

Motivational Landscapes of ARG Players: A Self-Determination Theory Perspective

Ruoyu Wen

University of Canterbury
Christchurch, New Zealand
ruoyu.wen@pg.canterbury.ac.nz

ABSTRACT

This study introduces a taxonomy for categorizing participants based on Self-determination theory in Alternate Reality Games (ARGs). The taxonomy emerges from a comprehensive analysis of player motivations and behaviors within a self-designed ARG project in China. By scrutinizing game website logs, chat group interactions, and employing a player motivation questionnaire, this mixed-method exploration sheds light on player behaviors and motivations, based on the Self-determination theory (SDT). Through this study, a new ARG player taxonomy system driven by player's motivation are built. This research contributes to a clear comprehension of the unique realm of ARGs, offering insights valuable to both designers and scholars.

Keywords

Alternate Reality Game, Player Taxonomy, Player's Motivation, Game Design

INTRODUCTION

1.1 The history of ARG

Alternate Reality Games (ARGs) represent a distinctive form of transmedia interactive narratives that seamlessly blend various media elements, including videos, websites, and video games, transcending traditional boundaries by incorporating real-world components. Notably, their origins can be traced back to *The Blair Witch Project's* promotional campaign, which utilized faux police reports and interviews to complement the movie's "found footage" theme. *The Beast*, launched in 2001, is often considered the inaugural ARG, created to promote Steven Spielberg's movie, *AI*, amassing over 7,000 participants during its 120-day duration. ARGs have evolved beyond marketing tools, finding applications in education and problem-solving contexts, such as citizenship education, language learning, and STEM education. Notable examples include *World Without Oil* (2007), *Urgent: Evoke* (2011), *Tower of Babel* (2011), *DUST* (2015), and *Ines&Us: Endless Love* (2018), emphasizing their versatility and potential for transformative experiences. ARGs maintain a close connection with video games, with instances like *I Love Bees* (2004) for Halo 2's launch and integration into 3A games like *Cyberpunk 2077*. Furthermore, video games increasingly incorporate ARG elements, fostering active gaming communities, as observed in *Rusty Lake: The White Door* (2020), *Inscription* (2021),

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and *The Past Within* (2022). In summary, ARGs represent a unique and adaptable form of gaming that merges real-world and digital components to create engaging interactive narratives, impacting not only the game industry but also realms beyond entertainment.

1.2 The structure of ARG

In 2008, Christy Dena introduced a two-tier structure to better understand ARGs: 'World' and 'Work.' The concept of 'World' encompasses all products within the same narrative or thematic setting, extending beyond ARGs into various media, including games, movies, books, and more. In contrast, 'Work' refers specifically to an individual ARG product. Dena's framework suggests that ARG research should explore not only the ARG itself but also its broader cultural context, acknowledging its connections to a wider creative landscape.

Furthermore, Beer and Bothma (2016) identified three core components that define ARGs: narrative, game action, and community and interaction. The narrative aspect plays a pivotal role in ARGs, often commencing with a cryptic clue, such as an email or a video, to immerse players in the game's unfolding story. This narrative is thoughtfully distributed across diverse media platforms, such as YouTube, Facebook, and sometimes real-world locations, encouraging players to piece together the overarching plot through puzzle-solving and exploration.

The game action in ARGs uniquely blurs the lines between the real and virtual worlds. Drawing from the insights of Jane McGonigal (2003), ARGs leverage real-world settings to foster a virtual engagement with reality, enabling players to exert influence on the game's virtual world through their real-world actions. This fusion creates an immersive experience that is distinctively characteristic of ARGs.

Additionally, ARGs thrive on community and interaction, underscoring the significance of collective play. Often, players must collaborate to solve an array of puzzles, as exemplified by *The White Door* ARG (Rusty Lake, 2020), where puzzle pieces are distributed across ten countries, necessitating global cooperation. Moreover, ARGs embrace player-generated content as a notable feature, which not only enhances the gaming experience but also strengthens the sense of community and shared exploration among players.

