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Leijnen, S.; van Veen, F.T.

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ArkaNet: Investigating Emergent Gameplay and Emergence

Stefan Leijnen
Amsterdam University of Applied Sciences
Theo Thijssenhuis 03A29, Wibautstraat 2-4
1091 GM Amsterdam, the Netherlands
+31624375294
s.leijnen@hva.nl

Fjodor van Veen
Amsterdam University of Applied Sciences
Theo Thijssenhuis 03A29, Wibautstraat 2-4
1091 GM Amsterdam, the Netherlands
+31639700632
fjodor.van.veen@hva.nl

INTRODUCTION

In this paper we present ArkaNet, a game that investigates the relation between emergence and emergent gameplay. *Emergent gameplay* refers to the appearance of new possibilities that arise from the interplay between game mechanics (Juul 2005). The type of gameplay allowed by these new possibilities is typically unpredictable and to some extent unintended by the game's designers, although a game can be designed with the possibility of emergent gameplay in mind. *Minecraft*, for example, provides players with ample opportunities to define their own intent and utilization. Designing for emergent gameplay requires treating simple game mechanics as building blocks that, properly combined, provide new degrees of freedom that are left for the player to explore (Dormans and Leijnen 2013).

Paradoxically, the term *emergence* is also used for processes that operate restrictively rather than creatively. Flocking, for example, is a self-organizing (i.e. without centralized control) emergent process (Haken 2006) where the positions of units that make up a flock are constrained by numerous small movement alignments that depend on the positions of other units. This recursive logic applies as much to naturally flocking birds as it is does to algorithmically flocking NPC's in games. In this perspective on emergence, the interplay between basic mechanics *restricts* the possible unit positions rather than providing new degrees of freedom (Leijnen and Dormans 2014).

ARKANET

In order to better understand the relation between these two apparently contradicting types of emergence we have developed ArkaNet, a browser-based game written in JavaScript (fig. 1). The game mechanics are similar to the game *Arkanoid*, with an additional mechanic as to how blocks are destroyed. The blocks are locally interconnected through a network that

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allows for emergent patterns to occur. The ball carries an energetic potential that not only damages the block it hits but also spawns energetic signals. These signals propagate through the network, potentially destroying other blocks.

Due to the recurrent architecture of the network, signals may recur locally resulting in emergent patterns. This is promoted further by blocks being close to each other being more interconnected. The visible pattern of destroyed blocks is a direct reflection of these emergent energetic patterns. So, the dynamics that arise from the mechanics of the network are *restrictive*: the different patterns of blocks being destroyed is potentially unlimited but constrained by the network architecture. Interestingly, this limitation is experienced by the player as a regularity which allows for an *expansion* of tactics and other emergent gameplay possibilities.

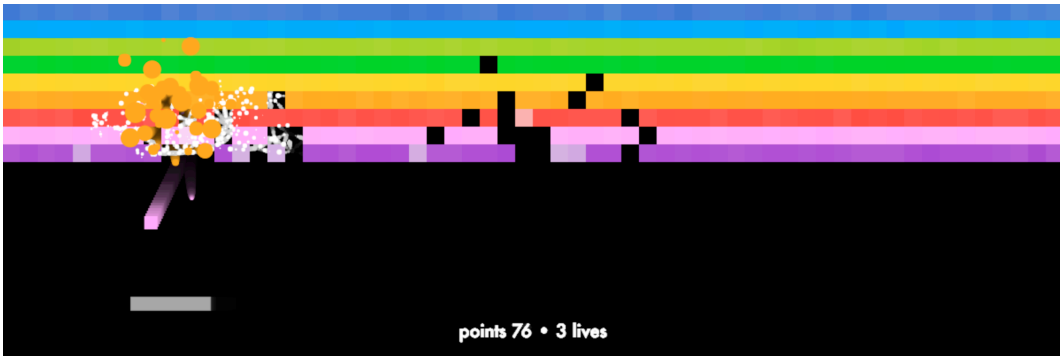

Figure 1: ArkaNet. White lines indicate active network connections.

CONCLUSION

Whereas emergence and emergent gameplay intuitively appear to be conflicting in terms of gameplay possibilities, we argue that the limiting nature of emergence is in fact supportive of the creative essence of emergent gameplay. The restrictive emergent patterns that appear in ArkaNet are experienced as regularities that open up new degrees of freedom for tactical play.

BIBLIOGRAPHY

Dormans, Joris, and Stefan Leijnen. 2013. “Combinatorial and Exploratory Creativity in Procedural Content Generation”. In *Proceedings of the 4th International Workshop on Procedural Content Generation in Games*.

Haken, Hermann. 2006. *Information and self-organization: a macroscopic approach to complex systems*. Springer.

Juul, Jesper. 2005. *Half Real. Videogames between Real Rules and Fictional Worlds*. MIT Press.

Leijnen, Stefan, and Joris Dormans. 2014. “Order of Battle: A Case Study for Designing Emergent Structure in Games”. In *Proceedings of the 7th Complex Systems Modelling and Simulation workshop at the Artificial Life conference*.