Teaching Game System Building as an Artistic Practice

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ABSTRACT
In this vision paper, we posit 'game system building' as a paradigm for game design. Inspired by earlier perspectives on cybernetic art and generative art we consider the creation of dynamic game systems as an artistic practice where the consideration of complex and often unpredictable behavior and effects are as foundational as the individual elements (rules, graphics, characters, UI etc.). The perspective of 'game system building' has important implications for the education of designers and games scholars. In this paper, we introduce the paradigm and its lineage and propose an educational approach that reflects 'game system building'.

Keywords
game systems, artistic practice, pedagogy, education

INTRODUCTION: GAME SYSTEM BUILDING
What is the activity of creating video games? "Game design" might be our first answer. While this reply is correct, it is also incomplete. Do we design video games the same way we design a piece of furniture or a coffee maker? Intuitively, we might say no, as neither of these products are dynamic artifacts. With video games, a central concern is the creation of reactive environments which enable continuous engagement and feedback – what the game designer builds can best be described as a dynamic, reactive system. A game's design is more than the sum of its parts (rules, graphics, characters, UI etc.), it is how the elements interact and how players can use the resulting system. Thus, game design might be best understood as the practice of 'game system building', an artistic practice which foregrounds the consideration of complex and often unpredictable behavior of dynamic systems. Indeed, many game designers are

TGPA:DiGRA2019

Paper presented at Teaching Games: Pedagogical Approaches - DiGRA 2019 Pre-Conference Workshop (TGPA:DiGRA2019) August 6 2019, Kyoto, Japan.

keenly aware of this fact and reflect it in their practice. However, analytical and educational perspectives so far have not fully embraced this notion or put it in words. In this sense, what we introduce here is more a conceptual shift than a pragmatic one with implications for game analysis and education.

In this paper we develop the paradigm of game system building, discuss its lineage from cybernetic and discuss its implication for game education.

GAME DESIGN AS AN ART PRACTICE

Games are an art form following Smut's (Smuts 2005) (Smuts 2005) argument that while not all games can be considered 'art', some can be, just as in other forms, e.g. movies, pictures, and novels. As soon as we see games as art, the act of building them is an artistic practice. The term artistic practice refers to the ways in which an artist goes about their work. In this paper, we regard game system building, the creation of an architecture containing rules and dynamic elements as an art practice.

The notion of building system as the activity of the artists can already be found in conceptualizations of cybernetic art practices during the latter half of the 20th century. Roy Ascott, a pioneer of cybernetic art,

> A shift of human interest is from the thing, the object, the product to the process, the system, the event […](Ascott 1968)

What Ascott points out here, is the difference to earlier forms of art like painting and sculpting which are complete and determinate. We can understand these earlier forms as 'object art'. He further explains:

> I make structures in which the relationships of parts are not fixed and may be changed by the intervention of a spectator. [...] To project my ideas I set limits within which he may behave. [...] the participant becomes responsible for the extension of the artwork's meaning. (Ascott 1964)

These salient features of system art - the co-creative role of participants/players, and the systems' dynamic and procedural nature has become even more accentuated by the development of video games in the decades that have passed since. Consider for example *No Mans Sky* (Hello Games 2016) (Hello Games 2016), where players act in a procedurally generated universe which includes over 18 quintillion planets. Or, consider a social game world such as Second Life (Linden Lab 2003), which allows players to create their own environments in the world, and to write code that govern the behaviors of the objects players make.

UNPREDICTABILITY OF SYSTEMS

The move in perspective from object art to system art reflects the work of game designers as artists. Game designers cannot know with certainty how something they build, or create affordances for, will be used by players and what results will come out of the combination of procedural elements and player interaction.

Unpredictability is therefore a fundamental element of the practice of building game systems.

Much effort is spent to accommodate the inherent uncertainty during the development of games. A common practice is to model system behavior around specific use cases. A more elaborate approach is to work with imagined users, or personas (Cooperothers 2004) who might want to play in a particular manner. The ultimate test of a game system would be with actual players - yet when we are still designing a game this is not possible - the system is not realized yet. Common work-arounds are to use either paper mock-ups or simple, digital prototypes. While these can demonstrate certain aspects of games, more complex game systems cannot be represented fully in such a way. A pivotal question is therefore: How do we deal with this uncertainty as system building artists?

THE NEWTONIAN DILEMMA

As game designers, we are trained to think in terms of mechanics. Yet the very idea of mechanics assumes a Newtonian world model in which all parts combine to form a whole as the sum of its parts. When in this mindset we have to imagine that dynamics and aesthetics can be achieved as a function of the mechanics (Hunicke et al. 2004). However, we know that the Newtonian way of considering the universe is not sufficient to explain the world around us. The same is true for procedural and participatory game systems. Given the unpredictability that is introduced by unexpected combinatorics, co-creation by players and by procedural content generation we need to embrace more advanced models like chaos theory (Alligood et al. 1997). To implement such a perspective in actual development is a considerable challenge. The standard way to think in mechanics is convenient and well established, yet the limitations of Newtonian thinking drives designers to assume a parallel mindset, a kind of 'doublethink' to accommodate the unpredictability of complex systems (Cummins 1999).

