How Can We Design for Gender-Neutrality in Games? – A Case Study With Children Using Gameplay Rehearsals

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ABSTRACT

Gender-oriented games have been prevalent in cultural media, perpetuating stereotypes that promote gender inequality. As an alternative, what insights could be gathered from a game designed for gender-neutrality? We present a case study of a gender-neutral game design within a STEAM diversity initiative to engage younger populations. A qualitative methodological approach was followed to analyze gameplay rehearsal observations and interviews, focusing on playful behavior, cooperative gameplay, social interactions, competence development, and gender-related aspects. Players engaged in mutual collaboration, encouraging and suggesting actions and strategies, while also adopting gender-specific differentiation language regarding their role play. From coded evidence, we propose three design insights that might influence the perception of gender-neutrality: (i) multiple activity modes that offer tasks diversity, (ii) a collaborative environment, featuring egalitarian roles and (iii) audiovisual representations adopting neutral gender patterns.

CCS CONCEPTS

• **Human-centered computing** → **Collaborative and social computing**; • **Social and professional topics** → **Gender**; • **General and reference** → *Design.*

KEYWORDS

Gender-neutrality, game design, cooperative gameplay, playful probing, child-computer interaction

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1 INTRODUCTION

Video games have become one of the most popular forms of entertainment among young people, as an important cultural element that influences behaviors and beliefs [5, 29, 34, 41, 45]. Games are an essential tool in developing psychosocial skills in early childhood [33]. Kinzie and Joseph [28] define "A game is an immersive, voluntary and enjoyable activity (...), [which] provides a safe environment for taking chances and the opportunity to develop the knowledge and refine the skills required to succeed". Games were identified as useful for developing highly specific skills and can have a positive effect on learning across age groups and content domains [28]. Play is a crucial learning tool [8, 28], where they may practice and exercise their new abilities, which supports their learning and development [1]. It is the earliest occupation, motivated by the enjoyment risen within the activity to keep learning [8], which impacts the development of motor, cognitive, social, and intellectual abilities [10, 32, 33, 37, 39].

The male gender is historically associated with game playing, influencing the adoption of stereotypes about female characters and players by game creators. In turn, the exposure to gender role stereotypes in video games can have negative cultural influences, reinforcing and legitimizing these stereotypes [4–6, 17, 21, 22, 29, 34]; of more concern when it influences children's behavior, shaping their attitudes and ideas about women and their capabilities [4, 5, 9, 14, 15, 17, 21, 22, 27, 34, 41, 46]. Game research shows that female characters are underrepresented or portrayed in objectifying ways [4, 15–17, 21, 22, 29, 34, 41, 46], often designed in ways that draw attention to their bodies, and thus displaying strong sexual connotations for young male players [4, 16, 17, 21, 22, 30, 34, 41, 46]. Playable female protagonists are also underrepresented in video games and, when female characters appear, they often need assistance or just support male characters, encouraging the assumption that women are less significant or capable [2, 4, 9, 21, 22, 26, 30, 45]. This focus on male audiences leads to a lack of female representation and perpetuates the feeling of exclusion by female audiences. The industry tends to disregard their interests or experiences when designing games and primarily features themes that are traditionally viewed as "male", such as confrontations, domination, and competition [30, 44].

With the rise of female gamers, a kind of female-oriented game design emerged [14], creating a gender dichotomy between "Green-Brown" games (highly competitive for young male audiences), which involve war or sports, and "Pink" games (more social for young female audiences) that involve cooking, dress-up or makeover [2, 24, 44]. This approach, as researchers identified, is based on stereotypes that also perpetuate cultural values that limit young girls to specific roles [14, 44]. Another industry attempt was the production of strong, female protagonists, such as Lara Croft, highly active and aggressive, which direct the game to combat themes. Due to her dominating role, this type of character could be perceived

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as challenging the traditional role of female characters. However, it still perpetuates the sexualization of female characters [2, 25]. Along with these issues, within the game community [48], the majority of women experience abusive behavior by the male players, including offensive language, verbal abuse, sexism, and harassment.

