

Escape Game

From observation to participatory research

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ABSTRACT

Our study raises the question of the representation of a new type of research. It consists in developing an escape game through a participative action research and a cooperative work between designers, researchers and players. This paper relies on the premises of a research matrix design. It suggests recommendations on different reading levels, analyses and quantifiable elements of escape games. The analysis is based on semi-structured interviews carried out among researchers and innovative methods game designers. We focus on a possible answer to scientific issues at stake in a fast-changing social context, a various challenges in observational methods: a shift of focus on the one observed. The individual could be an active participant in the research. This paper will present an example in which a cognitive research permitted to use the escape game to unify methods. The aim is to move from a linear method to a more dynamic one via an escape game design.

Keywords

Escape game, research method, participative observation, participative action research

INTRODUCTION

The methods mobilized in game research have been widely documented (Lankoski, Björk, 2015). The objective of our work is to contribute to a field that has hardly been explored by studies on games in humanities and in the social sciences, namely their use as a research tool. We are particularly interested in escape game as a game. Beyond the monolithic perspective of playful experience (Campion et al., 2018), the proposed analysis focuses on the issues of escape game in a scientific context. We wish to question this new device: is it possible to use it as a means of investigation ? What are the characteristic elements of such a research approach?

Our reflection is based on the results of the first phase of our project "Quest your Digital: an escape game for digital media education" which aims at designing an escape game that would allow the analysis of the digital practices of families. "Quest your Digital" raises the question of the implementation of a new scientific approach that places creativity and the users' "actions" at the centre of the research process.

This first phase is both reflective and empirical. Indeed, we conducted exploratory fieldwork with national and international structures: CRI-Paris, UCLouvain, NYU Game Center, The GovLab (New York University), MIT Game Lab, Games for Change, Columbia University, University of Southern California, and Stanford University, Westion Game lab of the University of Chicago. The aim was to meet researchers specializing in (serious and educational) games, designers of games for scientific purposes and innovative research experiences. Thus, we conducted interviews with 35 specialists on the use of escape games as a research tool. For this article, we have retained some of the comments in order to develop our presentation. We questioned the ways in which research is conceived when it calls upon innovative forms of investigation and when it is written in a "playful" form. How is it thought and how is it made?

The collected discourse was subjected to a content analysis (Bardin, 2013). The study of the corpus was carried out in particular by means of a thematic content categorization approach (frequency analysis) and completed by an analysis of co-occurrences. We also sought to draw a parallel between the reflections and experiences (research) presented by our interviewees and our own analysis aimed at setting up an escape game for research. Our analysis is mainly based on two innovative scientific approaches: the GovLab data collection matrix (RD4C *Responsible Data for Children*) and Cog'Innov (Paris) *Curious Game* escape game.

ESCAPE GAME AS AN OBSERVATION TOOL

Escape game can be defined as: a game played by a team of people who must escape from a room filled with challenges within a given time frame. To win (escape), the players must solve the challenges contained in the room. At the beginning of the game, the challenges may be inaccessible and must be found by solving puzzles and riddles. [...] In some iterations of the genre, an escape is not even necessary (Wiemker et al., 2015, p.2).

What is important in the structure and design of an escape room, according to Nicholson, are the challenges and narratives. The rooms can be classified as follows:

- Puzzle rooms: these present a series of puzzles, but no genre, setting, or general narrative. The player has no other role than to solve puzzles.
- Thematic rooms: they have a specific genre and setting, but the role of a story does not constitute a key element of the room.

- The narrative rooms: they have a specific genre and setting and also have a narrative that is important to the design of the escape room. The players have defined roles and the challenges are linked to the narrative.
- Hypernarrative rooms: they are rooms where the players have a choice in the direction the narrative takes. There is more designed content than can be seen in any game, as the players' choices will affect the content they engage with. These games can change through interaction with live actors or technology, and can be designed as a replayable experience (Nicholson, 2015).