1.3 The problem

Despite the rising popularity of Alternate Reality Games (ARGs) over the last two decades and their demonstrated potential in engaging players and fostering communities, there remains a notable gap in empirical research concerning player motivations and typologies. The utilization of ARGs has expanded into diverse fields including promotion, marketing, education, and healthcare (Beer & Bothma, 2016; Connolly et al., 2011; Andrade et al., 2019). However, the understanding of the player base, which is central to the success of ARGs, remains limited (Dena, 2008). Existing literature on player motivations and types of ARG is grounded in observation and personal experience rather than academic theories (Jenkins et al., 2006; Dena, 2008). Self-determination theory (SDT) is a popular theory from psychology that has been widely used in game study to research players'

motivation (Peng et al., 2012; Ryan et al., 2006; Ryan & Deci, 2007; Sheldon & Filak, 2008). Previous studies show using it in the player study domain can support us with a perspective to understand the motivations of players in ARG. As a result, this thesis aims to bridge the identified research gap by examining player motivation and behavior to formulate an ARG player taxonomy based on SDT. The investigation is structured around three specific research questions:

RQ1: What player types can be delineated in ARGs?

RQ2: What is the distribution of player types within a specific ARG community?

RQ3: What factors contribute to the categorization of player types?

LITERATURE REVIEW

2.1 Previous Research on Player Taxonomy and Motivation

Player motivation in gaming is a multifaceted area explored through diverse theories and models. Edwards' GNS Theory (2001) delves into the motivations of role-playing game (RPG) enthusiasts, introducing three fundamental paradigms: Drama (emphasizing narrative and story), Simulation (focused on world exploration and immersion), and Game (prioritizing challenge and competition). Within this framework, Edwards identified three primary player types: Gamism (characterized by a desire to compete and defeat others), Simulationism (centered on exploring intricately designed game worlds), and Narrativism (where players relish the unfolding of the in-game story).

Bartle's Player Types (1996), proposed by Richard Bartle, offer a qualitative model categorizing players into four distinct categories: Killers (who thrive on interacting with other players, sometimes disrupting their experiences), Achievers (motivated by achieving in-game goals and accomplishments), Socializers (who prioritize friendly social interactions and building connections), and Explorers (who seek deep immersion in the game world and enjoy uncovering game mechanics and narratives).

In the context of Live Action Role Playing (Larp), R. McDiarmid's research (2011) identified two central motivations: agency (players wanting to make decisions for themselves) and the fulfillment of game expectations. McDiarmid's taxonomy includes 16 motives for Larpers, encompassing Audience (engagement in compelling narrative experiences), Catharsis (connecting with character emotions), Comprehension (solving puzzles and understanding game elements), Competition (enjoyment from winning and overcoming challenges), and Exploration (desire to immerse in the game world).

R. Bienia's study (2012) aimed to validate McDiarmid's Larp player motivation theory, partially affirming it among German Larpers, albeit with limitations in terms of cultural differences and potential preconceptions introduced through the survey process.

N Lazzaro's Four Fun Keys (2008) summarize player enjoyment into four categories: Hard Fun (challenges and skill improvement), Easy Fun (exploration and content

enjoyment), Serious Fun (escapism and immersive experiences), and People Fun (social interactions).

Nacke et al. (2014) propose a neurobiological gamer typology, linking player preferences to neural mechanisms, with seven distinct gamer types like Seeker, Survivor, Daredevil, Mastermind, Conqueror, Socializer, and Achiever.

Additionally, Nick Yee et al. (2012) introduced a Player Motivation Scale, assessing player motivation in World of Warcraft based on three key factors: achievement, social interaction, and immersion, through a cross-cultural study involving both U.S. and Chinese players. These comprehensive models and scales provide valuable insights into the intricate motivations driving player engagement across a range of gaming contexts.

2.2 Prior Taxonomies of ARG Player

Ivan Askwith et al. (2006) published an exploratory report aiming to furnish initial design and research guidelines for aspiring ARG creators. In addressing the player demographics, the report proposed a classification of players into Organizers, Hunters, Detectives, and Lurkers. Organizers act as the community's linchpins, coordinating puzzle-solving endeavors and often delegating tasks, alongside maintaining crucial community documentation which aids newcomers in catching up with the game progression. Hunters and Detectives propel the game forward albeit with distinct preferences: Hunters relish in unearthing new clues across various media, while Detectives are inclined towards analyzing existing clues, solving puzzles, and decoding ciphers. Lurkers, although often overlooked, constitute a significant portion of the community, usually acting as silent observers with the Lurker-to-active player ratios estimated between 5:1 to 20:1 (Askwith et al., 2006).