An emergent solution is the concept of *gender-neutrality*, an approach for attracting individuals of all genders without being prejudicial [2, 36, 47]. It is described as an integration of characteristics that appeal to both genders, instead of creating games for a specific one [2, 25] - to "make games that we think are fun and (...) not targeted to any specific gender" [25]. Curiously, gender-neutrality appeared first in game research for educational purposes. Khalid [2], in a study with two fourth-grade classes, stated that gender-neutral math games could appeal to both genders and improve their perception on mathematics, with them preferring the gender-neutral format over the gender-oriented.

The idea that men and women prefer different types of video games, demanding particular "female" game mechanics, is outdated [47], as stereotypical assumptions of gender motivations are not significant. Men and women who currently play online games, namely WoW, are similar on what they enjoy doing, emphasizing the need for inclusive game mechanics to be enjoyed by both genders. World of Warcraft, which appeals to a wide range of players with variable play styles, invites gender-neutral play through the possibility of mixing character features (gender, race and class) [18, 36]. Nardi [36] particularly considers it as "quietly subversive in its gender dynamics, enabling the unremarked enactment of cross-gender activities as an aspect of character development". This grounding allows breaking down traditional gender barriers in play, without the constraints of societal expectations and gender stereotypes, offering a deeper understanding and acceptance of self and others and diminishing unconscious biases [36]. The social context within WoW then offers a variety of gender-neutral play, offering the potential for many alternate performances of the self [18].

A decade later, despite women currently making up half of the gaming population, social barriers still exist for them [30]. Lopez-Fernandez [30] and Cote [12] highlighted the need for the industry to move away from stereotypical games, and develop more diverse and inclusive games that may reflect all players' interests and experiences, beyond an heteronormative perspective. From this, we wonder: **What could be design principles for creating gender-neutral games?** Taking this necessity into account, we propose developing an inclusive game design espousing the concept of gender neutrality, tackling what could be its design foundations through multiple forms of engagement.

2 RESEARCH DESIGN

This research proposal is part of a play-enabled intervention for social innovation, aiming at designing alternatives for a gender-balanced representation in STEAM. The research focuses on increasing interest in STEAM fields by enhancing feelings of self-efficacy in computational thinking, through playfulness and collaboration.

Recognizing that compelling games should be offered regardless of gender to ensure global inclusion and engagement we propose a gender-neutral game design to reach a broader population. We conceived a proof-of-concept paper prototype, and a playful probing [7] exercise using gameplay rehearsal [40] as a data collection procedure to study how participants interpret and interact in-game. Gameplay rehearsals were recorded for a qualitative approach focused on observing, coding, and analyzing action and verbal engagement for insights into the gender-neutral design effectiveness.

2.1 Game Design Proposal

To achieve the gender-neutral design goal intention, we studied motivational activity modes in school-age children that could be incorporated in this game as features to attract both genders [13, 28]. Kinzie and Joseph [28] investigated preferences within middle school-aged children, state that educational games should be broadly adaptable to individual needs and interests, while considering gender preferences, to enhance engagement and boost learning results. Also, as Al-Washmi et al. [3] indicate, children enjoy interacting and communicating, collaborating, seeking guidance, and learning from each other. The authors suggest that collaboration is a feature that could be effective as a learning tool, since it promotes problem sharing and discussion. We drew from this knowledge to conceive a collaborative game that supports multiple forms of engagement by encompassing five activity modes [13, 28]: a) exploratory mode; b) problem-solving mode; c) creative mode; d) strategy mode; and e) social mode.