The organization of the puzzles and challenges within an escape game leads to the resolution of the proposed structures: tasks or activities that the players have to do as a team or alone, depending on the organization that can be open, sequential and/or evolving. In reality, escape games can have much more complex structures. This model allows us to measure the types of impacts puzzles can have by connecting to other rooms or by staying in one space.

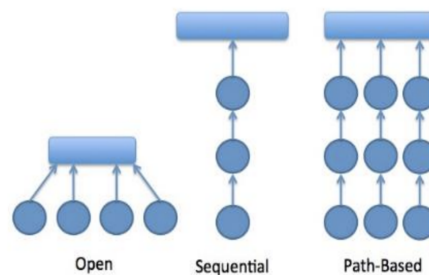


Figure 1: Basic forms of puzzle organization

This allows us to master specific categories of analysis: narration, challenges, puzzles. These measures, in addition to those derived from the players' behaviours, allow us to have various grids and levels of observation. As Henry Jenkins explains, the game is an evocative object in that it will provoke responses from the participants. It is a way of seeing how researchers apprehend the data they receive in a specific context (Interview with H. Jenkins, 2019).

According to him, research is a process in which "we are always looking for something" that will make the subjects meaningful and engaging from a naturalistic perspective, so "the power of the escape room is to enroll people in a critical and collaborative engagement," he adds. The game implies a relationship, it generates immediate associations with the ideas of group, team, individuals (players, positions, attack, defence, strategies, tactics, movements, alternating turns, etc.) (Selvini et al., 1990). As a result, the idea of "game" allows for a reading of different movements within it. As mentioned earlier, relational play involves an intuitive image as a metaphor. In this regard, H. Jenkins says that escape games allow the players to interact with each other by drawing from their natural roles, which allows us [researchers] to bring to the surface a problem-solving situation so as to question the abilities and knowledge they

can rely on to work together on a complex problem. It is also a very effective way to think about collective intelligence and the distribution of intelligence.

The puzzles to be solved in this type of game encourage collaboration and mobilize collective intelligence (Eber, 2003). Escape game can thus be seen as a tool allowing multi-channel research, thanks to the exploitation of observations.

According to S. Osterweil (creative director of the Education Arcade) the way the participants play is a research data in its own right. He explains that the game projects he has conducted have always been subject to specific hypotheses in order to test them at the time of their implementation: any research that uses games depends on what we are trying to find. If you are trying to study people's ability to meet a challenge, then the game, such as an escape game, is a perfect research tool. If you're asking questions like: can they master one thing more than another? Then the game will answer them (Interview with S. Osterweil, 2019).

Play requires what J. Lemke (2015) calls a "playful attitude," in other words, a cognitive attitude that is directly related to the creative, improvisational, and subversive qualities of play. Huizinga (1998) would call this illusory attitude: the attitude required of players in order to play. Playing is in many ways an act of faith that invests the game with special meaning; without willing players, the game is a formal system waiting to be inhabited. K. Salen (2014) adds to this that if "the goals are not specific and without value definition, we cannot hope to build a coherent body of knowledge around learning games." On this position, S. Verilli (development director at MIT Game Lab) analyses that the use of escape game or of games in general in a research context first depends on a content, a playing audience and the likely interest of researchers to assess the players' ability to interact with the game, to transfer knowledge, to solve new problems (Interview with S. Verilli, 2019).

The design of escape games in a research environment could allow us to know different types of measures. The observational elements through a game can take on more breadth, as they will be focused on a specific environment and compared or tracked through a cognitive reading or analysis of behaviours.

ESCAPE-GAME: TOWARDS A SYSTEMIC ANALYSIS

The systemic dimension in this game is a parameter that must be raised. In the design of an escape-game, the players are asked to perform actions and adopt certain concrete attitudes. Of course, these actions will later be able to define a relationship (exchange of information between team members, no words exchange, solve a puzzle together, etc.). This game system, from a pragmatic perspective of human communication, is established on two levels: content and relationship. That is to say, on the one hand we have access to a level of reading of information transmission and on the other hand a level from which behaviours are imposed when confronted to this information transmission (Watzlawick, Beavin, & Jackson, 1976).

