Competition Manifestation	2 Players compete for specific mushroom cards with higher point values.	Players compete to acquire high-value gem cards with more points.

Scarcity Manifestation	Limited options for mushroom collection, reflecting foraging in a forest.	Competition for scarce, high-value gem cards drives strategic decisions.
Effort Manifestation	Optimizing the limited resources at hand to score points efficiently	Outmanoeuvring opponents by acquiring most valuable cards

Table 3: Table showing how rules channel effort and the way this process manifests in two games: Fungi and Splendor.

Effort and Players (Autonomy)

The channelling of effort through rules, however, does not elicit a feeling of being restricted within those channels. Instead, rules give a structure to games that channel the players' thought processes and aid analysis of game states and decision-making. Game rules facilitate players' considerations of when, where, and how to apply effort within the game. Within the rules, players *autonomously* dictate the nature and extent of effort that they exert during gameplay, aligning their actions with their goals and preferences. The unpredictability and ambiguity introduced by game rules provide a stage for players to exercise their autonomy (Nguyen 2020). This autonomous exertion of effort is the fundamental aspect of the gameplay experience. In contrast to the previous idea of channelled effort, the autonomous perspective emphasizes that players exercise their agency while making game decisions. Although players are confined within preset rules, they still have the flexibility to adapt and shift their efforts.

Based on our examination of how rules influence player effort and autonomy, we delve into these concepts using an example from the board game *Azul*. In this game, players take turns selecting coloured tiles from a central factory display and placing them on their personal player board to create patterns and complete rows and columns. The goal is strategically gathering tiles to maximize points while avoiding penalties for unused tiles. While describing her experience in this game, one player articulated her disappointment with the way the game was turning out for her:

> "...I needed 2 yellow tiles to fix my game. There were only 2 yellow ones left and all others' turns were before me. I was lowkey nervous and hopeful. The first person didn't pick them up. I was relieved. The second person left them too, I was optimistic. However, the third guy took ten times more time than others to pick up the tiles and ended up picking up the yellow ones, which I needed! I was disheartened. I did, however, make another move. It so happened that it not only foiled all my playmates' plans but also made me win the entire game!"

In this excerpt, the player describes the unpredictability and associated emotions experienced by her, which arise due to rules that lead to the random availability of tiles that she can be picked up. Despite having limited choices based on her initial strategy, she came up with another move that worked in her favour. Players make several such micro in-game decisions that represent autonomy of effort. Autonomy and freedom of effort come from an actionable inventory of decisions. The game's

rules enable players to channel their effort amidst several possibilities, which players choose on account of their own volition depending on their situation. For instance, some players opt for an *intuitive approach*, as they describe making decisions based on immediate instincts, while some make *deliberate long-term strategies*. Commenting on his efforts in decision-making in Azul, one participant stated:

> "I have a gut feeling that I am in the right direction, so I have to stick to it. I am following my instincts more than strategy."

Autonomy of choice to rely on intuition or deliberate thinking, reflects player's liberty in shaping the gameplay and their experiences.

Effort Exists in a State of Flux

As players interact with rules, multiple game states emerge progressively, each with vast decision space. The possible game states remain uncertain, and the decision space remains complex. Within these uncertainties and dilemmas, rules serve as channels for mental effort while enabling players to exercise their autonomy. Players' actions, channeled by game rules, generate gameplay, raising the need for effort. This effort, however, is not stagnant in the way it manifests. Its form, in terms of quality and quantity, constantly alters as the gameplay evolves. To provide insight into this transformation, we explain different *forms* of effort.

Forms of Effort

Form is a tentative term to describe the differing yet unique characteristics of effort as it manifests during gameplay; for instance, the form of effort in psychological vs. intellectual struggles, strategy vs. tactics, anticipation vs. apprehension, advancing gameplay vs. stalling gameplay, have different attributes. Effort in these forms, however, does not exist in *either-or* situation. It can exist in a spectrum, overlap, or co-exist concurrently in multiple combinations of these forms. These forms can be discerned through instances observed during gameplay.