For the game's theme, recognizing the bond that children develop with animals [23, 35] and collaboration as a main aspect of the game mechanics, we searched animal species with collaborative social systems based on performing activities, not fixed nor defined by gender, but shared among their members to maintain the colony's survival. We found the example of the meerkat, which aside from the appealing figure, has a social structure that corresponds to the idealized. An in-depth examination of this species [11, 19] inspired the game's structure based on their habitat, and their behaviors as actions to be performed within the game. As a result, three functions became the foundation of the game mechanics: territory discovery and development, predatory defense, and member sustenance.

Collaborative behaviors were our main focus while designing the game's dynamics. We proposed a shared grounding purpose - to increase the number of elements of the colony - leading to players' cooperation. Players main role is to define meerkat behaviors by coding action sheets with pre-conditions, action and post-conditions, as if defining transitions in Petri Nets [31]. This mechanic also resembles Kodu Game Lab, which promotes learning through a tile-based visual programming. In this event-driven environment, a user defines condition/action pairs to form executable rules [20, 42, 43]. Programming in Kodu takes the "form of a when-do clause, that is, when condition, do action" [43].

On each round, players can define meerkat behaviors and roll dice to take actions. Actions can be taken from those behaviors, which can be jointly defined by all players, and limited to dice roll that defines the number of action points or steps. Cooperation may surface through coordinated behavior coding, pursuing combined goals or sharing action points with other players. The design is symmetric, with all colony members performing the same actions. The game dynamics invite an active dialogue to identify strategies,