Escape game can be designed on many levels, it can be seen as a systemic and multimodal model. As Jenkins notes, "in the escape room there is a mixture of problems (texts-based, digital-based, video-based, audio-based, etc.), which amounts to working

on a problem while using different modalities and this intersects with other categories of measures. We are fully in a systemic game" (Interview with H. Jenkins, 2019).

This game is then composed of the social fabric of the players, the instructors (game-masters) who shape the experience, the various game activities, the location where it is played and the objectives associated with it. In the case of using an escape game for research, the choice of the puzzles, riddles and of the scenario will have to respond to the "scientific" collection of the data and fit well with what is observed within the game.

	GAME OBJECTIFS	GAME SYSTEM	OBSERVATIONS
Questions/hypotheses	Wich repetitive constructions in the game? In which part of the game? What links with players?	How does the system repeat itself? What is action in the game system?	What influence of narrative structure in the game?
Interactions	What exchanges between players? What is shared?	Representation active in the game? Participation of teams	Group, team, self-help, role-playing, cooperation.
Understanding	Relationships between players? Codes? Relationship to the body?	Actions, solutions, education, mutual learning	Mediations, interpersonal communication, non-verbal communication, behaviors, learn to measure learning from the game.

Table 1: Game objectives, game system and observations

In the table below, the systemic elements of the game are put in perspective with three possible readings: the goals of the game (what are we looking for?); the systemics of the game (are there any repetitions, actions that activate the system?) and the possible observations escape game can offer in terms of game structure, teams, interpersonal mediations and communication, game appropriation.

This table can help us pose new perspectives of analysis. We raise the question of the way in which the propositions of multi-modality (proposed by escape games) can be systematised, as well as the different levers of observation and the epistemological framework.

Through this table, systemic modelling presents three stages:

- The first focuses on the structure of the game's objectives in all its dimensions (research questions/hypotheses, interactions, connections, subjects-players) that account for the actions to be observed.
- During the game systemic, we establish the different connections between the features of the model and the perceived features of escape game, keeping only what is relevant to the objectives of the game. The aim is to describe the characteristics of the data collection system.
- And eventually, the lines that are most conducive to observation through this escape game as a place of live analysis processes (observation, analysis, measurement) can be defined.

This "game" medium may be defined by a formal, subjective framework and constructed by the technical choice of a narrative subject (Nicholson, 2018). That is to say that there is a joint dual position: of the construction of escape game and the creation of a system in the dynamics of the game.

This is quite similar to what some visual methods scholars claim about attributing the making of images to the researchers, or to the people they are observing: "in one case the images proposed by the researchers delineate the research setting. In the other, the participants may create the images and talk about that creation" (Gauntlett, 2015). It is important to mention that these research methods are actively used in the research process, along with other types of evidence produced by interviews or ethnographic fieldwork, hence the ability to cross-reference the information proposed in the table above.

FROM ACTION RESEARCH TO PARTICIPATORY METHODS OF RESEARCH WITH ESCAPE GAME

Our epistemological framework can fall under the combination of the action research dimension (Catroux, 2002) with that of hermeneutics (Paillé, Mucchielli, 2012), for the analysis of the players' actions and of their interactions in order to produce scientific knowledge.

The design of an escape game for research would allow to federate players around a common goal in order to amplify the elements to be observed (Coutant, 2015). Escape game can be considered as a pragmatic framework (Goffman, 1991) that favours these observations. The basic principle of our approach is to place the players at the heart of the research process. Beyond the representations and discourses conveyed by people about their practices, this tool allows us to focus on the actions of the players-producers (Cohard, 2015). This game proposes a strong connection between the player and his/her own actions within the game (Nicholson, 2015). The collection of data is done in a negotiated and dialectical approach to the observations of the players' actions (Trémion, 2019).

The use of escape game would also allow for a more flexible and friendly relationship with the participants, compared to other research methods such as interviews or questionnaires (Interview with E. Zimmerman, 2020). Besides, the use of the game as

a research tool would allow for a very quick feedback/commentary, which represents a research fact in itself, as K. P. Blair notes, researcher at H-STAR, Stanford University (Interview with Blair, 2019).

