

Ethical Decision-making Through Systems-based Gameplay

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INTRODUCTION

This paper presents a theoretical framework that categorises the design paradigms in serious games developed for cybersecurity training. This theoretical framework was developed based on game design factors responsible for the player's decision-making process and their role in signifying morality in the gameworld. The model's development was followed by an evaluation process constituting in-depth semi-structured interviews conducted with seven professional game designers with industry experience.

In serious games developed for cybersecurity training purposes, there is a perceived dissonance between the design methodology used for developing the low-level technical aspects of the game and the high-level social and moral aspects. In this case, the high-level interpretation utilises a scripted approach where the designer hand-crafts each ethical dilemma at a low level, presenting these scenarios to the player with fixed branching pathways (Katsarov et al. 2019; Schrier 2015). On the other hand, the low-level interpretation uses a systems-based approach, which allows the designer to develop a set of gameplay systems that integrate the game's ethical system as interactive processes (Christen et al. 2013). This dissonance can be seen in commercial cybersecurity training games such as *CyberProtect* (Carney Inc. 2010) as well as in academic projects like *CyberCiege* (Cone et al. 2007) or *Anti-Phishing Phil/Anti-Phishing Phyllis* (Sheng et al. 2007).

As a result, while training technical aspects takes advantage of a game's nature as a procedural rhetoric, training of socio-cultural and moral aspects resorts towards more traditional methods. One possible reason for this conflicting methodology is the ease of accessibility in simulating low-level, technical aspects of the domain as opposed to the high-level, ethical, and moral aspects, which may require more nuanced approaches to developing a robust, cohesive gameplay system that organically produces ethical dilemmas and scenarios (Ryan et al. 2012).

In this paper, we propose a theoretical framework to develop an understanding of scripted and systemic design approaches at a low level where the decision-making

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process occurs, how it crafts the player experience and how it signifies morality in the game world.

We have identified the following design factors that affect moral engagement as well as determine whether a game aligns with a scripted or systemic configuration:

- **Atomicity of Choices.** The atomicity of choices in games relates to the level to which a big decision is granulated into more minor decisions (Formosa, Ryan, and Staines 2016).
- **Aggregation of Choices.** The aggregation of choices determines the extent to which an outcome is a consequence of the aggregation of past player choices (Formosa, Ryan, and Staines 2016; Kahn 1966; Sicart 2013).
- **Conflict between Layers of Abstraction.** Interesting choices occur when the elements from the test procedural layer¹ conflict with those from the semiotic layer² conflict with each other (Sicart 2013).

To evaluate this model's rigour, a study based on a semi-structured interview was carried out. In the study, the theoretical model was applied to existing ethically-relevant games and was further evaluated through an interview study involving participants who were game designers with expert industry experience.

As part of the initial screening, 11 ethically relevant games were selected. In the pre-test survey, participants were required to categorise each of these games as "scripted" or "systemic", followed by a brief description of their understanding of scripted "play" and "systemic play".

During the interview, participants were consulted regarding which game mechanics and dynamics are commonly found in games described as "systemic" and "scripted", relating these concepts to their answers from the survey. The interview further explored how these two game design methods affect moral engagement.

The study found that scripted play, as described by multiple participants, is "a pre-determined, event-driven experience tailored by the designer." On the other hand, systemic play is "built on rulesets defined by the designer, where the individual system of rules interact and organically impact one another".

From the perspective of moral engagement, participants asserted that scripted design could allow for greater engagement due to the level of fidelity the designer can apply to each outcome. However, it can also introduce disengagement as the scripted outcome may conflict with the player's interpretation of their decision. On the other hand, for systemic play, only one participant mentioned that systemic play could allow moral engagement as the player is "immersed with the feedback loop of the system". As for moral disengagement, four participants agreed that systemic play could generate disengagement as "the players are unable to comprehend the bigger picture".

These results align with our hypothesis of moral (dis)engagement and the two design methods. The next step in this project is to develop a framework for systemic play which will alleviate the issues of moral disengagement or, to an extent, enable the player to morally engage after experiencing disengagement.

BIO

Vedant Sansare is a PhD candidate in School of Computing at Macquarie University. His research involves exploring systems-based game design with a focus on ethical decision-making and cybersecurity ethics. Vedant earned a BA in Game Design and

Production from Abertay University with an MRes in Games and Computing. His dissertation focusses on designing systems-based, moral gameplay to alleviate the loss of moral focus caused in cybersecurity scenarios.

Malcolm Ryan is Course Director of the Game Design and Development program at Macquarie University and Director of the Games User Research Lab. His research involves user-experience design and evaluation the of serious games with a focus on ethical decision-making, as well as applications of artificial intelligence to video games. Malcolm earned a BSc in Computer Science from UNSW, where he also completed his PhD in machine learning. His work aims to integrate understanding from psychology, cognitive science, education and the arts to enrich the design of games and enable the creation of more sophisticated and engaging works.

Mitchell McEwan is a Lecturer in Computer Games and Deputy Director of the Games User Research Lab at Macquarie University, with research focusing on video game design and production, virtual reality, natural user interfaces, player experiences, serious games, game ethics and accessibility, and intuitive interaction. Mitchell earned a BFA in acting from Rutgers University, and an MIT in Game Design from QUT, before undertaking his PhD at QUT. Interested in emerging gaming technologies, his work aims to explore new opportunities for interactivity, improve accessibility, and develop techniques to evaluate and expand the expressive, affective and connective powers of the medium.

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ENDNOTES

1 The procedural layer constitutes the interaction between the mechanical agents (player and NPC) and the state machine through game mechanics in the form of I/O operations.

2 The semiotic layer provides cultural and narrative context to the various procedural elements of the system allowing the player to apply their internal values to operations of the state machine.

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