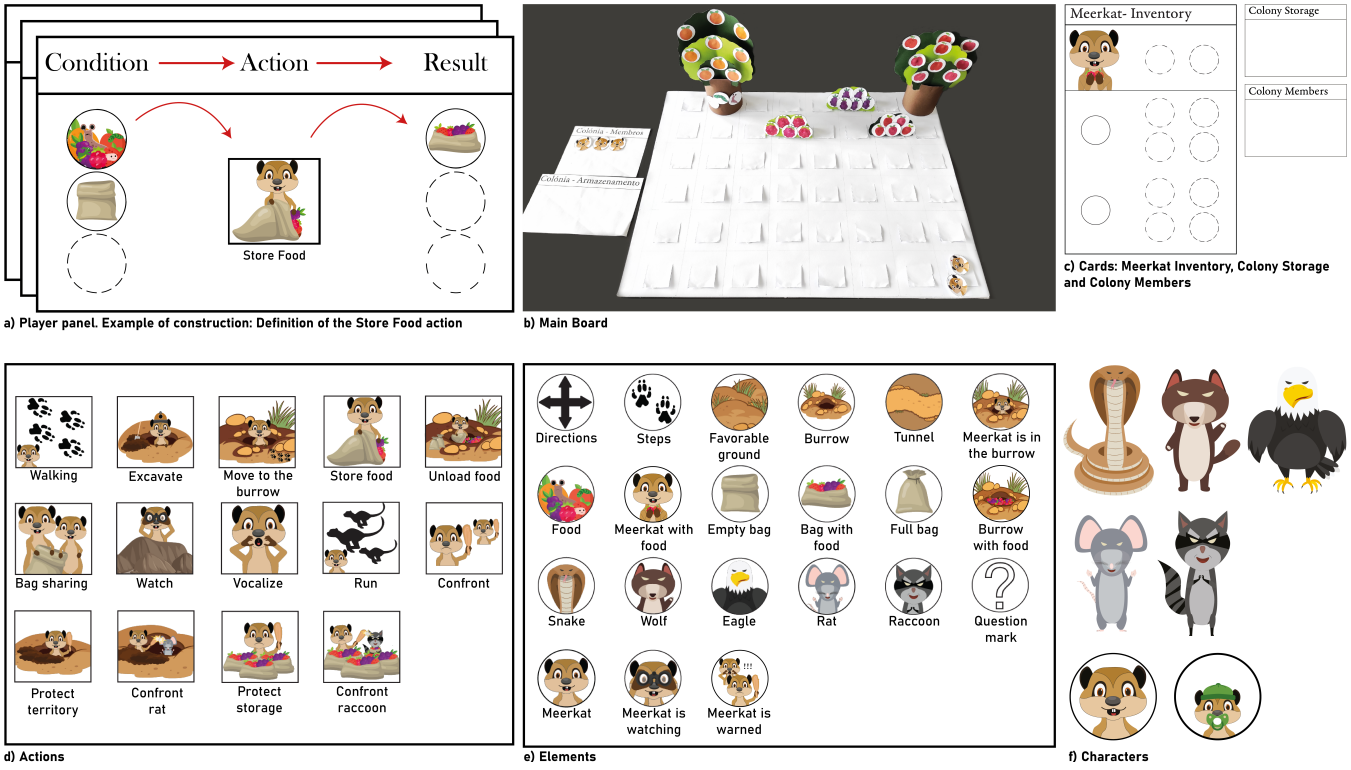

Figure 1: Prototype

learn to code behaviors and influence each other's decisions towards a common goal, leading to an aesthetics of sociability [38].

2.2 Paper Prototyping for Gameplay Rehearsal

The game prototype consists of a player panel (Fig. 1. a)) for coding the actions that meerkats can perform; and a main board (Fig. 1. b)) that defines the scenario where the meerkats enact player's choices. The player panel is formed by a set of cards, each with one main action to be performed, up to three conditions to trigger it, and up to three consequent results (Fig. 1. a)). The following action cards were devised (Fig. 1. d)): *Walking*; *Excavate*; *Move to the burrow*; *Store food*; *Unload food*; *Bag sharing*; *Watch*; *Vocalize or warn*; *Run*; *Confront*; *Protect territory*; *Confront rat*; *Protect storage*; *Confront raccoon*, and the following elements to signify conditions or outcomes (Fig. 1. e)): *Directions*; *Steps*; *Favorable ground*; *Burrow*; *Tunnel*; *Meerkat in the burrow*; *Food*; *Meerkat with food*; *Empty bag*; *Bag with food*; *Full bag*; *Burrow with food*; *Snake*; *Wolf*; *Eagle*; *Rat*; *Raccoon*; *Question mark*; *Meerkat*; *Meerkat is watching*; *Meerkat is warned*.

We also created visual components for representing the colony (Fig. 1. c)), namely: 1) a card to hold colony members 2) a card to hold the colony's storage of food, and 3) a meerkat inventory sheet. Five enemies were illustrated (Fig. 1. f)): the Snake, the Eagle and the Wolf as Predators, the Rat as Invader, and the Raccoon as Thief. The main board consisted of two overlapping A3 paper sheets, with the upper sheet divided into 6x8 cell cuts to hide/reveal game elements within the cells, which can be activated through actions in the player's panel. Trees and shrubs were used to represent food rewards, encouraging the player to explore them.

2.3 Game Mechanics

Concerning game mechanics, the players can use up to eight behavior cards; on each round, they define the actions the meerkats can perform on the main board, by altering and combining conditions on the cards (Fig. 1. a)). Each player rolls a dice, and the sum of all players' dice rolls gives the total number of actions (in meerkat behavior steps) plus movements on the main board, which can be performed within each round, distributed through the players as they choose. A round runs through three stages: (1) defining the actions on the player panel; (2) rolling the dice and (3) enacting actions with the characters on the main board, taking advantage of the behaviors currently defined. The game scenario exhausts its possibilities when all cells have been explored, all food (cells, trees, and bushes) has been collected and the meerkats have confronted all enemies. A gameplay video can be found online[1].