Christy Dena (2008) proposed a tier-based classification of ARG players, distinguishing between Hard-core Players and Audiences. Within the Hard-core tier, Dena identified three sub-groups: Puzzle Players, Story Players, and Real-world Players. Puzzle Players, akin to a combination of Hunters and Detectives (as per Askwith et al., 2006), are captivated by clue discovery and puzzle resolution. Story Players are drawn to the narrative aspects of the ARG, valuing the story above all. Real-world Players find appeal in puzzles tied to real-world locations, relishing the opportunity to undertake physical tasks (Dena, 2008). Conversely, the Audience tier represents passive participants who, although uninterested in puzzle-solving, derive satisfaction from reviewing documentation and observing the community's progress, resonating with the definition of Lurkers by Askwith et al. (2006).

2.3 Theoretical Framework

The ARG Descriptive Model (Javanshir et al., 2018) aims to build a method to split ARG into sections and research each section. They want to know how they connect to each other, and how to transfer from one to the other. The ADM is based on the concept channel, and the channel in this model is defined by its boundary (Javanshir

et al., 2018). Different contents in ARG exist on different websites, social media, real locations, etc. In a word, content with its media makes up the channel.

Furthermore, the ARG model also includes concept instances and links. The concept of "instances" refers to the particular states of content within a given channel at a specific moment. For instance, in the context of a poster being present at a certain location, each occurrence represents a unique instance. In the event that the producers of an ARG replace an existing poster with a new one, resulting in two posters simultaneously being present, this signifies the emergence of a new instance. Instances, in this context, are distinguished by two fundamental attributes: interactivity and state. Interactivity refers to whether the instance requires players to perform specific actions, such as sending an email or making a phone call. If the instance necessitates player engagement, it is considered active. On the other hand, if the instance only presents information to the players, such as watching a video or reading a message, it is deemed passive. Regarding the state, an instance is categorized as live if it occurs in real-time, such as live streaming or live performances. Conversely, if the instance remains unchanged and can be accessed at any time, it is considered static. (Javanshir et al., 2018). Links are connections between instances or channels, which are navigational paths. For example, from a live stream (instance) one can find a link to a missing person's Facebook account (channel). And scene means the narrating time.

Self-Determination Theory (SDT) is a theory of human motivation. According to SDT, the reasons why individuals choose to participate, exert effort, and persist in an activity can be categorized along a continuum of self-determined regulation (Deci & Ryan, 1985; Ryan & Deci, 2000b). According to previous research, if a game can satisfy players' intrinsic needs, players would feel more happy and immersive while they are playing (Peng et al., 2012; Ryan et al., 2006). One subset theory of SDT is Cognitive Evaluation Theory (CET), which has been used for research regarding video game players' intrinsic motivations (Ryan & Deci, 2007; Sheldon & Filak, 2008). There are three main needs of players in CET, Autonomy Need, Competence Need, and Relatedness Need. Autonomy Need relates to Agency, a common idea in game studies, where players want to make their own choices in the gameplay and determine the progress of the game with their own efforts. Competence Need connects to players' desire to improve their ability while playing, they are reported to want to face challenges that can be solved with effort. Relatedness Need is associated with a sense of belonging, social interactions make players not loners anymore, they want to feel they belong to some community. This model fundamentally explains the motivation of players to engage in the game.

METHODOLOGY

3.1 Sample and sampling techniques

Data collection for this study took place in April 2023, when the main pilot of the ARG was performed on Chinese social media. Three experienced ARG designers participated in the early in-depth interviews of the study, 287 players joined the game community group chat, and 61 players filled in the follow-up questionnaire. All respondents are recruited from social media and game communities in China.

3.2 Research Tools and Procedures

This development of the ARG is based on Research through Design (RtD), which is a model of interaction design. Furthermore, the research was designed to benefit Human-Computer Interaction (HCI) as well as practice community research (Zimmerman et al., 2014). There are five steps to carry out an RtD study, Select, Design, Evaluate, Reflect, and Repeat. By RtD, an ARG (shown in Figure 1) was constructed. Furthermore, participant observation was used for its ability to provide a detailed, in-depth understanding of human behavior and interactions. Specifically, participant observation involves the active involvement of the researcher in the social setting or group being studied, with the aim of gaining an in-depth understanding of the behaviors, interactions, and cultural practices of the participants. (Tegan George, 2023).