A TRIPARTITE MODEL OF CO-CREATION WITH ARTISTIC SYSTEMS

A fully developed model of artistic system design is a project for future research. At this point, we like to offer some conceptual framing. An important key to the artistic practice of game system building is to accept the fact that game systems will always entail unpredictability, even when sophisticated user testing methods or extensive run-time simulations are used. It is helpful here to consider Cook's distinction between the generative space and the possibility space of systems (Cook 2019). The generative space of a procedurally created environments can be enormous: for example, there can be 64921,600,000,000,000,000 different virtual landscapes instantiated in MineCraft (ibid). This number, albeit large, is finite and determined. In contrast, the possibility space of this system is even bigger as it describes everything that players can create with MineCraft - and for this space there are no restrictions. On this basis, we propose a tentative, conceptual solution – to understand a game system as three connected layers of co-creation, all of which need to be considered by the game system designer:

> 1. Architecture; original designers create the elements of a system (rules, characters, landscapes, objects, objectives, trajectories) a dynamic artifact that serves as raw material for further processing.
>
> 2. Procedurality: computational co-creation - the system when it is running, including procedural generation, and the generative space.
>
> 3. Participation, performance, and co-creation of players in the possibility space - recognizing that play can also be considered as acts of artistic performance.

This perspective demonstrates the challenge and pleasure of the art practice of game system design - the challenge is in the fact that the output is an architecture, two layers removed from the actual participatory engagement of the players with it. The pleasure is in unfolding possibilities - a never ending number of 'what-ifs' being realized. Game design as an art practice means to understand both - the challenge to design for potentialities, and the pleasure of seeing them realized by players.

THE EDUCATIONAL CHALLENGE

The move to the perspective of "system building" as a foundational post-Newtonian paradigm for game design (and related disciplines) has important implications for the education of designers and games scholars. What we are proposing is to make the understanding of game systems building a crucial element of game education.

Here, too, we can learn from Ascott. In the 1960s, he was faced with the educational challenge of teaching cybernetic art, essentially to train art students in systemic thinking and design and raise their awareness for the opportunities and limitations of technological developments. Ascott's response to this challenge was the development of a groundcourse at the Ealing College of Art, a two-year training intent on challenging student's established perceptions of object art and transform them into cybernetic artist with a systemic approach. Cornerstones of the educational program were the collaboration between artists and scientist, an ongoing series of problems student had to solve with artistic means (e.g. "Create a world on paper with major and minor structural systems. Show a fault occurring in the minor one; design a repair centre to put it right" (Ascott 1964)) and collaborations with other students:

> [The students] form groups of six. These sexagonal organisms, whose members are of necessity interdependent and highly conscious of each other's capabilities and limitations, are set the goal of producing out of substances and space in their environment, an ordered entity.
>
> [….]
>
> The subsequent "ordered entities" are as diverse as the composite personalities of the organisms they reflect. Totems, time machines,

> sense boxes, films, sexagonal cabinets, cages have been produced out of the flux of discussion and activity. (Ascott 1964)

Ascott took the groundcourse concept from the educational approach of the Bauhaus, arguably the most influential design school of the 20th century. Bauhaus founding director Walter Gropius saw the separation of specialized knowledge as a fundamental flaw of contemporary education in the early 20th century – that architects did not understand furniture making (the term "design" would become popular only later) while the makers of daily use products like silverware and plates were disconnected from architecture. Conversely, he saw many traditional professional crafts such as carpentry as disconnected from industrial developments. Gropius solution was the introduction of a Groundcourse – a general course mandatory for all students in which a shared foundation of knowledge was acquired.

In games education, the idea of the groundcourse is practiced. There is a common awareness that people working in different roles on a game project must have fundamental knowledge about each others' expertise. A programmer cannot be effective without understanding computer graphics, an artist needs to have basic programming and technical knowledge in order to create usable assets, and both need to understand the technical limitations and the opportunities of the technology creating user experiences. Thus, in games education it is a common approach to start a longer education with courses where students learn fundamental concepts and skills together. Yet, current approaches foreground addition (the result is the sum of its part) and not combinatorics (the elements together from a system with complex and often unpredictable behavior). The shift in education we propose would thus be in reorienting existing groundcourses towards systemic thinking and designing. Example content for such a course could be Ascott's collaboration exercise, observations of complex systems outside of games (e.g. factories, ecosystems), studies of games' systemic behavior, and the modification of an existing game (add a new feature and report on the unintened consequences you observe).

CONCLUSION

In this paper, we have introduced 'game system building' as a paradigm for game design. This perspective takes the systemic nature of games into account and acknowledges their complex behavior and often unpredictable effects. In addition, it creates an opportunity for a productive dialog with system-related art practices as our discussion of cybernetic art shows.

As a first step towards a more developed perspective on this paradigm, we propose a conceptual understanding of game system building as three connected layers of co-creation, all of which need to be considered by the game system designer: the architecture, the procedurally, and the participation.

Finally, we consider implications for education and suggest a change in focus for the common groundcourses in game design programs – to shift away from an additive perspective, where the result is the sum of its parts, towards an approach of combinatorics, towards systemic thinking and designing.

Our future work will be the further development of the ‘game system building’ paradigm in concert with the game design community.

BIBLIOGRAPHY

Alligood, K.T. et al., 1997. Chaos: An introduction to dynamical systems. *Physics Today*, 50, p.67.

Ascott, R., 1964. The Construction of Change. *Cambridge Opinion*.

Ascott, R., 1968. The Cybernetic Stance: My Process and Purpose. *Leonardo*, 1(2), p.105.

Cook, M., 2019. *Tutorial: Generative & Possibility Space*,

Cooper, A.others, 2004. *The inmates are running the asylum:[Why high-tech products drive us crazy and how to restore the sanity]*, Sams Indianapolis.

Cummins, J., 1999. The ethics of doublethink: Language rights and the bilingual education debate. *TESOL journal*, 8(3), pp.13–17.

Hello Games, 2016. No Man's Sky [video game].

Hunicke, R., LeBlanc, M. & Zubek, R., 2004. *MDA: A Formal Approach to Game Design and Game Research*, AAAI Press.

Linden Lab, 2003. *Second Life*, Linden Research, Inc [Virtual Social World].

Smuts, A., 2005. Are Video Games Art? *Contemporary Aesthetics*, 3.