The playfulness of escape game where the participants play and exchange also gives value to their actions. We can thus situate the use of this game in a type of action research, insofar as we understand escape game as a process by which the participants can identify, represent and develop their own way of playing and acting within a device that allows for challenge and personal commitment.

S. G. Verhulst (Co-founder and Director of Research and Development, GovLab, NYU) notes that "using escape game as a research tool would deliver a new observational tool and encourage taking actions in the game" (Interview with S. G. Verhulst, 2020). He also points out that in escape game "people participate in a game". Thus, if escape game can be defined as a new research technique, it is the participatory intention that counts. He adds that if escape game is used to collect data, they can be gathered through participatory observation, through the sharing of the players' actions. So the game seeks to test a certain type of assumptions. Through escape game we can try to develop a set of assumptions that can be tested afterwards, and even consider social change.

Action research takes place in a dialectical reflection/action process (Bourrassa, 2015). Escape game always starts from a narrative story (a prefabricated reflection) to make the players act. Using it in an action research context would produce contextualized results and encourage the sharing of ideas and skills of the actors involved (Ibid.) The participatory action research method, presented by Lucie Gelineau (2009) represents an interesting approach in this context. According to her, the research is done for the benefit of the community (of the players in the context of an escape game).

According to L. Gelineau (2009), it is necessary to mobilize the community, to give them a space to express themselves and communicate, in order to develop a common project. It is also a matter of considering the participating members as experts and developing the group's culture. The researcher must adapt to the particularity of each participant: a certain creativity is required to produce knowledge according to the public.

In order to explain escape game as a participatory research method, we feel it is important to raise the following point: this type of game can foster collaboration between the various participants and thus create a dialogical model of participation, as opposed to a linear model of observation. Read through this method, escape game can reduce the epistemic gap between researchers and participants by seeing each as an active part of the research process. The researchers are thus led to assume different postures during the time of investigation: maintain both a horizontal and vertical relationship (game master) with the participating players (observe), as well as a relationship of exchange and transmission (guide, debrief).

Our exploratory study gave us the opportunity to discover a data collection model proposed by the New York University GovLab team named RD4C - Responsible Data for Children. This matrix brings together two important aspects of the methodology we

have just discussed: the systemic dynamics of escape game and the participatory dynamics in action research.

THE RD4C MATRIX: A SYSTEMIC MAPPING OF DATA

The RD4C matrix presented in the GovLab interviews is designed as part of action research. One example is UNICEF's Aurora project, which aims to provide an overview of promising practices as well as potential barriers to ethical data collection for children. The RD4C matrix assesses and measures projects through a systemic lens, aiming to improve the situation of various publics (although they have focused primarily on children, the matrix can be applied to other populations). Five principles are emphasized.

- 1) Participation: engages and informs individuals and groups affected by the use of data. All the participants involved get informed and dialogue with each other.
- 2) Accountability: operationalizes responsible data practices and principles by establishing processes, roles and responsibilities. Most importantly, it establishes and defines the role of researchers as managers.
- 3) People-centered: it ensures that the needs and expectations of those involved in the research are prioritized by the people who process the data for and about them.
- 4) Data lifecycle prevention: it establishes end-to-end data accountability by assessing risks during collection, storage, preparation, sharing, analysis, and use of data lifecycle stages.
- 5) Goal-oriented: it identifies why the data are needed and how the expected or potential benefits are related to improving a specific situation.

This analysis matrix also proposes a "mapping of the decision source" which is a tool that is used to support systemic and responsible data handling. This tool was designed to be implemented by researchers who are responsible for coordinating the responsible use of data across priorities. Researchers can be accompanied by other people so as to identify and make visible the actors and the decision points. These individuals have an impact on the safe and effective handling of the data.