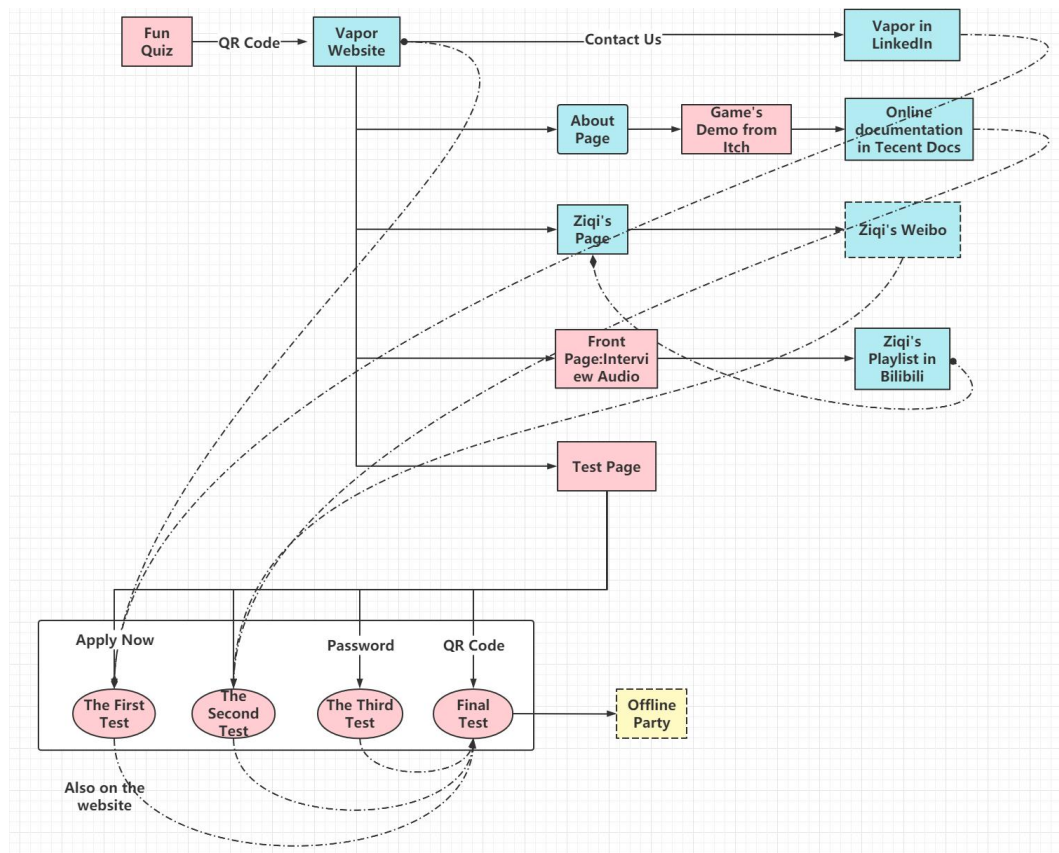


Figure 1: Game Structure Chart. The main process of the Vapor ARG is presented according to the ARG descriptive model (Javanshir et al., 2018). The structure of the Vapor ARG is divided into the following forms, squares indicate channel (media platform), ovals indicate instances (contents and states of contents), and lines indicate links (connections between instances or channels). Red indicates that the interaction is active, while blue indicates that the interaction is passive. A dashed border indicates that the interaction is live, while a solid border indicates that the interaction is fixed. Where live is information that gets updated on e.g., Weibo (Chinese Twitter) as players decipher the process, and where fixed is information that is available to the players from the game start.

3.3 Data Collection

To thoroughly analyze player behaviors in ARGs, an ARG was developed and launched in China. Given the collaborative nature of ARGs, players commonly use chat applications for communication and strategizing. A chat group was established on WeChat to facilitate player discussions and experience sharing. The researcher actively participated in the chat group, engaging with players to gain insights. As China currently lacks a dedicated ARG player website, this WeChat group served as the primary platform for player communication, and for researchers to document and evaluate player behaviors throughout the game.

A mixed methods research approach was employed to understand player motivations and characteristics within the ARG comprehensively.