2.4 Procedure & Participants

The gameplay rehearsals were carried out in five sessions, where the participants were grouped by grade, and their relationship as schoolmates may carry expected companionship. The rehearsals were composed by three mixed-gender groups of three individuals (Table 1), with fourteen participants, nine female and five male,

[1]Meerkat Gameplay - https://youtu.be/nd3f8OYjVHQ

Table 1: Sample categorization of the study

Rehearsal	1			2			3		4			5		
Grade	1st			2nd			4th		3rd			5th		
Player	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14
Age	7	6	6	8	8	8	10	10	9	9	9	10	11	11
Gender	M	F	F	M	M	F	F	F	F	M	M	F	F	F

between the ages of 6 to 11. The young, wide-ranged audience focused on reducing the influence of two factors: the exposure to peer pressure and stereotypes manifestation reinforcing gendered roles; and the school moment introducing disciplines, and with it success or failure at math, sciences, etc. Onward, participants will be referred to as P1-14(F/M).

Each session's audiovisual recording was done with a top-down camera, focused on the main board to track material manipulation, while avoiding faces, but capturing voice. Sessions started with the researcher introducing the game theme, main goal, the rules on the main board, and the action coding mechanics on the player panel. During the game session, the researcher intervened only when needed, to clarify emerging issues with the prototype. After each game session, the researcher gathered the players' testimonies via individual interviews. The interview included a set of gameplay and gender-related questions, such as: a) Did you enjoy the game?; b) Do you think this game is for you?; c) Do you think this game would be for all your classmates? Everyone would enjoy it?

2.5 Content Analysis

Relevant data was processed through content analysis, coding dialogue and actions captured in video, and players' answers regarding the artifact and the game experience. For this study, the content analysis involved the observation, coding and review of five game rehearsal videos (ranging from 01h50 to 02h38). Selected evidence and analysis of the interviews was used to gain insights into the design and gameplay. The video analysis was performed on each 30-second video segments, which allowed for a more detailed extraction and categorization of action/speech. Regarding the focus of this study, we will analyze collected evidence regarding interactions and issues found relevant to the gender-neutral design intent.

3 DISCUSSION AND INSIGHTS

The video analysis revealed no gender-specific differences in player performance, with all players completing the game's challenges. Collected evidence indicates three aspects that shed light on how the design proposal could meet the gender-neutral intent:

a) **The collaboration between players**: evidence shows that the players actively discussed what meerkat actions would be beneficial and necessary for activity accomplishment, and how their collaboration enabled problem-solving by sharing ideas and active dialogue. In general, the need for collaboration was well-accepted among participants. We observed variable moments of cooperation among players, regardless of gender, to achieve the final goal of maintaining and expanding the colony through board exploration, food collection and overcoming enemies. The iterative exchanges between players influenced their actions, not only for task accomplishment, but also for assisting each other, leading to shared, coordinated actions that satisfied individual and colony needs.

We observed that players also collaborated by providing actions and suggesting activities to others. This collaboration is next illustrated, with evidence that demonstrates the collaborative interaction between players. We observe that P6(F), by her initiative, provides actions for P4(M). Player P4(M) then makes his move based on the action given. Player P6(F) reacts to the move of P4(M), encouraging him to store the food found in the cell. This suggestion is accepted by P4(M), who exposes his need for more actions to perform this task, requesting collaboration of P6(F). Player P6(F) collaborates with P4(M) by providing her actions, with P5(M) encouraging and motivating P4(M) to perform food storage. This interaction process flows regardless of gender, where opinions are considered and collaboration proceeds without distinctions of who can or cannot perform specific actions.

> P6(F) decides to provide actions to P4(M), "*I'll give P4 a move*".
> P4(M) reacts to P6(F) offering, "*Aaahhhhhh* (surprised)". Moves, explores the cell and finds food, "*Food*" (excited).
> P6(F) comments P4(M) exploration, "*Food!*" (jumps).
> P4(M) "*I'm near the tunnel, and I'm with the storage empty*", referring to his inventory.
> P6(F) suggests that P4(M) store the food, "*You have to take it out!*".
> P4(M) requests that P6(F) make two of his actions available, "*Oh P6, you could give me a few things (actions) there that I only took one... you could give me both, that way you would get three and I would also get three*".
> P6(F) accepts the suggestion and gives P4(M) two actions, "*I'll give P4 two chances*".
> P4(M) reacts, "*I got three*" excitedly. "*I'll get the food*". The player stores the food.
> P5(M) comments on P4(M) storing, "*That's right!*".

