Understanding Games Through Complexity Thinking Approach

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ABSTRACT

The complexity theory and the concept of emergence is a theoretical framework that offers a vocabulary and tool for analyzing games as systems. Rather than dealing with a game as one complex adaptive system, this article uses the complexity thinking approach to study a game as a complex system composed of different levels of subsystems. Each level can be considered a complex system in itself; moreover, the interaction between a game’s subsystems creates complex, dynamic, and often unpredictable behavior. For a detailed understanding of a game system and how complex it is, this article focuses on the concepts of complexity and emergence at three levels of a game system: the design level, play level and metagame level. This explanation is meant to guide game designers in incorporating the various emergent consequences of game play from the beginning of the design process.

KEYWORDS

Emergence, Game Design Complexity, Game Learning, Game Pleasure, Meaningful Play, Metagame, Play Complexity, Social Emergence

INTRODUCTION

Game playing is an important part of our social and mental development. Its effects on our knowledge, skills, and social relations has led to the study of games from new perspectives that allow for a deeper understanding of the consequences of game playing; sometimes not anticipated or intended by either the player or the designer.

System thinking has been used to study and understand games by breaking them down into systems. At the conceptual level, a game is considered a system; a set of elements that interact with one another to form an integrated whole (Salen & Zimmerman, 2004). A game system, as defined by Hunicke, LeBlanc and Zubek (2004), consists of mechanics, dynamics, and aesthetics. The mechanics component refers to specific game components at the core level (i.e., the level of data representation, algorithms or rules). The dynamics component refers to the run-time behaviour of the mechanics, when the player interacts with the game to be specific. The aesthetics part refers to the gaming experience of the players and their desired emotional response when they perceive the look and feel of the game system and interact with it.
Along the same lines, Gee (2013) describes three levels of a game system, each of which can be considered a system in itself. The first is the rule system (program) guiding the game. The second is the ‘play’ of the game or a set of choices and actions constituted by the interaction of the player and the game. The third comprises interactions within the game or outside of it, among groups that form the systems of social interactions.

System thinkers see the world made of parts (systems, sub-systems, components, elements, particles) that can be separated and analyzed independently from one another, and thereby better understand the whole. The underlying assumption is that the whole is more than the parts, where ‘more’ usually relates to ‘more complicated’ or ‘more difficult to study and understand’; consequently, the parts are simpler and therefore easier for studying and understanding. While such assumption can be accepted for artificial (human-made) systems, it fails in nature and society (Dimitrov, n.d.).

Complexity theory is, in some ways, an extension of general systems theory, and it draws from research in the natural sciences that examines uncertainty and non-linearity (Grobman, 2005). Complexity suggests the ‘intricate intertwining or interconnectivity of elements within a system, and between a system and its environment’ (Mitleton-Kelly, 2000). In complex systems, the overall emergent behaviour is difficult to predict, even when subsystem behaviour is readily predictable.

The shift to complexity thinking across subject areas represents a paradigm shift in the study and analysis of games as systems. Games have for some time been studied as complex adaptive systems; for example, Storey and Butler (2013) put forward six criteria to assess whether a game can be considered a complex adaptive system. Also, emergence – a crucial aspect of games – has been discussed by many game researchers, as will be discussed later in this article. However, these studies deal with a game as a whole complex system.

This article attempts to extend the work of Gee (2013), and takes a systematic view of games to study them from the perspective of complexity thinking. A game will be studied as a complex system composed of three levels of subsystems, as shown in Figure 1. The first level is the game

Figure 1. Levels of a game system
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