3.4 Data analysis

In this study, the emotional experience of players were a critical component to evaluate to understand their overall experience. To measure the emotional changes of players throughout the game, a Python-based text sentiment analysis tool has been developed. This tool utilizes the Baidu Chinese Language Analysis API to analyze the sentiment of entered texts and outputs, where the sentiment value ranged from 0 to 1. A sentiment value less than 0.5 indicates negative sentiment, whereas a value greater than 0.5 indicates positive sentiment. This approach allowed for a quantitative evaluation of players' emotional experiences during the game. Furthermore, this technique is based on deep learning training, to make automatic sentiment tendency judgments (positive, negative, neutral) on texts, including corresponding confidence levels. (Baidu, 2023)

In addition, a questionnaire was developed, based on two established game experience research scales, Player Experience of Need Satisfaction (PENS; Ryan et al., 2006) and Game Experience Questionnaire (GEQ; IJsselsteijn et al., 2013). The goal of these tools was to investigate the experiences of ARG players during gameplay. The survey was distributed through two WeChat gameplay groups and several ARG game communities. The questionnaire consisted of three main parts, with the first part aimed at collecting demographic information such as gender and age range. Through a drop-down menu, participants were also given the option to share their Myers-Briggs Type Indicator. The second part of the survey investigated participants' experiences and habits as video game players. Participants would answer how many hours they usually spend on games weekly, if they self-assessment themselves as light, core, or hardcore players, and if they had previous experiences with puzzle games, ARG as well as Chinese Jubensha. In the third and last part, the questionnaire focused on players' experiences during their last played ARG. All questions revolve around the established player-type analysis model).

In more detail, for the questionnaire analysis, the participants were grouped into gamers and audiences based on their attitudes about participating in ARG. Where gamers are willing to try some part of the game, while audiences usually just want to watch. Furthermore, the audience population were then divided into Lurkers and

Discussants, depending the number of messages they sent in the chat group. In this study, if a participant sends more than five messages in the chat group during the game process, they will be considered a discussant, otherwise they will be considered a lurker. For gamers, Autonomy, competence, and relatedness were measured on a three-dimension scale, with a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). Furthermore, Autonomy was measured with, for example, the following statement: "I really enjoy browsing the various social accounts and online platforms involved in the ARG to find clues." For competence, it would be: "I really enjoy the reasoning process and knowing the story when solving a puzzle." And for relatedness, it could be: "When I last played an ARG, I really enjoyed the discussion in the chat group." The questionnaire was created and implemented through Tencent Questionnaire and results were analyzed using IBM SPSS Statistics 27. According to the outcome of this questionnaire, a player coordinate system with three dimensions was created, to be used as a tool to categorise ARG players.

The validity and reliability of the conducted study were analyzed through Cronbach's alpha coefficient test and Kaiser-Meyer-Olkin (KMO) measures test in SPSS.

4. PLAYER TYPE TAXONOMY MODEL

An interim ARG player taxonomy was built based on previous literature, in-depth interviews with experienced ARG players, designers, and researchers, as well as the personal experiences of the author of this thesis. This interim model is primarily intended for future research regarding possible features to construct a more robust ARG design model.

Player Categories: Gamer and Audience

First of all, in analyzing ARG participants, a distinction is made between active players and passive observers. Despite both being termed as "ARG players," their interaction levels significantly differ. Following Askwith et al. (2006) and Dena (2008), this study categorizes active participants as Gamers and passive observers as Audiences, further dividing the latter into Discussants and Lurkers based on their engagement level within the game communities.

Audience: Discussant and Lurker

Discussants actively engage in game communities, sharing advice and socializing, akin to audience participants in live streaming, who interact with streamers and chat boards. Their motivation, rooted in social interaction (Nacke et al., 2014), aligns with Serious fun (Lazzaro, 2008). On the other hand, Lurkers remain passive, similar to the "Cloud Gamers" phenomenon in live streaming. They just silently observe gameplay without active participation.

Gamer: Autonomy/Competence/Relatedness

Grounded in CET (Ryan et al., 2006), this study correlates gamers' primary actions in ARG—finding clues, solving puzzles, and community discussion—with three intrinsic needs: Autonomy, Competence, and Relatedness.

Autonomy: Gamers crave control over their gameplay, relishing in the explorative freedom ARG provides. This research classifies explorative players as Hunters, who enjoy the unrestricted quest for clues, akin to Bartle's Explorers (1996) and Nacke's Seekers (2014). Conversely, Sages prefer a linear experience, waiting for Hunters to uncover puzzles before engaging.

Competence: Gamers seek challenges that hone their skills. Detectives, interested in unraveling the narrative through puzzles, contrast with Hackers, who focus solely on the results of puzzle-solving, often leveraging technical skills to progress, sometimes at the expense of others' gameplay experience.