Taking the different forms of effort in strategy and tactics as an example, when players strategize for the long term, they think about multiple steps ahead through anticipation and experience. At the same time, one can play depending on whatever game state emerges and tactically make a decision. For example, one form of effort in Azul is to pre-plan actions that players can take to fill the wall with all the tiles of one colour and constantly strive to get a bonus score. However, with a randomizing mechanism and uncertainty arising from opponents, such long-term strategies have to be abandoned, depending on the tiles remaining on the central factory display. Player negotiates their effort between these two forms simultaneously, and this negotiation is dependent on the specific context within the gameplay. In one of the sessions involving the experience sampling method in the game of Azul, one player described his goal of aiming for bonus points:

> "I was aiming for the bonus points, and hence, all strategies were based around bonus points. At the same time, it was a little overwhelming to figure out what the opponent might be planning. I am aiming for a bonus so, right now, my points are on the lower end, but I am keeping myself patient and trying to think for a longer term."

This excerpt exhibits the player's dilemma regarding his long-term plans and apprehension about how his opponent can foil his strategies. Further, upon realizing that his long-term plan did not materialize as expected, his response hints at a momentary shift in his form of effort from strategy to instinct-based tactics:

> "I have a gut feeling that I am in the right direction, so I have to stick to it. I am following my instincts more than strategy… My strategy for a long game was not successful. Could not figure out how the opponent was strategizing."

Despite this observable transition, effort exists in strategizing, parallel to tactically making moves depending on the game's situation. Hence, these two forms of effort, which are seemingly diametrically opposite, are, in fact, constantly shifting to the extent that it is impossible to distinguish one from the other at any given time.

Another form of effort is distinguishing characteristics of exertion in *psychological and logical challenges.* Players frequently battle with unknowable information and ambiguity in games arising from co-players that simulate psychological struggles. Games involving logical conflict, on the other hand, have a greater emphasis on problem-solving and strategic planning. For example, players of games like Chess or Azul describe their effort as a logical challenge that requires them to plan ahead, spot patterns, and devise clever strategies. In contrast, games like Secret Hitler, Codenames, and Hanabi compel players to read their opponents' intents, pull off bluffs, and hide their goals. The effort is essentially psychological in such games since players constantly assess and adjust to the changing game dynamics.

To illustrate this distinction, we explore the effort of *hint-giving* in two games – *Hanabi* and *Codenames*. Hanabi is a cooperative card game in which players work together to arrange a set of cards with limited information sequentially. Players hold their cards facing outward so they cannot see their hand and rely on clues from their teammates to play the correct cards in the proper order. Codenames, on the other hand, is a word game that involves deduction and word association. Players are divided into two teams, with one player from each team providing one-word clues to help their teammates guess the words on the board while avoiding words that belong to the opposing team. Secret Hitler is a social deduction game in which participants are secretly assigned roles as Liberals or Fascists. The game hinges on their ability to negotiate and deduce their opponents' true identities while enacting policies. The game unfolds through voting, strategizing, and deceiving as players put effort towards their respective goals of enacting policies or identifying Hitler. In all these games, the rules demand players work towards giving hints and guessing, but the effort is channelled in different forms. In a focus group discussion revolving around the variation in the task of giving hints in Hanabi and Codenames, one player expressed:

> "Hint giving is complex in both Hanabi and Codenames. In Hanabi, it is more logical, while in Codenames, it is more about subjective knowledge. Here (Codenames), it is more about how each person thinks. It is sillier and more fun as we are playing against people. Hints in Hanabi is more logical in nature and when it's logical, its less fun, because if I can't give hint, it means I'm just stupid."

In Hanabi, hints are more specific, often involving colors and numbers to guide teammates. Hints are predominantly given based on the known information about the cards in players' hands. In Codenames, however, hints depend on the implicit

knowledge base of players. They provide one-word clues to lead their team to the correct words on the table, banking on their grasp of their teammates' knowledge base. A small amount of psychological judgment is required by both hint-givers and guessers in Codenames, which is lacking in Hanabi.