The purpose of this "decision mapping" is to receive information through various systems. It is composed of three systems:

- 1) The control system that allows to define non-exhaustive, global and relevant objectives in relation to the data collection purpose that the research team wants. In the control system, various possibilities can be created to define the objectives of the observation.
- 2) The information system that stores the collected information. This must answer: How is the data generated and captured? How is existing data made accessible to the participants?
- 3) The decision-making system that involves the researchers and the participants in an active context (e.g., action research in education, various types of

creative-observation workshops, etc.) This answers the question: what is the participants' share in this data collection?

CREATION OF A RESEARCH MATRIX FOR ESCAPE GAME THROUGH RD4C

Based on this matrix and drawing a parallel with escape game, the research matrix we propose is based on the triad of systems above-mentioned. This systematization can be seen as an investigative practice that contributes to the construction of knowledge in a relational, interactive and interdependent dynamic. It can also be understood as a transformative social practice that stimulates discovery and creation (Ghiso, 2004).

The design of this type of research corroborates A. Shapiro's vision (managing director and chief learning officer. Games for Change.) who considers games as "a concrete way to learn the systemic approach and the approach to complex problems" (Interview with Shapiro, 2020). In this vein, E. Zimmerman (co-founder of GameLab) points out that "games (including escape-game), are generally about systems. Systems thinking is a very important form of thinking in games" (Interview with Zimmerman, 2020).

As the DRC4 matrix assesses and measures systems, we want to frame this tool with the participants to address a myriad of decision points. These points are highlighted in the graph below:

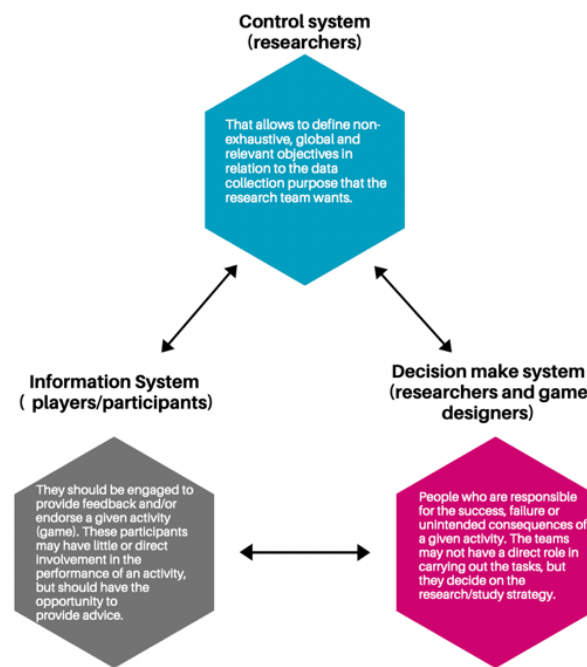


Figure 2: RD4C matrix applied to the escape game

Starting from this triangulation, it is worth analysing what the relationships that operate between the team of players and the observers are, and vice versa. This implies reading a close relationship between certain systems and sometimes maintaining a permanent or repetitive triangulation. In other words, escape game can be seen as a specific mode of relationship through which a triangulation takes place first and is maintained later by those involved, hence the usefulness of the RD4C matrix when the systemic

paradigms triggered by escape game are used. This triangulation tells us about the maintenance of positions and distances between the people and the game.

With this system of data collection, the research work remains objective, as it refers to the technical dimension of an ordered process: first informing the players of the "game experience" for an action research in which they know and understand the use of the data. Then, as part of the DRC4 decision system, an exchange in the form of an interview is proposed at the end of its application to check the data that were collected during the game. This corresponds to the typical debriefing time that takes place after an escape game.

Through this matrix, it is possible to analyse the players' behaviours and actions (player-experience), and thus to raise psychic aspects that support constructive social exchanges (productivity, creativity as well as the question of intimacy). With the application of DRC4 in escape game, it is possible to recognize the subjects' individuality as a constitutive part of the research process. It is how participants engage in the game with their own ideologies, identities, judgments and culture. Using this matrix the objectives, the object of study, the method and the instruments of observation are presented. These elements tend to become entangled in play behaviours that include and redefine roles: play is a reflection of the experience itself. The most important thing is to capture the experience that the players go through, whether it be emotional, cognitive or metacognitive, and this is what is important in the use of the game as a research tool, according to Y. K. Chang, researcher at the Media & Social Change Lab, Columbia University (Interview with Y. K. Chang, 2020).