Relatedness: Socializers enjoy the communal aspect of ARG, actively engaging in discussions and collaborations, akin to some game studies (Bartle, 1996; Nacke et al., 2014). Unlike Lurkers, Loners actively play while preferring solitude, engaging minimally with the community, reflecting a unique player archetype within the ARG landscape.

	Active	Passive
Autonomy: Freedom of ARG	Hunter	Sage
Competence: Unraveling puzzles	Detective	Hacker
Relatedness: Interacting with others	Socializer	Loner

Table 1: The gamer types

RESULTS

5.1 DEMOGRAPHICS

The survey ran from March 30 to April 19, 2023, garnering 61 responses. Demographically, 62.3% identified as male, and 27.9% as female, with the remainder being non-binary or undisclosed. The age majority (70.46%) ranged from 18 to 26.

5.2 PLAYER HABITS

Most respondents play games exceeding 5 hours weekly, predominantly within a 5-10 hour range (34.4%), while a notable portion exceeds 20 hours (26.2%). A smaller group (14.8%) reported a gaming time of less than 5 hours weekly. When categorized as "light gamer", "core gamer", and "hardcore gamer", a plurality identified as "core gamers" (49.2%), then "light gamers" (39.3%), and "hardcore

gamers” (11.5%). This self-identification also exhibited a gender correlation consistent with Bateman et al. (2011), where female respondents leaned towards “light gamer” status (76.5%), contrary to male respondents who predominantly identified as “core gamers” (63.2%). The sample size for non-binary and undisclosed gender respondents was inadequate for a definitive analysis.

The survey findings also explored genre preferences, with 44.3% having played puzzle games a few times, and 36.1% identifying as puzzle game veterans. A small segment (18%) had awareness but no experience with puzzle games. Regarding ARG experience, 47.5% had played several times, 21.3% had joined player groups yet never played, and 14.8% were aware but lacked experience. Both extremes—complete unawareness of ARG and extensive play—comprised 8.2% of the sample each.

5.4 Player game experience correlation analysis

In this research, to analyze players’ game experience correlation, The Spearman rank correlation coefficient is introduced. The Spearman rank correlation coefficient (Spearman ρ) is a nonparametric measurement correlation. It is used to determine the relationship existing between two sets of data (Dodge,2008). According to Spearman (1961), if the Sig<0.05, it means there is a significant correlation between the two tested factors and vice versa. The results are shown in Figure 2.

			What type of player do you consider yourself to be	Your personal experience with puzzle games	Your personal previous experience with ARG
Spearman's rho	What type of player do you consider yourself to be	Correlation Coefficient	1.000	.319*	.177
		Sig. (2-tailed)	.	.012	.173
		N	61	61	61
	Your personal experience with puzzle games	Correlation Coefficient	.319*	1.000	.383**
		Sig. (2-tailed)	.012	.	.002
		N	61	61	61
	Your personal previous experience with ARG	Correlation Coefficient	.177	.383**	1.000
		Sig. (2-tailed)	.173	.002	.

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Figure 2: Correlation Analysis(Player’s Previous Game Experience): The Sig between player type self-identification and previous puzzle games experience is 0.012, which is less than 0.05 meaning the player’s type is correlated to the player’s previous experience with puzzle games. The Sig between previous experience with puzzle games and previous experience with ARG is 0.002, which indicates that puzzle game experience has a significant impact on previous experience with ARG.

5.5 Player Type Taxonomy Analysis

Based on CET, the three-dimensional analysis model has been built to evaluate gamers in ARG. Each dimension is represented by a variable, whose value could be 0 or 1. Autonomy contains two variables: Hunter (1) and Sage (0). Competence: Detective (1) and Hacker (0). And Relatedness: Socializer (1) and Loner (0). The model calculates the total value of respondents' answers (in the Likert Scale) for each dimension and compares it to the average value. If the total value is greater than the average value, the respondent is assigned a value of 1 for that dimension. Conversely, if the total value is less than the average value, the respondent is assigned a value of 0 for that dimension. For example, if the value of a player is (1,1,1), this means the respondent is a [Hunter, Detective, Socializer] when they play this ARG. The results of respondents in this survey are shown in Figure 3.