Aspect	Hanabi	Codenames
Rule Generating the Need to give hint	Players lack information about their own cards, needing hints to guide based on colours and numbers.	Implicit knowledge-base requires hints to lead the team to correct words on the table.
Nature of Hint	Hints are specific, often involving colours and numbers to provide precise guidance.	Hints are one-word clues, abstract, and open to interpretation, connecting multiple words.
Effort in hint giving	Logical and precise effort as hints are based on known information about the cards.	Involves psychological judgment, making hint-giving more subjective.

Table 4: Table comparing effort in hint-giving in Hanabi and Codenames

However, the difference in the form of effort in terms of logical and intellectual struggle is more than just genre dependent. Within a single gameplay session, the psychological and intellectual form of effort can also exist in a state of flux. For instance, Azul is an abstract strategy game in which players primarily focus on maximizing their score through logical planning. In this game, psychological effort in deceiving and lying is less essential for winning than in games like Secret Hitler. However, in one session involving Azul, we observed players also invested in a psychological form of effort. Describing how he executed a convincing behavior to deceive his opponent regarding his next move, one of the players wrote:

> "It was during one of the last rounds of Azul, the annoying person playing before my turn was hell-bent on ruining other people's score and did not care about winning even though he could. I wanted the dark-blue pieces to complete my strategy. So I acted like I wanted all the yellow pieces (which were also perfect in number for me but would have given me a couple of fewer points). And it worked! The dark blue tiles were spared. I proceeded to take the dark blue pieces after that with a sarcastic 'thank you.'"

It can be observed that along with the logical planning of getting dark blue tiles to fill walls on his board, the player also instinctively pretended to lead his opponent to a false belief. This example portrays how the two forms of effort can coexist even in abstract strategy games like Azul under suitable circumstances.

Effort-Emotion Concomitance

As players engage with games, their emotional states can fluctuate in response to the demands shaped by the game. These emotional fluctuations, in turn, influence their perception, interpretation, and articulation of mental effort. The interplay between effort and emotion constitutes a fundamental facet of describing the gameplay experience. This interplay emphasizes the complex relationship between mental exertion and emotional states, providing insights into how players navigate and respond to the emergent game states. It is also closely linked to the phenomenon of effort always being in flux. It can also be argued that effort and emotion together form a synergetic relationship that is always in a state of flux. We tentatively call this relationship between effort and emotion *effort-emotion concomitance*. This concomitance highlights the reciprocity between mental effort and emotional states during gameplay. It demonstrates the role of emotions and effort as dynamic influencers of player experience, underscoring that mental effort and emotional dimensions exist in flux. The player's emotions, shaped by in-game events and outcomes, continuously intertwine with, and reciprocally affect mental effort, resulting in a multifaceted gameplay experience:

> "I had already given up on winning or at least felt like it would be too much effort to actually think of a strategy and win. So, I just made up my mind to troll everyone for the last round. I felt evil and mischievous and had a devious grin on me. Then I looked at the factory tiles and realized no matter what I pick, no one's game would be ruined. Long story short, it didn't really work, but I managed to take one point from Dev at the end. Worth it."

End-game events often evoke heightened emotions and increased tension. In this passage, a player reflects on the in-game events as the game nears its conclusion. He expresses his state of inescapable loss and circumstantial decision to disengage himself from making strategies to win. Having resigned himself to the inevitability of defeat, he redirected effort towards actions aimed at sabotaging the opponents during the limited remaining time. His emotion transitioned from 'resignation' to 'playful rebellion.' This shift was accompanied by a change in the nature of effort, moving from collecting tiles to increase one's score to collecting tiles to reduce others' scores. Similar to 'resignation' and 'rebellion,' games provide a platform for the emergence of other momentary emotions. Detailed descriptions of experiences by players highlight the roller-coaster of fleeting emotions co-occurring with varying forms of effort:

> "I felt that the game ended too soon. 'Soon' because I was strategizing for a longer span. Hence, I felt disappointment. During several situations within the game, I succeeded in anticipating opponent's move beforehand which felt like eternal happiness. This feeling was not expressed but felt more in the sense of control over situations. When the tiles were drawn out, I realized some mistakes from the previous game which could have been dealt with in a better way. A voice like 'you should have thought about it' played in my mind."

