Climate Influence: Implicit Game-Based Interactive Storytelling for Climate Action Purpose

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Abstract. People have emotionally ingrained perspectives when it comes to climate action, making it difficult to argue against climate change denial using arguments like data and policy. Stories and games, however, engage audiences on a subconscious level, working to promote causes that align with readers' innate motivations. In creating visual narratives, we realized that interactive games in exhibit form can promote values that align with pro-climate actions of seeing long-term consequences, individual responsibility, and caring for others. We created a Tamagotchi device to narrate the caretaking theme to align audiences to climate action without policy argument. We found that audiences understood the game as showing caretaking in environmental contexts as opposed to intervention on resource depletion, interacting with the instrument on a human purposive level instead of the physical level of resource and policy.

Keywords: Climate action · Serious games · Implicit storytelling · Tamagotchi

1 Introduction

Despite the mass of scientific evidence on climate change [16], a gap remains between public awareness [17] and actions that people take. People often see climate change as distant and impersonal [11, 21], making it difficult to capture the attention and affect the actions of people using logical arguments, especially climate change skeptics distrustful of science. Climate change communication requires motivating strategies to cultivate long-term actions, using storytelling and interactive experiences designed for specific social goals [10] from a pro-environment mindset [3].

Stories have the potential to make climate change real, so that audiences may have greater emotional connection [12]. Previous work has shown that collaborative storytelling provides platforms for behavioral change [8, 10]. However, our previous narrative designs are Pavlovian [7] in the sense that they equate certain types of goals like future-looking orientation and individual responsibility with a positive outcome but do not ask

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the reader to take actions interactively. However, players are reinforced or punished in an operant conditioning context in an interactive environment like games [18], thus directly promoting certain actions. Games place players in scenarios and prompt them to analyze situations from different perspectives [20]. These scenarios enable the target audience to resonate with their physical situations and worldviews and create an emotional relationship with characters in the game [20]. In particular, analyzing risks inherent in climate change [19] and adapting to future climate change scenarios [13] have utilized serious games, whereas explicit forms of entertainment involving saving worlds from environmental catastrophe have populated efforts to influence climate action in players [5, 9, 15]. However, these games with explicit climate change goals can alienate those who don't align with climate action goals, so a more effective design would involve implicit forms of storytelling based on psychological goals rather than directly adding climate change themes into games [1]. To apply these operant interactive strategies that reinforce pro-climate behaviors, we created a game that uses the Tamagotchi to carry forth the care-taking metaphor to a climate change issue that is not explicitly told to players.

Fig. 1. (Left) Comic magazine *Drizzle* as narrative influence for pro-climate action. **(Right)** The serious game *Chikyuchi* promotes climate action by aligning players with pro-climate goal.

2 Designed Intervention

To understand the effect of storytelling on audiences, we designed five stories based on Booker's [2] story structure for particular human phenomena that lead to climate change, including immediate gratification, the idea that individual effort doesn't matter, myopia, etc. One story from the collection is *New Revolia*, which uses the plot of shipwreck on the Antarctic ocean to narrate the idea that distributing resources with others leads to self benefits (Fig. 1), a pro-climate action goal. While visual narratives can frame stories that promote actions consistent with climate action, they cannot reinforce behaviors that actively lead to pro-climate choices. To create an immersive experience that reinforces audience behavior to align with climate action goals, we created and exhibited a game that reinforces the notion of "caring for environment" without explicitly revealing the concept. The game uses a metaphor to reinforce players who take care of an avatar that implicitly represents the Amazon forest.

The main avatar in the Chikyuchi game anthropomorphizes a natural resource (trees of the Amazon) that is declining at the rate of a hectare a minute in reality, leading to

increased surface temperature and reduced rainfall [14]. The Chikyuchi is connected to the deforestation API, reporting the actual size decreasing 2 km^2 with every second in the statistics menu. Chikyuchi is determined by its health and mood (1 to 4 hearts). Health is always low due to the situation of deforestation. Although users are able to temporarily cheer up the Chikyuchis with thematically related food and games, increasing their mood status, it won't change their critical health status. Chikyuchi also periodically chats about each crisis by interrupting the game. It does this by using text generated with the transformer language model GPT-2 pretrained on tweets containing the words "deforestation" and "global warming" over a 3 day period (temperature = 0.8 during generation, 6500 epochs training). The text generated are implicit forms of persuasion rather than directly lobbying for climate action.