		Frequency	Percent
Valid	[Sage, Hacker, Loner]	2	3.3
	[Sage, Detective, Loner]	5	8.2
	[Sage, Detective, Socializer]	1	1.6
	[Hunter, Hacker, Loner]	1	1.6
	[Hunter, Hacker, Socializer]	2	3.3
	[Hunter, Detective, Loner]	2	3.3
	[Hunter, Detective, Socializer]	47	77.0
	None	1	1.6
	Total	61	100.0

Figure 3: Gamer Type Analysis: It suggests that in this ARG most players hold a positive attitude in all three dimensions. Autonomy connects with finding clues in ARG, most gamers, according to the result, are willing to find clues themselves, which indicates that they may derive enjoyment from having control over their free and real gameplay experiences. Competence is defined as the relationship between puzzle-solving and narrative comprehension; most gamers care about the narrative in the game world while solving puzzles; they don't want to skip the narrative with some technical methods. Relatedness relates to the game communities and most gamers prefer the collective playing way of ARG instead of working alone, they are fond of discussing in the game chat groups with others.

To analyze what factors correlate with the gamer's category, the Spearman Rank Correlation Coefficient has been conducted. The results of the analysis are shown in Figure 4-6.

		MBTI	What type of player do you consider yourself to be	Your personal experience with puzzle games	Your personal previous experience with ARG	Your personal experience with Jubensha	
Spearman's rho	Gamer Type'	Correlation Coefficient	.177	.073	.288	.306	.177
		Sig. (2-tailed)	.246	.581	.026	.018	.176
		N	45	60	60	60	60

Figure 4: Spearman Rank Correlation Coefficient: It shows that gamer type is correlated with respondents' previous experience with puzzle games and ARGs.

Correlations

			Your personal experience with puzzle games	Autonomy
Spearman's rho	Your personal experience with puzzle games	Correlation Coefficient	1.000	.361**
		Sig. (2-tailed)	.	.005
		N	61	60
	Autonomy	Correlation Coefficient	.361**	1.000
		Sig. (2-tailed)	.005	.
		N	60	60

** . Correlation is significant at the 0.01 level (2-tailed).

Figure 5: Correlation Coefficient (Previous Puzzle Game Experience*Autonomy): It indicates that the game experience of puzzle games has an impact on the gamer's autonomy dimension. In conclusion, in this ARG players who are more familiar with puzzle games are more likely to enjoy the open experience in ARG games.

Correlations

			Your personal previous experience with ARG	Relatedness
Spearman's rho	Your personal previous experience with ARG	Correlation Coefficient	1.000	.280*
		Sig. (2-tailed)	.	.029
		N	61	61
	Relatedness	Correlation Coefficient	.280*	1.000
		Sig. (2-tailed)	.029	.
		N	61	61

*. Correlation is significant at the 0.05 level (2-tailed).

Figure 6: Correlation Coefficient (Previous ARG Experience*Relatedness): It indicates that the game experience of ARG influences the gamer's Relatedness dimension, which means gamers with more ARG experience in the player chat groups enjoy more.

5.6 Message Analysis

A total of 2844 messages were shared in two WeChat groups, with 1317 and 1527 messages in each group respectively. After data cleaning, 548 and 859 valid messages remained for a two-day puzzle-solving period.

The game period was divided into two-hour intervals, with message counts charted in Figures 7 and 8.



Figure 7: Messages in Group 1



Figure 8: Messages in Group 2

Analysis indicates heightened discussion with new clue discoveries or puzzle solutions. Dialogues occasionally veered off-topic during challenging segments. Data suggests game completion took around 30 hours.

For deeper insight, a Python-based text sentiment analysis program, utilizing Baidu's API, processed messages, marking sentiment indexes from 0 (negative) to 1 (positive). The average sentiment per interval illustrated emotional trends among players (Figures 9 and 10).



Figure 9: sentiment indexes in Group 1



Figure 10: sentiment indexes in Group 2

DISCUSSION

6.1 Participant analysis

The ARG attracted 287 participants, with over 42 identified as gamers, yielding a gamer-to-participant ratio exceeding 0.146. This aligns with Askwith et al.'s (2006) findings of a 0.05-0.2 ratio in their ARG white paper, highlighting a common challenge where many express interest in ARGs, yet few engage actively. To address this, ARG developers could design events necessitating broad player engagement for resolution (Habibi et al., 2022). For instance, assigning a unique badge to each site visitor, where collecting 100 badges unveils a crucial clue, could foster larger discussions in game chat groups. Even though website visits constitute minor actions, they significantly bolster the gaming community. Each small contribution cumulatively enhances the game, potentially fostering a sense of achievement and connection among participants, thereby possibly boosting player involvement.

