

Procedural Content Generation, Player Agency, and Playfulness in Survival-Crafting Game *Astroneer*

Bettina Bodi

University of Nottingham
bettina.bodi@nottingham.ac.uk

Keywords

Agency, playfulness, procedural content generation, survival, crafting, *Astroneer*

INTRODUCTION

The explosive and still very much soaring success of *Minecraft* (Persson 2011) accelerated the proliferation of sandbox games based on the mechanics of exploration, crafting, building, and ultimately, survival. Hit titles *Space Engineers* (Keen Software House 2013) or *Subnautica* (Unknown Worlds 2018) afford gameplay that is, in many ways, less constricted than in other avatar-based genres, such as action-adventures or first-person shooters. In fact, notions of freedom and creative play are often associated with such design, which evoke questions about agency. This paper interrogates the implications survival-crafting games' design has for player agency. As part of a larger project looking at agency in a variety of avatar-based genres, this paper draws on previous scholarship framing player action as an affordance of game design (Juul 2005; Salen and Zimmermann 2004; Sicart 2008), and conceptualizes agency as the possibility space for player action as expressed through avatar action that manifests in multiple dimensions (cf. Calleja 2011).

AGENCY AND PROCEDURAL GENERATION

The relationship between the design of survival-horror games and the agency they afford has been explored before (Boonen and Mieritz 2018; Habel and Kooyman 2014; Krzywinska 2002; Perron 2009). Yet, the same question has rarely been asked with regards to survival-crafting games, which, while different in themes and tone, often overlap with their horror counterpart in aspects of their design, such as an emphasis on exploration or resource gathering and management. A common denominator of such games is a 3D world rendered via voxels (cube-like three-dimensional pixels), and a procedurally generated sandbox. Through the case study of recently released *Astroneer* (System Era 2019), a game that in its design builds on the titles mentioned above, this paper aims to identify the dimensions in which procedurally generated voxel-based survival crafting games enable agency to manifest.

Procedural content generation is by no means a new design method. It has been the preferred choice of developers of dungeon exploration games from *Rogue* (Toy et al. 1980) to *Spelunky* (Yu 2008) for it is less resource-intensive than handcrafting details in terms of manpower, time, and costs. As such, this design method is often discussed in computer science (Hendriks et al. 2013; Shaker et al. 2016; Togelius et al. 2011; Yannakis et al. 2011). However, most of these studies, by virtue of their discipline, only briefly engage with the aesthetic considerations of such design. While the concept of procedurality as a fundamental quality of the medium of digital games is central to game studies scholarship (Bogost 2007; Murray 1997), and some exploratory work has

Proceedings of DiGRA 2020

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also been done with regards to the poetics of game systems generated such (Karth 2018), the impact of such design on player agency has not yet been explored.

METHOD AND RESULTS

This study proposes a multidimensional framework for conceptualising agency that addresses, in simple terms which would be further unpacked in the paper presentation, agency as afforded in space; in time; in terms of how much the avatar and the virtual world can be tailored to players' preference; and in the development of a story. Using these four analytical lenses, textual analysis (Fernández-Vara 2015) of the game was conducted. This comprised autoethnographic work supplemented by YouTube playthroughs and online game wikis to map the game's possibility space for avatar action as exhaustively as possible. The results of the investigation were that *Astroneer*'s design, which draws largely on a tradition of procedurally generated dungeon games as well as sandboxes like *Minecraft*, affords more player freedom across some, but not all dimensions, which incentivises free, experimental, creative, or in other words, "paidic" (Caillois 1961) play. Such design, in turn, can be attached to the notion of "playfulness" (Huizinga 1949; Millar 1968).

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