The player-experience can therefore be raised by this matrix. It allows us to underline the latent difference between game and play. Inspired by Bruno Bettelheim, Jenkins explains this distinction as follows: play has a more open and spontaneous purpose, while being less subject to rules (game). It is more exploratory, focuses more on shifting identities while the rules are always renegotiated, there is a form of appropriation that makes play interesting (Interview with Jenkins, 2019).

Indeed, the use of escape game can be seen as building "continuities between the phenomena we study and academic research by bringing collaborators together around the topic at hand" (Rose, 2016). This type of game answers questions about a framework that is broader than an immediate topic. Thus, we can understand that this game allows access to an advanced observation dimension of exchange and interpretation. The players are confronted with the resolution of riddles which will lead them to follow a path, a strategy and to collaborate together. Through the potential of the game design, the researcher can make hypothesis and see how the players will solve the problems in order to escape. Jenkins also raises the following questions: what skills do the players automatically mobilize in a situation like this? How do they position themselves in a situation where they have no other contacts outside their comfort zone? How can they make the situation comfortable again, or make it a space where they can show what they are capable of and act for and with others in that context? What are the players' natural skills when confronted to puzzles? (Interview with Jenkins, 2019).

In the matrix presented above, there is a first level of analysis that is linked to a systemic approach of observation in the context of escape game. There is then a second level of analysis that refers to microsystems: this means that participation in the game is not only related to the ability to express a "behaviour" or an "action" in relation to escape game. Rather, participation means being able to manifest oneself as a person participating in a playful experience. On the other hand, it is important to point out that escape games (as tools for scientific, cultural, educational mediation, etc.) are not neutral spaces. They are places that can be understood as specific rhetorical spaces that filter, modify and develop certain forms of expression. The RDC4 matrix, guided by the ethics of investigation, invites the participants to create a dialogue on the rules, interests and stakes of escape game.

In order to deepen our analysis and to bring other elements of answer to our key issue, we will take support, in what follows, on Curious game (an escape game for research in cognitive sciences) example which emanates from our exploratory field.

CURIOUS GAME UNDER THE EYE OF RESEARCH: TRIANGULATIONS AND PREMISES OF A PARTICIPATIVE RESEARCH TOOL

Through Curious game, we will examine a concrete example of the use of escape game as a research tool. To support our remarks, we will rely on interviews with Laure Duchamps and Vincent Roger (project manager and game designer at Cog'Innov). We will deepen our reflection by proposing an analysis of the RD4C matrix applied to this game.

Launched by the associative community Cog'Innov in 2018, the Curious game project lasted ten months. Training in the methodology of designing educational escape games was provided by Vincent Roger. He explains that "in order to start the game design, I organized a game jam with the Cog' Innov team. It was a creative and collaborative process followed by three playtests". In collaboration with six supervised volunteers, the objective of this escape game was to transmit and produce knowledge and to respond to research problems in cognitive sciences. L. Duchamps explains that it was "a research tool and an educational tool that leads the players to place themselves in a context of extreme emergency: the breakdown of a nuclear power plant that causes several malfunctions. [...] Curious Game allows to immerse the players in their own cognition, [...] it allows us to study cognitive reactions to stressful situations. [...] The players have 30 minutes to leave the room" (Interview with L. Duchamps, 2018).

The challenge for the Cog'Innov team was to allow the public to take part, in a playful way, in a participatory research in a game format where transmission and creation of knowledge become one. It is both a scientific mediation tool and a research tool, "it is participatory science", explains L. Duchamps. She adds: "I could define it as a scientific escape game, a popularization tool [...]. It is thus a serious escape game for researchers [...]. The observation within this escape game allows us to learn more about human behaviour".

