"El Niño's Finger": A Lightweight H5 Game Using Conceptual Metaphors to Reflect Ecological Thought

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INTRODUCTION

Throughout the past century, human activities have instigated substantial changes in the climate system (Houghton 2009), resulting in biodiversity loss and increasingly frequent extreme events (Yamori et al. 2021). Although people's daily lives are closely related to the natural environment, most people seldom engage with these issues in embodied and reflective ways (Gifford 2011). This results in a lack of awareness and hence impeding the possibility of more responsible actions towards the natural environment (De Leeuw et al. 2015). Nowadays, popular culture is increasingly providing opportunities to promote ecological awareness (Griffin 2018; Canavan et al 2014). Specifically, some researchers have explored climate-themed games (Larreina-Morales et al. 2023; Abraham 2018), enabling more playful interactions and allowing players to explore ecological issues in an engaging and immersive manner.

As a contribution to facilitating awareness, this paper presents a lightweight HTML 5 game, "El Niño's Finger", metaphorically portraying the dynamic relationship between animals and climate through playful interactions. We take turtles as a particular example, aiming to present the impact of El Niño[1] on those species relying on temperature-dependent sex determination (TSD) (Laloë et al. 2017). This metaphorical interaction design approach does not possess an overt environmentalist rhetoric in the game, but rather aims to convey an ecological thought — "everything is interconnected" (Morton 2009; Chang 2019). In other words, we foreground the nature of relationships between players and the world, players and objects, and players and other elements through deliberate design choices.

BACKGROUND&RELATED WORK

As a massive global industry and a hugely influential form of popular culture media, multiple studies (Larreina-Morales et al. 2023; Abraham 2018) and international organizations (UNEP, 2023) have confirmed that video games hold great potential to engage vast audiences to explore new characters, rules, and narratives concerning ecological issues. However, to the best of our knowledge, little research has been conducted on the use of games to improve awareness of El Niño[1], despite its significant impacts on global weather patterns and its relevance to various human activities.

Furthermore, it is a common practice among game developers to relegate environmental issues to background scenery, while too frequently disregarding complex interactions within ecosystems (Chang 2019; Abraham 2022). Therefore, we emphasize strengthening the mapping between real ecological systems and gameplay mechanisms. Moreover, existing commercial games in this realm tend to prioritize enriching gameplay mechanics and visual rendering, while overlooking the development of more lightweight games. We see an opportunity to create games that can be easily accessed and understood by a wider audience, thus enabling broader participation, and promoting the wide spread of information.

INTRODUCING EL NIÑO'S FINGER

Overview

Our concept draws its inspiration from ecological phenomena caused by El Niño, deftly translating them into interactive mechanisms embedded in games. We focus on the scenario of sea turtle egg incubation amidst the background of El Niño. In the game, El Niño assumes the role of an invisible little boy manipulating Earth's climate on the screen mischievously, while players themselves are portrayed as climate protectors and regulators from beyond the screen. The goal is to control the environmental temperature to stabilize the population of different-gender sea turtles, whose offspring rely on temperature-dependent sex determination. Given the close relationship between the El Niño phenomenon and everyone, as well as the simplicity of the game's interaction, we expect this game to be widely accepted and enjoyed by people of all ages. See Figure 1 for an overview.
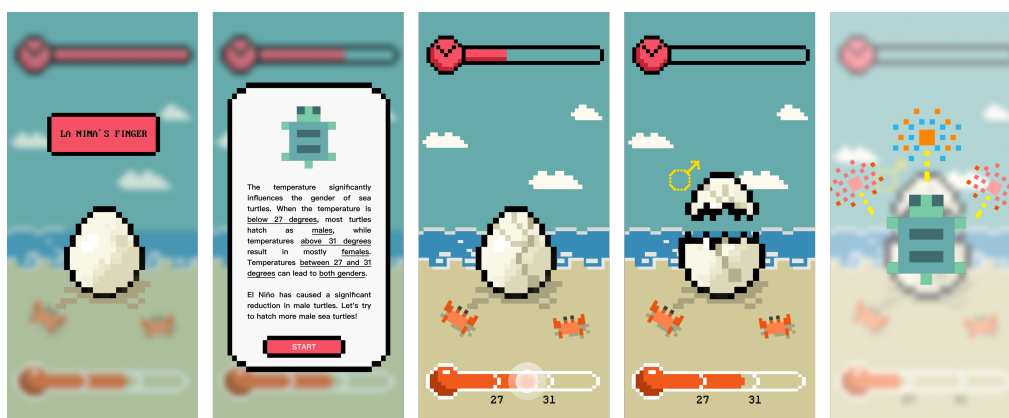

Figure 1: Overview of the game design. After starting the game, players will read the game tasks. Then, players need to manipulate the thermometer at the

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bottom of the screen, trying to keep it below 31 degrees. However, the temperature may suddenly rise at times. After the countdown timer at the top of the screen expires, the incubation process concludes. When the temperature is below 27 degrees, most turtles hatch as males, while temperatures above 31 degrees result in mostly females. Temperatures between 27 and 31 degrees can lead to both genders.

Conceptual Metaphor

There is the metaphoric claim of correspondence between the game and the world itself (Abraham 2018).

The effect of temperature on the sex of sea turtles transforms into a game task. Sea turtle species rely on temperature-dependent sex determination (TSD) for their offspring. Research has indicated that successful embryonic development within the sea turtle population occurs within a temperature range of roughly 25-35°C (Laloë et al. 2017). It means that as global warming drives an increase in incubation temperatures, sea turtle species confront skewed and potentially lethal hatching conditions, severely disrupting gender ratios and further imperiling the persistence of sea turtle populations.

El Niño event transforms into an invisible mischievous boy as the game's environmental background. El Niño is a natural phenomenon on our planet that cannot be eliminated but only prevented. In Spanish, it is referred to as "The Boy." The extreme weather brought by El Niño poses a potentially lethal threat to species, including humans. Therefore, in the game, we design El Niño as the environmental background, metaphorically portraying it as an invisible mischievous boy who manipulates Earth's climate using his finger, causing the planet's temperature to become extremely unstable.

Human behaviors transform into the gaming progresses within the human and nature. It is imperative for humanity to recognize the environmental damage it has historically caused. However, amidst the ongoing climate crisis, human involvement can either exacerbate or mitigate the ecological balance of the Earth. The relationship between humans and nature is not a zero-sum game but rather a dynamic interplay where they mutually influence and regulate each other. Consequently, in the game, players utilize their fingers outside the screen to adjust the in-game thermometer, thereby modifying the temperature of the virtual environment. Simultaneously, the unseen mischievous boy "El Niño" inside the screen also manipulates the virtual world's temperature with his invisible fingers, rendering it less controllable by humans.

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ENDNOTES

1 El Niño is a natural climate phenomenon characterized by warmer-than-average sea surface temperatures in the eastern equatorial Pacific Ocean. It can have significant impacts on weather patterns worldwide, affecting agriculture, and water resources, and even contributing to extreme events like floods and droughts. This makes El Niño closely relevant to human life and various activities dependent on weather conditions.