b) **The encouragement and suggestions between players**: regardless of gender, recommendations were positively appreciated, with all rehearsals presenting evidence of incentives and suggestions/advice by players. The fact that players often accepted other's suggestions indicates they valued external contributions during the game. In the following example, no evidence pointed towards gender differences in considering and executing suggested actions. We can observe the interaction between players that results in the suggestion of P4(M) to P6(F) to accomplish the activity. Player P6(F) accepts the suggestion and executes it; P4(M) then encourages and reinforces the activity performed by P6(F), enthusiastically recognizing equal peer performance by P6(F) saying she will also have her hands full.

> P4(M) suggests and encourages P6(F) to store the food, "*It's good to take! To have more food*".

> P6(F) accepts player P4's suggestion and stores the food, "*I will take it*".
> P4(M) encourages and reinforces the storage action, "*Like me; you have your little hands full*" (makes a gesture with his hands, exemplifying that he has his hands full).

c) **The language used by the players**: during rehearsals, we observed that players could not specify the gender of the meerkats, which may indicate its non-adherence to gender stereotypes. Occasionally, an attempt was made to distinguish the meerkat regarding gender differences; however, players were unable to identify or label characteristics indicative of gender. We came across situations where players referred to the meerkat: "*Eeeeeeeeyyyyyy, we have ten **members***" or "*We have eight **adults** and one **baby**, which is nine*" or "***Babies***" or simple "***Meerkat***". Most players could only identify the meerkats as adults or babies and did not assign a specific gender to them. As illustrated in this sequence, players discuss who are the parents (mother and father) of the new meerkat baby. Player P11(F) randomly points to the colony members labelling them as the parents, but does not specify who is the mother or the father.

> P10(M) reacts to the appearance of a new member "*Whose son is he?*" laughs.
> P11(F) "*From this one, with this one*" pointing, randomly, to the meerkats in the Colony.
> Players laugh.
> P10(M) reacts, "*We have a baby*" (laughs).

There was a situation where the player's ability, due to her gender, to confront the predator was questioned. In this case, P5(M) refers to the meerkat gender of the female player (P6(F)) as influencing the activity's success. Player P5(M) wonders how the female player can defeat the enemy, which could reveal gender stereotype about the female being less able to perform the confrontation. It's perceptible that P5(M) associated the gender of P6(F) with the respective meerkat. However, P4(M) presents a possible solution to help P6(F) by appealing to the collaboration between players to defeat the predator together. We could observe that this stereotypical attempt did not adhere, with P4(M) intervening by suggesting that all players come together to assist in the confrontation. This dialogue reinforces that the problem does not seem to regard gender, but the amount of players performing the activity; at a later stage, when the male player has to confront a predator, they also perform the same collaborative move. Players having to perform the same tasks seems to have little gender association, since everyone has the same elements and opportunities to successfully perform them.

> The eagle character appears on the main board. The players discuss what to do about the eagle.
> P4(M) asks what the eagle will do, "*What is it going to do?*" (laughs).
> P6(F) states that he will defeat the eagle: "*I will defeat it!*".
> P5(M) questions how player P6(F) will defeat an eagle, "*How is **she** going to defeat an eagle... A meerkat!*".
> P4(M) proposes a solution to help player P6(F) in the confrontation against the eagle, "*She calls us, and we get there and pow pow pow*" (makes punch gestures with his hand).