The challenge of Curious Game was both to transmit and to produce knowledge about human cognition with the help of researchers. The team hid cognitive psychology experiments inside the game to be able to collect data (choice buttons, emotion measurement, etc.). In 2018, it was tested on more than 10,000 participants in the Paris region.

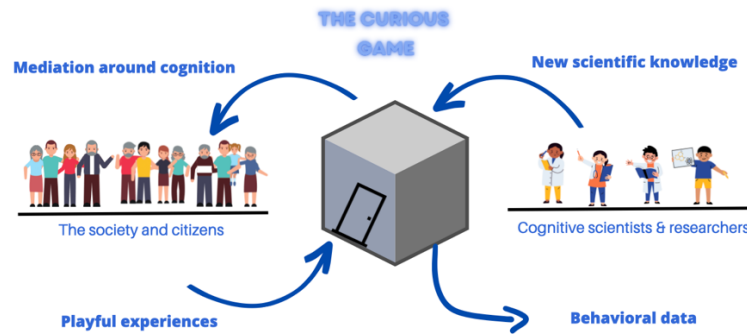


Figure 3 : Diagram of “ The Curious Game” created by the researchers of Paris University Sciences & Lettres

Based on the principle according to which escape game is an ideal setting for action research, we propose to examine the interactions between the researchers, game designers and participants in the context of this escape game, by presenting three elements of analysis in the graph below, based on the RD4C matrix.

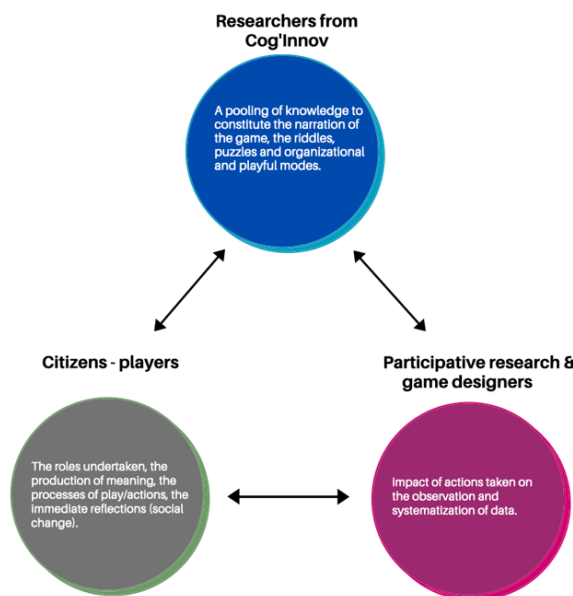


Figure 4: Triangulation RD4C applied to Curious Game

This triangulation allows us to analyse some data on the use of escape game as a research tool:

1) This figure describes the role changes that occur in the control and information system when the behaviour and action processes take on dimensions that differ from those desired: comments, team strategy, speed or signs of "boredom", or on the contrary, too much involvement (discomfort, stress...) during the game.

2) Depending on the number of players (up to four in Curious Game), all the people involved in the information system maintain communication with each other. In the different relationships created, abandoned or reported actions can be seen as an additional problem to be solved besides the puzzles.

3) In this triangulation, there are also boundaries between the systems of participants that are sometimes unclear ("is this a game? am I allowed to have fun? or do I have to learn? besides, I am being watched for a research). In a "rigid triad" when two participants come into conflict, or if they wish to act differently, the observation can be distorted. A rupture between the observers and the observed may occur. Then, a form of coalition can be created and lead to a new reading of the actions carried out within the escape game.

This tool for collecting and analysing information allows us to explain the particular "philosophy" of participation and actions of the players during the Curious Game playful process. Thus, a basic criterion of this investigation process consists in taking advantage of the existing resources in the setting up of the escape game in order to provide feedback on the analysis capacity of the researchers/game masters. With this criterion, the EWC4 matrix enters into a participatory action research process as a research tool and can widen the sources of information and deepen qualitative and quantitative techniques that are suitable for data collection.