6.2 Sentient analysis

Based on the results of sentiment analysis, some conclusions can be drawn regarding the gaming experiences of the participants in the two groups:

Firstly, in terms of these two groups, the players' gaming experiences were generally consistent. Both groups had similar game durations, game processes, and similar trends in player sentiment. At the start of the game, players were positive and excited, chatting in the group and expressing their anticipation for the game. As the game progressed, sentiment levels fluctuated, reaching the lowest point on the second day at noon, when only a few players discussed in the group channels, causing their sentiment indexes to determine the average values.

Additionally, from the graphs, we can infer that the players in both groups maintained a curious and friendly atmosphere of exploration, as the sentiment indexes were consistently positive. The sentiment index fluctuated as the game progressed; if players did not make progress for an extended period, it would become more negative until someone found new clues, prompting more players to join the discussion, leading to a very positive sentiment index.

6.3 Survey Results

Survey data reveals that many ARG players originate from puzzle game communities. This affinity can be attributed to the overlap of game mechanics between ARGs and puzzle games, suggesting that previous puzzle game experience may influence ARG participation. However, this confines ARG player demographics to a subcultural niche, posing a challenge in expanding the player base.

Utilizing a CET-based model for player classification revealed three dimensions of engagement. Firstly, players value the freedom to explore real-world internet clues. Secondly, they are interested in the game's narrative over using technology to bypass it. Lastly, the collaboration within game communities enhances their gaming experience, resonating with Jane McGonigal's views in "Reality is Broken" on the enriching aspect of collective gaming endeavors. The most emerging player persona from the ARG questionnaire is a blend of Hunter, Detective, and Socializer.

The questionnaire further indicated that prior puzzle game experience could bolster players' autonomy motivation, owing to the cognitive challenges posed by puzzle gameplay. This experience facilitates faster clue identification in ARGs, enhancing their engagement. Additionally, previous ARG engagements seem to reinforce players' relatedness motivation, as ARGs necessitate collaborative gameplay. With 88.5% of respondents identifying as Socializers, it's evident that community interaction is a key motivator. Therefore, enriched ARG experience likely correlates with deeper communal engagement, possibly explaining recurrent ARG gameplay.

LIMITATION

This study presents several notable limitations. Firstly, its scope is confined to a small sample of Chinese players, rendering the findings quite restricted. Given China's unique gaming culture due to historical game bans, Chinese players' ARG experiences may diverge significantly from those of Western players. Additionally, the study's insights, derived mainly from a specific ARG, may not universally apply due to potential biases inherent to different ARG designs, such as the emphasis on puzzles or narrative immersion.

Furthermore, the employed observational and questionnaire methods struggle to capture the behavior of less active or hidden players, like lurkers and loners. Despite their presence, these players' lack of engagement in chat groups or questionnaires has likely skewed the results. Future research endeavors should incorporate in-depth interviews to better understand these hidden players' motivations and behaviors.

The ARG's undisclosed nature initially, paired with the openness of our platforms, may have inadvertently involved non-players in certain game phases, possibly affecting the data integrity.

CONCLUSION

In this study, a methodology for ARG player taxonomy has been developed, grounded in a custom-built ARG. Three independently validated dimensional variables—autonomy, competence, and relatedness, derived from player activities within ARG and the Self-Determination Theory (SDT)—were employed to assess players. The evaluation unveils that the majority of players actively participated in this ARG, exhibiting a self-directed pursuit of clues in the open game world, valuing both narrative comprehension and puzzle-solving prowess, and actively engaging in the gaming community. The three motivations from Cognitive Evaluation Theory (CET) significantly resonate among ARG players. Concurrently, the data highlights a correlation between the level of community discussion engagement and positive emotional shifts among players during the ARG gameplay. The community-centric nature of this ARG effectively fostered cooperation among a diverse group of unfamiliar players, facilitating trust, unreserved sharing of achievements, and rapid development of relatedness within this nascent community.

For subsequent research, extending investigations to players across diverse cultural and national landscapes, utilizing the established framework and player taxonomy model of this study, is recommended. This extension will enable comparative analysis, fostering a more profound understanding of the ARG player community and laying the groundwork for the conceptualization and execution of cross-cultural and transnational ARG endeavors.

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