During gameplay, players invest effort in strategies and anticipation, potentially accompanied by 'disappointment' if things do not unfold as expected. Conversely, feelings such as 'contentment' and 'self-assuredness' may surface when outcomes align with anticipation. Experience of 'disappointment' and 'remorse' can also arise from self-evaluation of previous moves. Irrespective of the chronological sequence in

which emotions are recognized and interpreted, it is crucial to grasp that they are fluid and entangled in nature. In certain circumstances, 'disappointment' may coexist with 'contentment.'

> "I didn't expect them to buy or reserve second tier cards yet. So now they have changed a bit. Yet, I was able to adapt."

The simultaneous presence of transitory emotions and effort does not imply a *cause-and-effect* relationship between them. Instead, it emphasizes the absence of temporal or logical boundaries that distinguish one from the other.

SUMMARY AND DISCUSSION

We play to experience fun, challenges, achievement, and other emotions. When asked to describe their gameplay experience, players attach their exertions in activities like strategizing and anticipating explaining their experience, such as 'fun,' 'boring,' and 'immersive' (Author Year). Therefore, effort is intertwined with emotions experienced during gameplay, and it is crucial to comprehend the nature of effort. Four themes describing the qualitative nature of effort have been detailed – rules channel effort, players' autonomy in effort, effort in a state of flux, and effort-emotion concomitance.

Rules channel effort delves into the relationship between the rules of a game and the effort exerted by players. Rules are not just constraints but the very reinforcement that sculpts gameplay experience. In terms of effort, they create channels, shaping and directing player's non-visible mental exertions. The difference in these channels results in different interpretations and perceptions of experiences. *Players' autonomy in effort* explores the concept of player agency and its role in shaping the nature of effort. Players actively choose the channels through which they invest their effort, and these choices are deeply intertwined with their intrinsic motivations and personal agency. *Effort exists in a state of flux* describes the multifaceted nature of effort and how it emerges throughout gameplay. The interaction between players and rules generates multiple game states and results in the emergence of effort in several forms. These forms do not emerge in successive fashion, i.e., one after another. Through several examples of players' responses, we elucidate how games give rise to states of flux, in which multiple forms of effort can exist in a spectrum, overlap, or shift. This theme underscores the adaptive nature of effort within gameplay contexts and situations, highlighting the nature of effort to seamlessly transition as well as coexist between these different forms as the game progresses. *Effort-Emotion Concomitance* outlines that the existence of effort in the state of flux is inextricably linked with the dynamic emotions players feel throughout gameplay. This association does not have a cause-effect relationship. Instead, we argue that it is concomitant, i.e., their presence is significantly overlapping, so it is impossible to differentiate effort from different emotions. These identified nature of effort in raises theoretical queries and methodological challenges.

The recognition that effort exists in a state of flux raise question of what sustain this dynamic nature throughout the gameplay. This prompts to delve deeper into the role of elements like uncertainty and motivation in influencing effort and other emotions. Similarly, the coexistence of emotions and effort nudges to investigate the nature of their integratedness. The nature may include identification of similar patterns across different games or nebulous units of time delineating a particular type of

concomitance. Analysis of this nature is unavoidably linked with the method used to collect data and the epistemological positioning of the study. The data collection method used for this study is a mix of immediate and delayed reportage. Being emergent in nature and existing in a state of flux along with emotions, the perception of effort at any given point in time is not only difficult to capture, but also to articulate or describe conclusively. Hence, this study instigates the need to explore diverse methods to understand effort in games.

CONCLUSION

In the paper, our goal is to offer an in-depth exploration of the qualitative attributes of effort in tabletop games. Rooted in a constructivist framework, our approach places a strong emphasis on understanding how effort emerges as players engage with the rules of games. Drawing from analysis of qualitative data collected during numerous gameplay sessions, we identified and examined four key themes that provide insights into the nature of player effort in tabletop games – rules channel effort, players' autonomy in effort, effort in a state of flux, and effort-emotion concomitance.

The future direction of this study involves an expansion of methodologies to unearth dimensions of the subjective experience of effort. Exploring newer methods, to capture and visualize effort and emotions as a game progress, can unveil additional layers of understanding. By recognizing the intricate relationship between effort and emotion, future studies can contribute to the analysis of games for playtesting purposes.

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