Curious Game suggests an important "survival value" for the people involved. By focusing on time and the proposed narrative, the participants recreate a new dimension of play: they give an image of themselves and create roles in order to bond and collaborate with each other. This is how the use of the observation data of this collaboration becomes a measurable criterion of escape game. Duchamps also explains that the latter "must be used to structure an alternative researcher-player relationship".

This criterion can be called "double action". That is to say that the creation of roles is also embodied by the researcher, who must leave the observed subject "autonomous" for a certain period of time, before intervening as "game master". This can be explained by taking into account the fact that the players experience this escape game as a "discovery". If this internal relationship between the player/observed - researcher/game master system has not begun to be structured, it will be difficult to assign roles precisely. The researcher's strategy is confirmed when the escape game is constructed, because there is always a question to clarify: that of the researcher's ethics. How to understand the researcher (meta-analysis)? The researcher can be seen both as a "mediator" or a "saviour" (game master) who gives the clues to answer the riddles, or even as a "persecutor" (insofar as you have to go fast to escape the room).

The methodologies of data collection and experiences proposed by Curious game offer a circular and relational epistemology as well as new forms of interaction between the researcher and the subjects as participants in the production of mutual knowledge. For

this reason, it seems relevant that all the participants should be involved as actors in participatory and systemic research processes. In this respect, there is a move from an objectivist conception to a constructivist and communicative conception of escape game.

The types of puzzles and/or riddles in an escape game designed for research must depend on the objectives of investigation. As P. Tan (creative director for the MIT Game Lab) notes: "One of the advantages of the escape room is that people collaborate with each other. The codes of communication between players represent a goldmine for observation" (Tan interview, 2019). Working around the design, focused on specific questions, provides a necessary insight to explicitly connect game goals, the game systemics, and observation. Games in general cannot be narrowly defined. The DRC4 and its analysis systems allow us to answer the ethical question of data collection while integrating: the social context, the narrative, the choice of puzzles and riddles or the choice of scenario.

CONCLUSION

Throughout this article, we have outlined different points concerning our initial question: can escape game be used as a research tool? What we can conclude is that escape game can be considered as a participatory and systemic research tool in the framework of an action research. Two dimensions also emerge in response to this question: the dimension of game and the dimension of play. From our point of view, both readings are unavoidable, even if play allows for a greater focus on the subjects observed. This seems plausible in terms of behavioural analysis, but also paradoxical since it depends on the narrative that allows the "systemic" functioning of the game. Escape game is the complex result of the game's interaction and the players' efficacy. Yet this process, which coincides with the essence of the needs of research in general, answers a wide variety of patterns carried out by the players.

On the other hand, when targeting the escape game models to be used and the analysis process (RD4C) as the fundamental object of participation, the impossibility of prioritizing the control of the players' actions becomes obvious. Observational control will continue to be necessary as the subjects engage in the game, and know that they are subject to search and observation strategies. At this point in the analysis, the formalization of escape game as a research tool must be adapted onto a set of classificatory labels that facilitate the understanding of relational phenomena within the game. S. Nicholson notes, "if you use escape game as a research tool, you have to focus on the core of what makes an escape game, which is communication and teamwork" (Interview with S. Nicholson, 2018).

Concerning the construction of a corpus of data collection through the use of escape game, it should be noted that as a participatory action research, this game is closely linked to the epistemology of praxis. That is, there is a theory-praxis dichotomy. It is through the narrative of the game and its structuring that a new understanding of the subject-object duality emerges.

Assuming this dichotomy leads us to a new approach to knowledge generation. This can take place as a result of the intentional transformation of the (players') action.

Escape game is incorporated into this process as an evaluative component and places particular emphasis on the transformation of the reality of the research object to produce new knowledge.

Eventually, we consider that the fundamental function of participatory and systemic action research refers to comprehensive experimentation (Salvador, 1999). This consists in linking various variables (within escape game), such as those presented in the DRC4 matrix. This interpretative and qualitative model leads to a deeper understanding of the actors' point of view and of the phenomena observed in their context.

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