The interviews provided insights about the players' perception of the experience and related gender-neutrality. In short, participants mentioned that the game was entertaining, funny, unpredictable, strategic and collaborative, which led them to enjoy the game more as it promoted sociability. To identify if participants found anything in the game indicative of a specific gender without priming, we indirectly asked if they thought the game would be for all their classmates; most participants (11/14) said that everyone would appreciate it. The remainders (3/14) mentioned it might not be suitable for certain individuals, not because of gender, but due to differences in personality traits. In this case, participants pointed out that individualistic people might not appreciate the game due to their inability to collaborate and consider opposing opinions: "*Yes, more in the sense that they are competitive and they don't accept that you tell them anything, that nobody contradicts them*"... "*Because there are people in my class who prefer not to be thinking too much*".

3.1 Design contributions on how to achieve gender-neutrality

Direct playful engagement and performance by the target population provided a set of rehearsal experiences that, however limited, provided valuable qualitative process-oriented data that already enabled emergence of an initial set of insights into the proposed design challenge.

To develop a design with the intention of gender neutrality, and as "performance can not be faked" [36], we found it valuable to examine gameplay interactions from a process-oriented, performance-based perspective. What activity players could perform and enjoy, irrespective of their gender identification? A designer may (1) **consider how several characteristics or "activity modes" in the game can motivate or inhibit diverse genders' engagement**. For this, we implemented activities compatible with: a) exploratory mode; b) problem-solving mode; c) creative mode; d) strategy mode; and e) social mode [28], as we wanted the player experience to combine these characteristics, offering a diversity of engagement modes that could be enjoyed regardless of gender.

The game's theme was found to be central in the quest to establish openness to playfulness and gender neutrality. An important aspect was the choice of animal-based characters that did not present rigid hierarchies. Instead, the meerkat colony theme translated into collaborative, (2) **social organizations emerging from the performance of tasks in an egalitarian way**, with no strict division of labor regarding gender. This theme assisted in the intention of developing a gender-neutral game design, by demoting gender-task and gender-role associations, as observed in the evidence, effectively resulting in a symmetrical gameplay.

Furthermore, the selected representations for the meerkat made it difficult to determine its gender, with evidence showing the players could not specify the gender of meerkats. In developing representations for this game, care was taken to (3) **maintain neutral characteristics, avoiding distinctive female or male cultural patterns associated with gender representations**. We think that this meerkat colony theme enabled us to avoid more "culturally loaded" distinctions with gender-oriented interpretations, where there are more stereotyped gender labels inherited from other media. A clear limitation ensues as such an approach has natural limitations when such aspects are deemed relevant in the represented context of the game.

4 CONCLUSION

As part of a STEAM diversity balancing initiative, authors present a case study of a gender-neutral game design approach to engage younger populations. In this design proposal, players are invited to cooperatively code and roleplay behaviors in the context of a meerkat colony.

Five gameplay rehearsal exercises were conducted, videographed and axially coded for relevant categories, together with individual interviews. Content analysis focused on playful behavior, cooperative gameplay, social interactions, competence development and gender-related aspects. Based on content analysis, we could find evidence that the design proposal lead to a gender-neutral reception, creating a cultural substrate where players engaged in collaboration, encouraging and suggesting actions and strategies, while failing to assign gender-specific role play. Analysis of coded evidence enabled us to propose design insights that influence the perception of gender-neutrality: multiple activity modes that offer task diversity, a collaborative environment leading to sociability and assisted learning, egalitarian roles and audiovisual representations that adopt gender-neutral patterns.

Future research will require an in-depth analysis with a larger and more diversified audience, incorporating different representations of the gender binarism spectrum to analyze the interactions, and taking into account the sociocultural influences of the participants. An implementation of a digital version of the game will also offer, besides a wider distribution for testing purposes, the possibility to understand the comparison between the participants' behavior and in-game interactions using a physical or a digital display, and how gender perspectives emerge in this form.

With this study, we aim to open new possibilities for exploring alternative inclusive design paths for playful media, which can promote a breadth of audiences, possibly transcending gender issues. Generating new possibilities and glimpses into media futures that mitigate gender stereotypes may, ultimately, contribute to transitioning towards social equality.

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