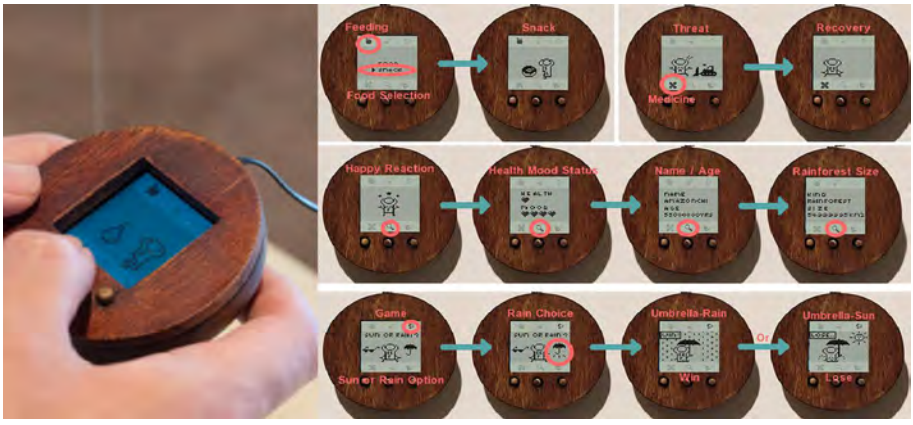

Fig. 2. (**Left**) Game Device. (**Top Right**) Feeding and threat interactions. (**Middle Right**) Info flow: name, age, health, declining rainforest size. (**Bottom Right**) The umbrella/sunglasses game play flow (the player must guess whether the next day will be sunny or raining).

There are three lower buttons (select, execute and cancel) that allow participants to make in-game decisions (Fig. 2). Participants could interact with the virtual pet through six functions: food, clean defecation, play game, medicine, information and attention. Each in-game decision affects Chikyuchi's mood in the short term but does not improve its health. For example, playing a guessing game with the weather about whether it should bring an umbrella (it'll rain) or sunglasses (it'll be sunny) can raise its mood if the guesses are correct. The random weather outcome also implicitly informs us about climate change. The stats menu gives the current health, mood, age, and size of Chikyuchi. In summary, Chikyuchi uses the interactive gaming paradigm to promote care-taking behavior from players in relation to climate change [4].

To allow engagement with Chikyuchi, we created an installation consisting of a live video-feed for real-time interaction of audiences in Tokyo and Hong Kong, two game devices, photos that hint at the climate topic, and a rusted bronze cast of Chikyuchi that represents destroyed natural resources as dead virtual pets. The interaction with Tamagotchi [6] is shown as a live video feed that brings people together to develop a common practice of caring across different places in the world.

3 Results and Discussion

To see how Chikyuchi affects visitors (18 to 35 years old), we surveyed audiences at the *Constructing Contexts* exhibit in Hong Kong (2021) following 15 min of game play each. One survey focused on the effectiveness of the installation (n = 23, 12 female), while another emphasized audience perception (n = 15, 7 female, 7 male, 1 other). Players found that the exhibit communicated the process of caretaking significantly more effectively than the physical layer of resource depletion (Fig. 3) (Wilcoxon p = 0.00011). All other effects were not significantly different from each other, although the amount of information learned was perceived to be low compared to other ratings like awareness of climate change generated from the intervention.

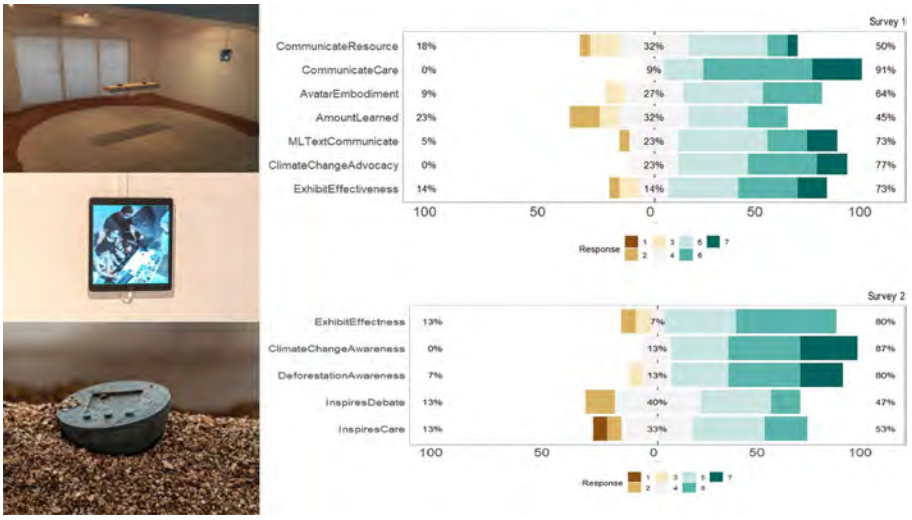

Fig. 3. (**Top Left**) Exhibition. (**Middle Left**) Real-time audience interaction. (**Bottom Left**) Bronze cast showing Chikyuchi's decline. (**Right**) Survey of effectiveness of intervention and of audience perception. (To see text of survey questions used: sites.google.com/view/chsu/app).

We studied the use of implicit influences in purposive interactive storytelling for climate communication. Narrative interactive games are proposed to reinforce the mental connection that alters climate awareness in the long run and take pro-climate actions. Indeed, evaluation showed audiences understood the caretaking aspect of the game significantly more than the actual information about resources conveyed. Future work would involve evaluating audience perception of comics for climate action to compare between interactive and non-interactive strategies for climate influence.

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